IJAIR

IMPACT FACTOR

7.36

International Journal of Advance and Innovative Research

* ISSN : 2394-7780 *

International Journal of
Advance and Innovative Research

International Journal of Advance and Innovative Research

Editor- In-Chief   Dr. Tazyn Rahman

IJAIR

IMPACT FACTOR

7.36

ISSN : 2394-7780

Scientific Journal Impact Factor

CERTIFICATE OF INDEXING (SJIF 2018)

This certificate is awarded to

International Journal of Advance & Innovative Research
(ISSN: 2394-7780)

The Journal has been positively evaluated in the SJIF Journals Master List evaluation process
SJIF 2018 = 7.363

SJIF (A division of InnoSpace)

SJIFactor Project Manager
International Advisory Services
INNOSPACE INTERNATIONAL

SJIFactor Project

CONTENTS

Research Papers

INDIA'S CONSTITUTIONAL APPROACH TO THE RIGHT TO EDUCATION

Priyanka Parasar[1] and Dr. Ishrat Naaz[2]

[1]Research Scholar (Ph.D.) and [2]Assistant Professor, School of Education. Galgotias University, Greater Noida, Uttar Pradesh

ABSTRACT

Human rights are a person's fundamental rights, without which they are unable to function in their current society. Regardless of caste, creed, religion, gender, ethnicity, or any other factor, human rights cannot be denied anywhere or under any circumstance. Part III of the Indian Constitution, which covers fundamental rights, lists various rights. Indian citizens are entitled to six fundamental rights: the right to equality, the right to freedom, the right against exploitation, the right to freedom of religion, the right to cultural and educational freedoms, and the right to constitutional remedies. Because it determines and shapes a person's future as well as the future of the entire nation or country, education is a crucial component. Education was originally included in the State List when the Indian Constitution was first passed, but after the 42nd Amendment to the Indian Constitution was passed in 1976, it was moved to the Concurrent List. This means that both the federal government and the state governments are involved in matters of education. The 86th amendment to the Indian Constitution, ratified in 2002 by the Parliament under article 21A, declared education to be a fundamental right. The Right to Education Act of 2009 and its associated issues are the main subject of this essay.

Keyword: *Right to Education, Human Right, Indian Constitution*

INTRODUCTION

Human rights are fundamental or basic rights that cannot be denied by anybody or by any authority. The term "Human Right" was originally used by American President Franklin D. Roosevelt in his renowned speech to Congress in 1941. He asserts that the world should be established on four fundamental freedoms: freedom of expression, freedom of religion, freedom from fear, and freedom from want. The UN General Assembly in Paris adopted the Universal Declaration of Human Rights, or UDHR, on December 10, 1948. It comprises 30 articles and the majority of them were written by Rene Cassin, who won the Nobel Prize in 1968. The Universal Declaration of Human Rights (UDHR) is a global agreement that establishes universal standards of success for all countries and individuals. The fundamental human rights are now universally safeguarded, and this declaration is regarded as a landmark because it has been translated into more than 500 different languages. It also includes no mention of any particular culture, political system, or religion. Eleanor Roosevelt served as chair of the UN Committee that authored the proclamation. More than 70 international and regional human rights treaties are included in the UDHR document. The charter of this document addresses four key areas: personal rights, which relate to the freedom and equality of every citizen; relationship rights, which relate to nationality; economic, social, and cultural rights, which cover social security; education; employment; and wages; and, finally, spiritual and political rights, which refer to the right to exercise one's right to free speech and the right to vote. All humans are born free and equal in dignity and rights, according to the first of the 30 articles in the UDHR treaty. So, we observe "Human Right Day" on December 10 of each year.

The right to education is included as one of the fundamental rights in the UDHR under article 26. This right is not only regarded as a right, but also as a way to advance world peace and respect for human rights. Article 26 of the UDHR states unequivocally that Everyone has the right to education. The fundamental and elementary levels of education must be free, and the first grade must be required. The general availability of technical and professional education is required, and merit-based access to higher education is required for all.

Education must focus on fostering respect for fundamental freedoms and human rights as well as the complete development of the human personality. It will advance the UN's efforts to maintain peace and encourage mutual respect, tolerance, and goodwill among all nations, racial or religious groups. Chapter 26 (2).

The Supreme Court's ruling in Mohini Jain v. State of Karnataka, which was rendered on July 30, 1992, established the right to education as a fundamental right (Supreme Court of India). The Supreme Court was faced with three primary issues in this case:

1. Whether the Indian Constitution guarantees the right to an education.

2. If yes, consider whether it is against this right to permit private schools to levy capitation payments.

3. Whether the Article 14 of the Indian Constitution, which ensures equal protection under the law, is violated by the imposition of capitation fees in educational institutions.

In this instance, a resident of the state of Uttar Pradesh objected to a notification made by the government of Karnataka that allowed private medical colleges to charge more money to students who weren't given "government seats." According to the Supreme Court of India, private educational institutions' collection of a "capitation fee" violates both the right to equal protection under the law and the implicit right to education that derives from the right to life and human dignity. When considering whether the practise of imposing capitation fees was constitutional in this case, the Supreme Court, acting through a division bench made up of justices Kuldip Singh and R.M. Sahai, stated: The right to education springs immediately from the right to life. Without the right to education, the right to life and the dignity of an individual cannot be guaranteed.

A five-judge bench in the case of J.P. Unni Krishna v. State of Andhra Pradesh, which was decided on February 4, 1993, further considered this court decision (Supreme Court of India). The Court disagreed in Unni Krishnan with the judgement rendered in the earlier case of Miss Mohini Jain vs. State of Karnataka and Others on July 30, 1992, which said that the Constitution guarantees the right to education at all levels.

The Court further ruled that a right need not be explicitly identified as a fundamental right in Part III of the Constitution in order to be treated as such: "The provisions of Part III and Part IV are supplemental and complimentary to each other." The Court disagreed that the moral demands and aspirations expressed in Part IV's provisions are superior to the rights reflected in Part III's provisions. "The right to education further means that a citizen has a right to call upon the State to provide educational facilities to him within the limits of its economic capacity and development," was clarified in this case for the extension of the right to education.

Avinash Mehrotra v. Union of India was another case that was decided on April 13, 2009. (Supreme Court of India). In this ruling, the Supreme Court of India expanded the definition of the right to education to include the right to a safe learning environment, and it required schools to abide by the judgment's specific fire safety requirements.

The Supreme Court ruled that a child has a basic right to an education devoid of security or safety concerns, and that this right includes the right to safe schools under Articles 21 and 21A of the Constitution. The State is required to make sure that children don't suffer any harm while exercising their fundamental right to education, regardless of where a family chooses to teach its children (including private schools). Affidavits of compliance were required to be filed by the relevant authorities. State Governments and Union Territories were instructed to ensure that schools adhere to basic safety standards and that school buildings are safe and secure in accordance with the safety norms prescribed by the National Building Code. Dalveer Bhandari, J. reasoned while interpreting the right to education: "Educating a kid involves more than a teacher and a blackboard, or a classroom and a book. A quality school must be attended by a child in order to fulfil their right to an education, and such a school must not endanger their safety.

Government of India (1999), Department of Education, Ministry of Human Resource Development, "Expert Group Report on Financial Requirements for Making Elementary Education a Fundamental Right." 1999

The NDA administration formed the Tapas Majumdar Committee in 1999 to examine the financial effects of implementing the 83rd Amendment Bill, which the United Front government had passed in 1997 and sought to make the right to free and compulsory education up to the age of 14 a basic right.

The Tapas Majumdar committee advised that even children from the most underprivileged social groups should have access to education that is on par with the best. According to its financial memorandum, the Committee also estimated that it would cost roughly Rs. 1.37 lakh crores over a ten-year period (1998–2007) to enrol all children between the ages of 6 and 14 in school by 2008. It also stated that there should never be a national programme for hiring paraprofessionals and that genuine community involvement in school operations must be actively encouraged.

Government of India initiatives Prior to RTE

The Five year Plan

Following India's independence, the Planning Commission is creating a period of five-year development plan with the assistance and involvement of all states. The first five-year plan was started in 1951, but education was given importance in the eleventh five-year plan. The eleventh five-year period lasted from 2007 to 2012. The quality of education has been continuously improved, the foundation of the Indian educational system has been strengthened via numerous schemes and programmes, and research has been encouraged. The eleventh five-year plan's goal is to close all gender and geographic imbalances in school enrollment by 2011–2012. Additionally, there is a provision for one year of pre-school education (PSE) for kids starting primary school and for the

percentage of elementary school dropouts to drop from 50% to 20% by 2011–2012. NCERT quality monitoring tools must be adopted by all states and union territories. Additionally, all EGS (Education Guarantee Scheme) centres have been transformed into ordinary primary schools, and by 2008–2009, the Mid-Day Meal Program should be available to all students in elementary school. Additionally, it helps to enhance the CRCs and BRCs (Block Resource Centers) (Cluster Resource Centre). The purpose of BRCs and CRCs is to help teachers academically and to provide in-service teacher training in each block of a district. According to the eleventh five-year plan, there are five resource teachers per block and one CRC for every ten schools.

SSA: Sarva Shiksha Abhiyan In 2001,

The Sarva Shiksha Abhiyan was launched. This programme was created for initiatives in elementary and primary education. All children between the ages of 6 and 14 are required by the SSA to complete five years of elementary education by the year 2010. In a conference held in 1998, state education ministers advised the SSA to pursue a purpose dubbed Universal Elementary Education (UEE). The SSA encompasses the entirety of the nation, with the exception of Goa, and a specific emphasis was placed on the educational needs of girls, members of scheduled castes and tribes, as well as children from disadvantaged backgrounds. The SSA's objective is to ensure that all children receive a school education and attend back-to-school camp by 2005. (revised up to 2007). Additionally, it closes the gender and category gaps in primary education by 2007 and in basic education by 2010. Another objective that needs to be completed by 2010 is universal retention, with an emphasis on providing elementary school students with an education that prepares them for life after school. The SSA also offers free textbooks and pertinent reference materials to kids from rural areas.

MDMS: Mid-Day Meal Scheme

The Government of India introduced the Mid-day Meal Scheme in 1995 with the goal of encouraging the universalization of primary school education and raising the enrollment rate of children, particularly for those who belong to the economically poorer portion of society. Additionally, it has been noted that this programme fosters a sense of brotherhood among the kids, regardless of their race, gender, or other characteristics, while concurrently raising their nutritional status. The food that is cooked in schools must contain at least 8 to 12 grammes of protein per serving and 300 calories per day for at least 200 days. On April 20, 2004, the Supreme Court announced a new rule mandating that meals be provided throughout the summer vacation in drought-stricken districts.

The National Policy on Education (NPE),

NPE was first adopted in 1968, aims to make education accessible to all people. The emphasis is mostly on instilling moral ideals and social responsibility. Women, minorities, and socially disadvantaged groups all receive education. Additionally, it places a focus on adult education, research education, vocational education, and employability education. A new educational strategy known as NEP 1986, or National Policy on Education, was introduced in 1986. The goals of this strategy are to support universal literacy, lifelong learning, and the provision of education to housewives, employees in the manufacturing and agricultural sectors. Additionally, it promotes programmes for integrated child services and wholistic child development and aims to eradicate the lack of literacy among women. A programme of action with the goals of promoting equality and a common educational structure was introduced in the year 1992.

The District Primary Education Programme (DPEP)

DPEP was introduced in 1994. It was declared in 14 districts across several states in 2002–2003 and was being implemented in 271 districts in all 18 of the states. The fundamental goals of DPEP are to give all primary school-age children with both official and informal education, as well as to work toward a primary school dropout rate of less than 10%.

District Information System for Education (DISE): India has seen a higher or amazing expansion of the education sector, and this expansion calls for many levels of decision-making to meet the growing demand for data and information. It also keeps a detailed profile of the teachers (more than 7.2 million teachers). It was started by NIEPA1 (now known as NUEPA), with help from the UNICEF and the Ministry of Human Resource Development. DISE offers a range of computerised data and statistical analysis linked to school administration.

Fundamental Duties (Part IV A),Fundamental Rights (Part III), and the Right to Education from the Perspective of the Indian Constitution

Part III of the Indian Constitution's fundamental rights states the right to education. The Right to Education Act, often known as the Right to Free and Compulsory Education Act or RTE Act for short, was passed on August 4,

2009, and it took effect on April 1, 2010. The Right to Education Act is covered by Article 21A, which was added to the Indian Constitution on the 86th amendment. The State shall provide free and compulsory education to all children aged six to fourteen years in such manner as the State may, by legislation, designate, states article 21A. According to the "Right to Free and Compulsory Education Act," which includes the word "free," no child (aside from those who are admitted in private schools or by their guardians in a school that is not supported by the government) is required to pay any type of capitation fee, any charges, or any other expenses until they have completed their elementary education. The Act's title, "compulsory education," makes it plain what it means: It is the responsibility of the government to ensure that all children between the ages of 6 and 14 be admitted, enrolled, and finish primary school. The Act also includes provisions for non-admitted children to enrol in a class that is appropriate for their age. The Act outlines the obligations of each government, parents, and local bodies or authorities to ensure that children receive an education. It also discusses how the state and federal governments would share the cost of that education. For the Pupil Teacher Ratios, school working days, infrastructure, and sanitation facilities, there are a set of rules and norms. This Act forbids the mental and physical abuse of children, the screening of children upon entrance, private tutoring by teachers, and capitation fees. Only those instructors are appointed who are trained and adequately qualified.

Article 51A of the Fundamental Duties, Part IV A, received a new clause (k) in the 86th amendment to the Indian Constitution. According to this article, it is the obligation and responsibility of parents and guardians to give their children, who range in age from 6 to 14 years old, the opportunity to pursue an education.

Right to education and Directive Principles of State Policy (Part IV)

Article 41: In some circumstances, the right to employment, education, and public aid. A State must establish provisions to guarantee the right to work, public aid in circumstances of employment, old age, disability, disease, and education, as well as in other cases of unjustified desirability, within the limits of its economic growth and capabilities.

Article 45 A *Early Childhood Care and Education (ECCE)* Right: constitutional provision, ECCE is found in Article 45's Directive Principles of State Policy. In the December 2002 and July 2009 enacted by Parliament 86th Amendment to the Indian Constitution, it is stated that "the State shall endeavour to provide Early Childhood Care and Education for all Children till they finish the age of six years."

Article 46: "Promotion of the economic and educational interests of the Scheduled Castes, Scheduled Tribes, and other weaker sections," with the state taking special care to advance the economic and educational interests of the socially and economically backward and weaker sections of the population and to shield them from social injustice, social inequalities, and other forms of exploitation. The scheduled castes, scheduled tribes, and economically disadvantaged members of society are the primary beneficiaries of this law. To attain universal education, further efforts are being made for these pupils, such as providing hostel facilities, scholarships, ashram residential schools, relaxing admission rules, and reserving seats.

The following provisions are included in the right to education:

1. Children who drop out of school or who have never attended a school or other institution are welcome to enrol in the school without facing any admissions restrictions.

2. The economically disadvantaged segments of society must be given a 25% seat reservation in all private schools.

3. The neighbourhood school was recognised by the school mapping system, and the local authority and school management committee will identify any children above 6 who are not enrolled in schools.

4. All such schools must be accredited; else, they risk a fine of up to Rs. 1 lakh.

5. The RTE Act forbids admission tests for parents and children at the time of admission as well as capitation or gift fees.

6. Until the end of primary school, no child may be expelled, held back, or forced to pass the board test. However, the non-detention policy was dropped following the RTE Act 2019 modification.

7. There is one instructor for every 30 students, or a 1:30 student to teacher ratio. It offers a suitable number of highly qualified professors.

8. Schools must guarantee an adequate number of employees, teachers, and classrooms, as well as proper infrastructure facilities like playgrounds, libraries, restrooms, and drinking water facilities. Additionally, schools must provide barrier-free access to students with physical disabilities within three years.

9. Parents of students who supervise the use of grants and the operation of schools make up 75% of the members of school management committees.

10. The National Commission for the Protection of Child Rights (NCPCR) offers protection for children's rights, makes recommendations for and oversees the proper application of the law, and also looks into complaints about children's rights to free and compulsory schooling.

11. The ratio of financial burden between the federal government and the states is 55:45, and it is 90:10 for the states in the North-Eastern region.

The main problems and obstacles to realising the right to education are:

1. Inadequate infrastructure results in poorly maintained buildings or facilities.

2. The absence of drinking water infrastructure.

3. Deficient toilet facilities.

4. The student to teacher ratio is quite high, and teachers also lack the necessary education and experience.

5. Laboratories and libraries are not adequately stocked or maintained.

6. Many schools continue to employ outmoded curricula and teaching techniques that are entirely dependent on memorization of the material without any understanding of that material.

7. The lack of vocational education that would assist students in finding jobs after completing their study in the classroom.

8. Compared to boys, fewer girls enrol in school.

9. The distances between the schools in rural locations are comparatively more.

In order to provide children with a quality education, it is crucial for schools to have competent and trained instructors on staff. Every Child Needs a Teacher" was a global theme introduced by UNESCO and teachers unions worldwide in 2006. Without qualified teachers, excellent education for all students cannot be achieved, and the purpose of attending school is not to receive an education. A qualified teacher is an essential component of the educational system.

Approximately 129 million girls worldwide are not in school, and millions more are enrolled in schools but are not learning. As a result, girls enrol at much lower rates than boys. Only 49% of countries in the globe had gender parity in primary education, 42% had it in lower secondary education, and 24% had it in upper secondary education. Due to early child marriage, poverty, broken or poor families, gender-based culture, conservative or orthodox society, and parents who only choose to educate their son or sons, the number of girls enrolled in school is low. Some schools fail to adequately manage cleanliness and sanitation, failing to provide for the needs of female students in terms of safety. The gender gap in education or the low enrollment of girls in school is thus also a result of this. School dropouts are another major problem in the education system. The high school dropout rate is higher in rural locations for several reasons, including the difficulty in accessing clean drinking water and unsanitary restrooms.

As P.N Bhagwati, the former Chief Justice of India, put it, "*The child is a soul with a being, a nature and capacities of its own, who must be helped to find them, to grow into their maturity, into a fullness of physical and vital energy and the utmost breadth, depth and height of its emotional, intellectual and spiritual being; otherwise, there cannot be a healthy growth of the nation*"

According to this remark, it can be claimed that the current generation always hopes that their offspring would build up the country more successfully than they did. The fundamental worry for every country is that education is the sole means through which we can empower our next generation. The level of education and literacy in a country has a huge impact on its ability to progress because literate people have a much higher capacity for critical thought and are always considering how to advance their country. As a result, every country needs to consider how to establish a high-quality educational system. Unquestionably, the right to education exists and may be realised through free and mandatory education at the national level. However, due to poverty and numerous prejudices or stereotypes in the community, the effort made to create the Indian educational system has not been successful.

CONCLUSION

Education is crucial for the advancement and defence of human rights. Another important strategy for preventing violations of human rights is education. Everyone should therefore have an education so that they can comprehend the significance and principles of human rights. Diversity in social and cultural values should be ingrained in schooling from a young age. Instilling gender equality, respect for human rights, and human dignity should be a part of teaching and learning. For the removal of problems like socioeconomic inequity, education is crucial. To ensure high-quality education for all students, significant efforts have been made. Additional efforts are required in the following areas:

- Because a child's family plays such an important role in his or her education, it would be in the best interests of the child's family involvement in the school's development plans by establishing School Management Committees.

- The idea of pre-schooling needs to be more broadly understood because if every child has access to some form of early childhood education, the chances of the child continuing on to regular school are high. To address social injustices, it is important to support the formation of such committees, which include parents, local government representatives, teachers, and the kids themselves.

- Teachers, who are the cornerstone of providing great education, must be paid market-driven pay to raise the quality of education. Such SMCs would also help in evaluating each instructor in the school's abilities as well as analysing the kids' growth. The current basic minimum pay for teachers, as determined by the Sixth Pay Commission, is Rs. 22,000 per year. It is obvious that these low earnings are inadequate when compared to those paid to teachers in other countries, especially in India. In order to encourage academics to put out their best effort in support of the realisation of a successful educational system, it would be ideal if schools were permitted to lay out the compensation packages of each of their faculty members.

Lowering the weight of school bags is a top concern since it's heartbreaking to see tiny children carrying heavy books on their backs as they travel to class. Based on the recommendations of the Professor Yashpal Committee, the HRD ministry has encouraged the National Council of Education Research and Training to reform the school curriculum to reduce the number of books students need to read. In order to lighten backpacks, the Central Board of Secondary Education has also issued directives for its affiliated schools to abide by. The implementation of the aforementioned recommendations has not yet taken place, nevertheless, because of how sensitive people are still to the plight of young children. By giving homework and assignments top priority, school bags at the basic level should be removed.

In conclusion, it is crucial to recognise that ensuring everyone has access to high-quality school education is the cornerstone of development and a prerequisite for turning India into a knowledge society.

REFERENCE

1. Universal Declaration of Human Rights by United Nations, available at https://www.un.org/en/about-us/universal-declaration-of-human-rights visited on 23-03-2022

2. Article 26(1) of Universal Declaration of Human Rights available at https://www.un.org/en/about-us/universal-declaration-of-human rights#:~:text=Article%2026&text=Education%20shall%20be%20free%2C%20at,on%20the%20basis%20of%20merit.

3. Miss Mohini Jain vs State of Karnataka and Ors on 30 July, 1992

4. Unni Krishnan, J.P. And Ors. Etc. ... vs State Of Andhra Pradesh And Ors.1993 AIR 2178

5. Avinash Mehrotra v. Union of India & Others, Writ Petition (Civil) No.483 of 2004, (2009) 6 SCC 398

6. Available at https://niti.gov.in/planningcommission.gov.in/docs/plans/planrel/fiveyr/11th/11_v2/11v2_ch1.pdf visited on 02-04-2022.

7. Kainth.S. Gurcharan (Aug.2006). A Mission Approach to Sarva Shiksha Abhiyan. Economic and Political Weekly. Retrieved from https://www.jstor.org/stable/4418492 visited on 03-04-2022.

8. Sahai.S. Chandra (October.2014). Mid-Day Meal Scheme: Achievements and Challenges. International Journal of Humanities and Social Science Invention.

9. Vinothkumar.K (December.2018). Earlier National Education Policies of India- A Review. International Research Journal of Engineering and Technology

10. Available at https://old.amu.ac.in/emp/studym/100018597.pdf visited on 03-04-2022

11. Available at http://udise.in/ visited on 03-04-2022

12. Alam. Khabirul & Halder. K. Ujjwal (June 2018). Human Rights and Right to Education in India. International Journal of Research and Analytical Reviews.

13. Dr. Kaur. Jaswinder (Dec 2018). Human Rights and Right to Education in India. International Journal of Social Science and Economic Research. Available at https://ijsser.org/2018files/ijsser_03__542.pdf visited on 03-04-2022

14. Elumalai & Nair. S. Deepthi. Human Rights Vis-à-vis Right to Education in Indian Context: Problems and Issues. Available at http://oasis.col.org/bitstream/handle/11599/2142/2010_Elumalai%26Nair_Human_right.pdf?sequence=1&isAllowed=y Visited on 31-03-2022.

15. United Nations Girl's Education Initiatives available at https://www.ungei.org/ visited on 02-04-2022

16. UNICEF for every child available at https://www.unicef.org/education/girls-education visited on 02-04-2022

17. Planning Meeting: Research on child labour in South Asia, Jaipur, June 18, 2000 CUTS-CITEE, Jaipur. Available at http://www.cuts-international.org/linkages-Meeting-18.htm visited on 02-04-2022.

18. Low pay for teachers still bane of education, http://m.timesofindia.com/PDATOI/articleshow/6494467.cms

5 LEVEL CASCADED INVERTER BASED D-STATCOM

Ravin Patel and Anuradha Deshpande

Department of Electrical Engineering, Faculty of technology & Engineering, The MSU of Baroda, Vadodara, India

ABSTRACT

5 level cascaded inverter based D-STATCOM for harmonic and reactive power compensation, provides a simple three-step LPF-BPF based fundamental active current extractor system. The proposed LPF-BPF fundamental current extractor offers an instantaneous value for the fundamental active component of load current, which ensures that the source current is sinusoidal and the supply power factor (UPF) is maintained. The proposed algorithm extracts the fundamental active component of load current with THD less than 5% and maintains unity power factor at the supply end when the supply voltage is distorted. The goal of this paper is to look at the design, analysis, and control of various cascaded multi-level inverter topologies for single phase static VAR compensator (STATCOM) applications

Keywords— Cascaded, Inverter, Fundamental, Active, D-Statcom

INTRODUCTION (*HEADING 1*)

The Smart City Mission is receiving a lot of attention from the Indian government. For a city to be transformed into a smart city,ten fundamental infrastructural elements are required. Three key electrical engineering elements are assured electric supply, sustainable environment and Efficient urban mobility and urban transport.

The four areas under electrical engineering are renewable energy technology Control of Solar and Wind Energy Systems, Power Quality Enhancement, Distributed Generation and Electric Vehicle to Grid interface(V2G). Utility and customer-side disturbances are the primary causes of terminal voltage fluctuation, transients, and wave form distortions on the distribution system. Power quality engineers are becoming increasingly concerned about the quality of electrical power. Electronic switching devices, which are commonly included in new load equipment, may result in poor network voltage quality. Power electronics' wide spread use in the residential, commercial, industrial, and transportation sectors has resulted in everincreasing non-linear loads. Power quality difficulties (PQ) such as current and voltage distortions, power factor (PF) degradation, electromagnetic interference, voltage flicker, etc have resulted. The widespread usage of inductive loads, which require reactive power, exacerbates PQdifficulties. This causes further distribution system degradation and underutilization, as well as voltage sags and swells. The negative consequences of low PQ have led to the creation of power quality standards, such as IEEE-519-2014/IEC-61000 which when observed would minimize the adverse effects.While power electronics are responsible for the majority of PQ concerns, they are also responsible for the solution. Various custom power devices that can ensure compliance with PQ rules have been mentioned in the literature. The distributed static compensator (D-STATCOM) is one such device that may compensate for harmonic current and reactive power without requiring the supply to offer only the fundamental current at unity PF (UPF). D-STATCOM based on a 1/3-phase voltage source inverter has been documented in references [1] –[27].

For1-phaseFL-CHBI basedD-STATCOM, this work provides a simple LPF-BPF basic current extraction algorithm. To estimate the peak magnitude of the fundamental, the proposed LPF-BPFcurrent extraction technique first estimates the fundamental in-phase and quadrature components. Second, for the development to unitv vector template(UVT), the same technique is repeated for the supply voltage, guaranteeing that the algorithm functions well even with a distorted supply. Finally, the instantaneous value of the fundamental active component of load current is computed based on the two steps. The control method ensures that the grid only supplies resulting source current with total harmonic distortion (THD) below 5% and UPF at the supply end. In addition, voltage balancing is included for CHBI. Under dynamic and state settings for undistorted and distorted power supplies, the functioning of the 1-phase FL-CHBI based D-STATCOM with the suggested LPF-BPF fundamental current extractor is investigated. For high-power applications, D-STATCOM, which consists of cascading traditional multi-level/two-level inverters, is an appealing solution. The architecture consists of standard multilevel/two-level inverters coupled in cascade via a three-phase transformer's open-end windings. In high- power drives ,such topologies are common. One of the advantages of this design is that the number of levels in the output voltage wave form can be increased by maintaining a symmetric voltages at the inverters ' dclinks. This enhances the quality of the power. As a result,compared to traditional multilevel inverters, overall control is straight forward.

2. **THEORY AND FORMULA**

1.1 CONTROL SCHEME AND MODULATION TECHNIQUE OF D-STATCOM

2.1.1 LPF-BPF Fundamental Extractor and calculations:
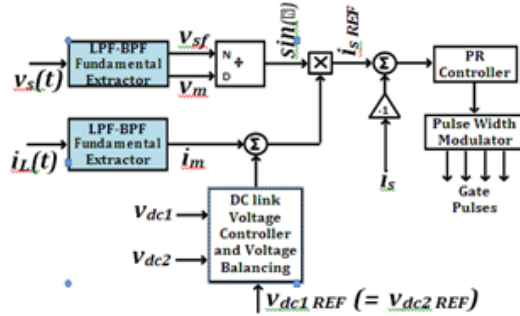
Figure4.shows the block diagram of the control scheme

Let the distorted $vs(t)$ and $iL(t)$ be defined as in equations (1) and (2), where $Vm1$ and VmK are the peak voltages of fundamental and Kth harmonic components, $Im1$ and ImK are the peak voltages of fundamental and Kth harmonic components, φ and φK are the angle by which fundamental and harmonic components of iL lags behind the voltage, and t is time.
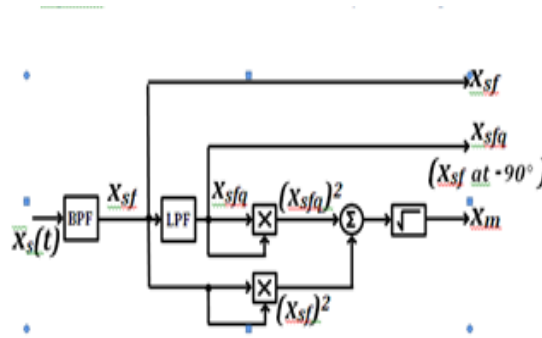
Figure5.LPF-BPFFundamentalExtractor Block

The proposed LPF-BPF fundamental active current extractor combines the operation of PLL and fundamental current estimator for the extraction of fundamental active component of load current. Fig. 4 shows 4 shows the schematic diagram of LPF-BPF fundamental current extractor.

$$(t) = V_{m1}\sin(\theta) + \sum_{k=2}^{\infty} V_{mk}\sin(k\theta) \qquad (1)$$

$$(t) = I_{m1}\sin(\theta - \varphi) + \sum_{k=2}^{\infty} I_{mk}\sin(k\theta - \varphi_k) \qquad (2)$$

In Step-1, employs fundamental component extraction for the determination of peak magnitude of fundamental load current. In S- domain the output of II-order BPF, (S), while processing (S), is given as in equation (3), where $G(S)$ is transfer function of BPF, B is the passing band and ωo is the centre frequency. From equation (4), it is clear that the output of BPF in time domain, (t),is equal to the fundament component of load current, $iLf(t)$, and consists of the $iLfp(t)$ and $iLfq(t)$.

$$I_{\_p}(s) = G_{BPF}(s)I_L(s) = B\frac{s}{s^2+Bs+\omega_0^2}I_L(s) = I_{Lf}(s) \qquad (3)$$

$$(t) = i_L(t) = i_{Lfp}(t) + i_{Lfq}(t) = I_{m1}\sin(\theta - \varphi) \qquad (4)$$

As BPF cannot separate (t) and $iLf(t)$, $ip(t)[= iLf(t)]$ is passed through LPF to get $iq(t).(S)$ is further processed by LPF to determine the quadrature component, (S), as in equation(5), where $GLPF(S)$ is transfer function of LPF, ωc is the cut-off frequency, μ is the coefficient of damping. From equation (6), it is clear that the output of LPF in time domain, (t), is in quadrature with (t). Based on equations (5)-(6), the peak magnitude is determined as in equation

$$I_q(s) = G_{LPF}(s)I_p(s) = 1.41\frac{\omega_c^2}{s^2+2\mu s+\omega_0^2}I_p(s) = I_q(s) \qquad (5)$$

$$(t) = I_{m1} \sin(\theta - \varphi - 90°) \qquad (6)$$

$$I_{m1} = \sqrt{[i_p(t)]^2 + [i_q(t)]^2} \qquad (7)$$

In Step-2,the fundamental component extractor is employed for the estimating $Vm1$ and the fundamental in-phase component of (t), vsp (t). The use of fundamental component extractor ensures that

UTV having only the fundamental frequency component

is generated even under distorted supply conditions.

First (t) is determined by BPF, based on which the

fundamental quadrature component of (t), $vsq(t)$ is

obtained through LPF. With thus obtained vsp (t) and

vsq (t), $Vm1$ is determined as in equation (8). Finally,

generated UTV is given by equation (9)

$$V_{m1} = \sqrt{[v_{sp}(t)]^2 + [v_{sq}(t)]^2} \qquad (8)$$

$$UTV = V_{m1}(t) = V_{m1}sin(\theta) = \sin(\theta) \qquad (9)$$

Lastly, Step-3 is employed for the separation of (t)

and $iLf(t)$ components of $iLf(t)$. Based on equations (7)

and (9), (t) is determined as in equation (10). Use of thus

obtained (t) acts as $iREF$ (t), ensures the desired

D-STATCOM operation. To accommodate the dc-link voltage regulation and cell voltage balancing, the modified $iREF$ (t) is given by equation (11).

$$i_{(t)} = UTVI_{m1} \qquad (10)$$

$$i_{REF}(t) = UTV(I_{m1} + i_{dcREF}(t)) \qquad (11)$$

3. RESULTS & DISCUSSIONS

1.1 PERFORMANCEANALYSIS

Table1.%THD for different modulating index and different level of inverter

% THD of Current in 5-Level Cascaded Inverter			
M.I	**IPD**	**POD**	**APOD**
0.7	2.16	2.16	2.16
0.85	1.85	1.85	1.85
1	1.43	1.43	1.43

% THD Current in 7-Level Cascaded Inverter		
IPD	**POD**	**APOD**
1.64	1.61	1.64
1.44	1.33	1.36
1.15	1.03	1.03

% THD of Current in 9-Level Cascaded Inverter		
IPD	**POD**	**APOD**
1.14	1.03	1.02
1.16	1.09	1.10
0.84	0.79	0.79

Table2.Switching losses for different Modulating techniques and different level of inverter

Modulating Techniques	5-Level CMLI Switching loss	7-Level CMLI Switching loss	9-Level CMLI Switching loss
IPD	0.9638	1.2247	1.6348
POD	0.9606	1.1747	1.6175
APOD	0.9631	1.1847	1.6275

1.2   SIMULATION RESULTS
5-level,7-level and 9-level voltage source inverters have been implemented using Sinusoidal pulse width modulation. Results are shown in figure 9 below
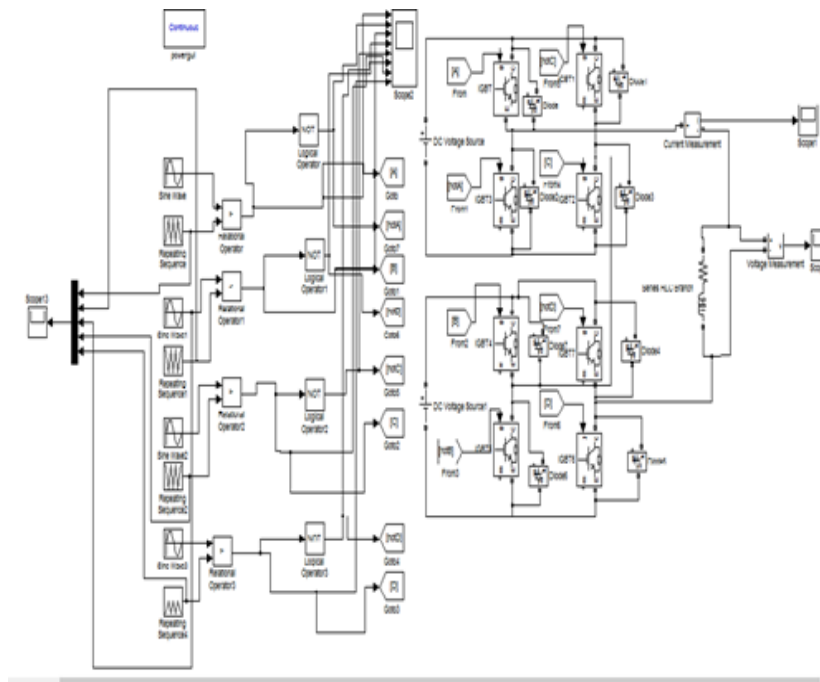
Fig9. 5-level,7-level and 9-level voltage source inverters
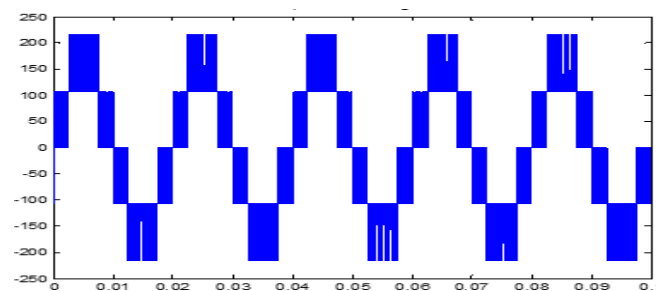
Fig.10. Voltage of 5-Level CMLI

Figure 10.shows the 5-Level voltage waveform of cascaded multi level inverter and 5-level of voltage is generated using two same value of the voltage sources. 110 V of dc sources are generate5-level of voltage.
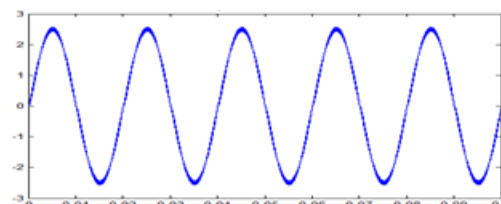
Figure11. Current of 5-Level CMLI

Figure 11.shows the current waveform of output inverter. It is purely sinusoidal having THD of 2.16 % , the 0.7 modulating index. THD will decrease with increase in the modulating index.
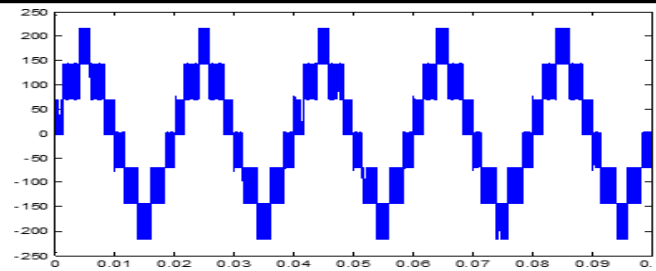
Figure12.Voltageof7-LevelCMLI

Figure 12.shows the 7-Level voltage waveform of cascaded multi level inverter.7-level of voltage is generated using two different values of voltage sources. Like 145 V and 75 V of dc sources are generate 7-level of voltage.
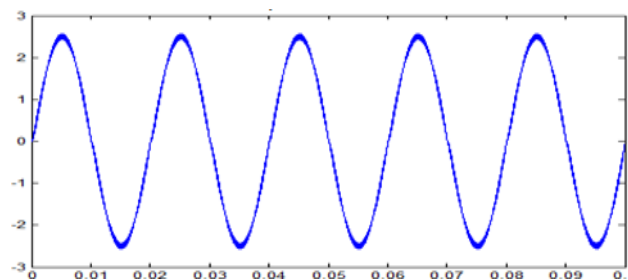
Figure13.Current of 7-Level CMLI

Figure 13.shows the current waveform of output inverter. It is purely sinusoidal having THD of 1.64 % with 0.7 modulating index. THD will decrease with increase the modulating index.
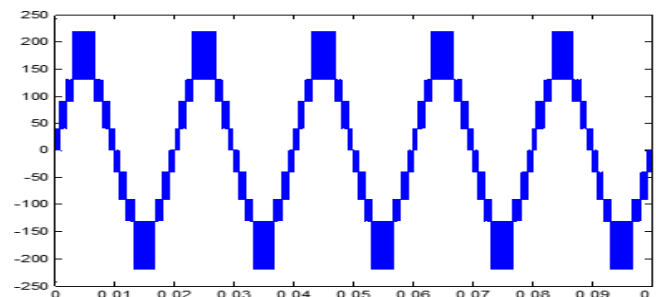
Figure14.Voltageof9-level CMLI

Figure14.shows the 9-Level voltage waveform of cascaded multi level inverter.9-level of voltage is generated using two different values of voltage sources. Like 90V and 130V of dc sources are generate 5-level of voltage.
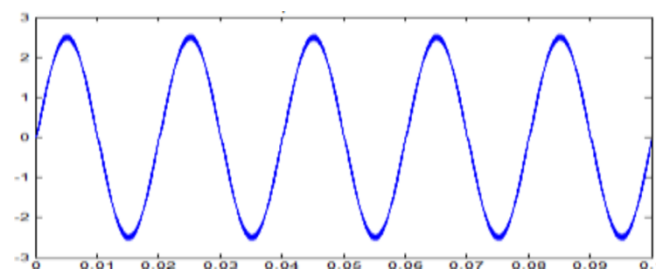
Figure15.Current of9-LevelCMLI

Figure 15.shows the current waveform of output inverter. It is purely sinusoidal having THD of 1.16% with 0.7 modulating index. THD will decrease with increase in the modulating index.

Figure 15.shows the current waveform of output inverter. It is purely sinusoidal having THD of 1.16%

With 0.7 modulating index. THD will decrease with increase in the modulating index

2) Simulations are carried out in MATLAB software for single phase FL-CHBI based D-STATCOM with the proposed control scheme. The system parameters are: Gridvoltage: 84.85V, 50Hz rms gridvoltage, coupling inductor impedance of : (1+j 0.0002), dc-linkcapacitors: 1100microF, lineimpedance:(1+j0.001) .Load-1:1-phase

uncontrolled rectifier with resistive and inductive load (50,100mH) and Load-2:1-phase uncontrolled rectifier with resistive and inductive load (50,200mH) and 1-phase uncontrolled rectifier with resistive and inductive load (50,100mH). The load current (L)is found to have a peak value of 1.86A at 39.99 %.THD under Load-1. Load-2, on the other hand, pull siL with a peak value of 3.36A at 22.73%THD. The simulation studies are carried out for the following cases of supply and load conditions are;

Undistorted supply voltage with steady state load.

Fig (a-b-c-d) shows

VPCC is sinusoidal with the RMS value of 84.85Vand THD of 1.0%.

iL is highly distorted with the peak value of 1.83A and THD of 27.5%.

iL having the peak magnitude of 0.43A and 0.25A.

iL having the peak and RMS values of 1.95A and1.32A, sinusoidal with THD of 2.4%.

In phase with Vpcc with the PFof 0.9997.Compensating current peak value of 1.44A.

The two most dominant harmonics 5thand7th the peak magnitude of 0.43A and 0.24A.

Maintained at an average values of 99.2V and 100.2V.With the respective peak-to-peak ripple of 0.3V and 0.1V. The determined by the proposed fundamental active current extractor is 2.05A.

With the peak to peak ripple of 0.05A
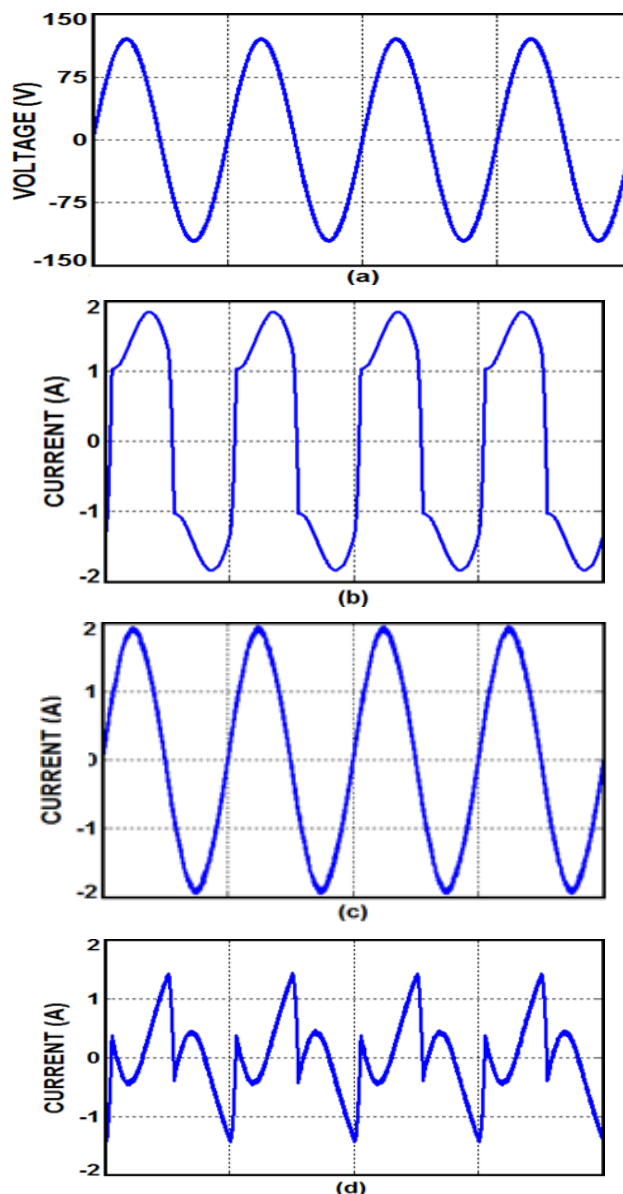
Fig 16. Undistorted supply voltage with steady state load

Undistorted supply voltage with dynamic load condition

Fig. (g-h-j-i) depicts the performance of the 1-phase FL-CHBI based D-STATCOM with LPF-BPF fundamental active current extractor under thedynamic load change.   Load-1 is connected to the system. With a change in load from Load–ItoLoad –IIat4s , the peak magnitude is increases from 1.83A to3.3A. themaximum peak value of 3.42A under dynamic state. THD of the two different load is less than5%. The step increase in load causes drop in Vdc1 andVdc2 drop to a minimum value of 97.8V and 97.5Vduring the Dynamic state.
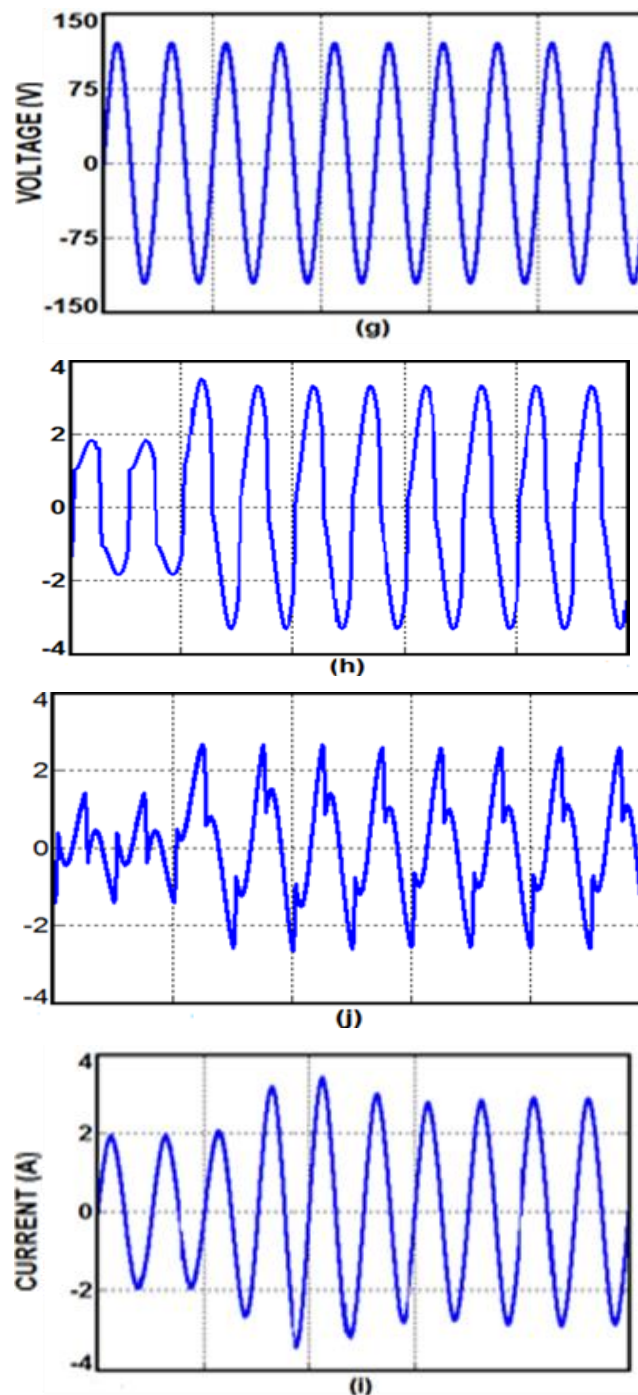
Fig17.Undistorted supply voltage with dynamic load condition

Distorted supply voltage with steady state load condition:

The distorted supply voltage considered in this study is given as

$$(t) = \sum_{n=1}^{\infty} vmn\sin(n\omega t.)$$

Fig. (m-n-o-p) illustrates the steady state performance of 1-phase FL-CHBI based D-STATCOM with LPF-BPF fundamental active current extractor under distorted $vPCC$. Distorted $vPCC$ has the peak value of 129V and THD of 24.5%.

The two most dominant harmonic are 5th and 7th peak magnitude of 24V and 17V.

Resulting iL and is highly Distorted with the peak value of 3.4A and THD of 22.6%.

The two most dominant harmonics are having The peak magnitudes of 0.51 and 0.4. even with the distorted supply, the D-STATCOM provides effective compensations of that, with The peak value of 3.1A, has THD of 2.3%, and is in phase with Vpcc. This results in Supply end PF being maintained at 0.9997.It has The peak value of 2.7A.with The 5th and7th being the most two dominant harmonics having a peak magnitudes of 0.52A and0.41A.Respectively, Vdc1and Vdc2 are regulated at an average value of 99.7V and100Vwith the peak-to-peak rippleof 0.4V and 0.02V,

Even under the distorted supply, the proposed fundamental active current extractor effectively determines that im1has an average value of3.4Aandpeak-to-peak rippleof0.08A.
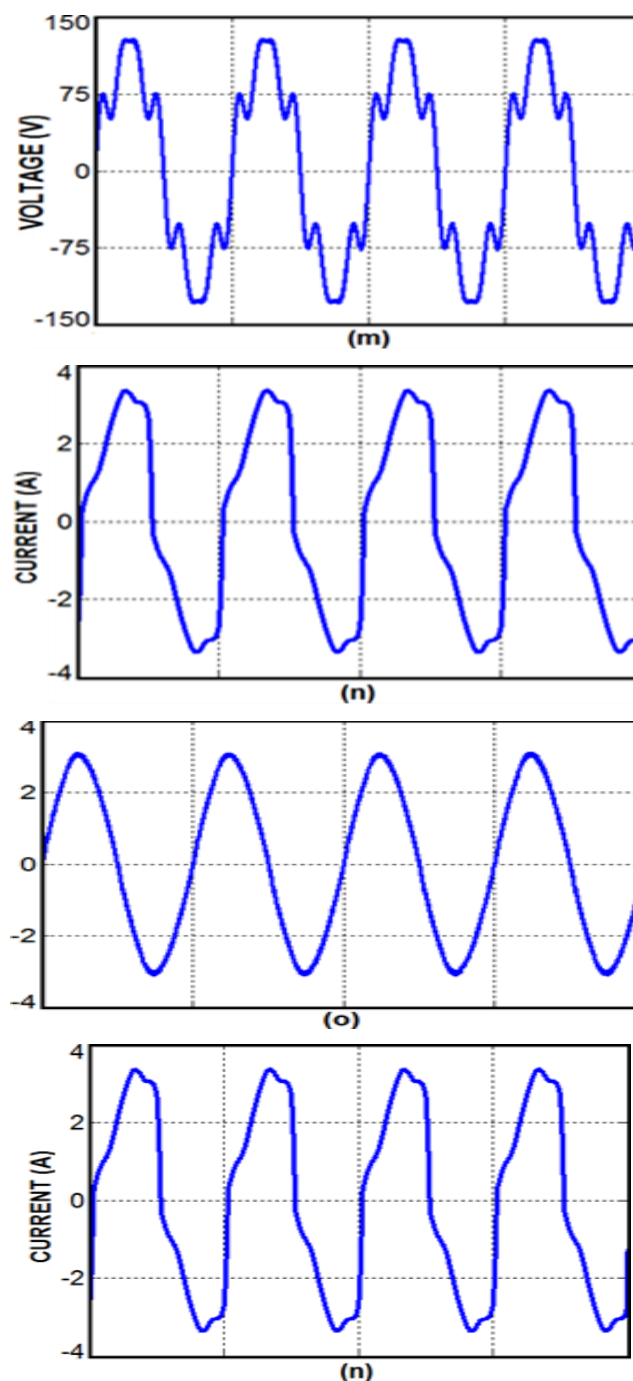
Fig18.Distortedsupplyvoltagewithsteadystateloadcondition

CONCLUSION
The proposed LPF-BPF fundamental active current extractor algorithm has been implemented in PSIM simulation package for the control of 1- phase FL-CHBI based D-STATCOM for demonstrating its effectiveness in mitigating PQ issues for the distribution system, thereby facilitating sinusoidal source currents and UPF at supply end. The control system ensures that only the extracted fundamental active component of load current is fed by the source, implying that the D-STATCOM provides harmonic current and reactive power compensation. This simulation results validate the theory by demonstrating that the source currents are the fundamental active component of load current, drawn at UPF and having THD well below the 5% limit set by the IEEE standard 519. Moreover, voltage balancing for the CHBI is also incorporated. The performance of the 1-phase FL-CHBI based D-STATCOM with the proposed algorithm was found to be satisfactory under the dynamic load change and even under distorted supply conditions.

ACKNOWLEDGMENT *(HEADING 5)*

REFERENCES
[1] Salmeron,P.,&Litran,S.P.(2010). Improvement of the Electric Power Quality Using Series Active and Shunt Passive Filters. IEEE Transactions on Power Delivery, 25(2), 1058–1067. doi:10.1109/tpwrd.2009.2034902.

[2] E. Hossain, M. R. Tür, S. Padmanaban, S. Ay and I. Khan, "Analysis and Mitigation of Power Quality Issues in Distributed Generation Systems Using Custom Power Devices," in IEEE Access, vol. 6, pp. 16816-16833, 2018, doi: 10.1109/ACCESS.2018.2814981.

[3] El Mofty, A.; Youssef, K., "Industrial Power Quality Problems", Conference on Electrical Distribution, Vol. 2, pp. 18-21, June 2001

[4] Mohan Mathur, R.; Varma, Rajiv K., "Thyristor- Based FACTS Controllers for Electrical Transmission Systems", John Wiley & Sons, Inc., Publication, IEEE Press,ISBN 0-471- 20643-1, 2002.

[5] De Almeida, A.; Moreira, L.; Delgado, J., "Power Quality Problems and New Solutions", International Conference on Renewable Energies and Power Quality'03,Spain, Vol. 1, 2003

[6] Casadei, Domenico; Profumo, Francesco; Serra, Giovanni; Tani, Angelo, "FOC and DTC: Two Variable Schemes for Induction Motors Torque Control", IEEE Transactions on Power Electronics, vol. 17, issue: 5, pp. 779-787, September 2002

[7] Sun, J.; Czarkowski, D.; Zabar, Z., "Voltage Flicker Mitigation Using PWM-Based Distribution STATCOM", Conference on Power Engineering, Vol. 1, pp. 616-621,2002.

[8] [8] Rani, RoddaShobha; Jyothi, B., "VSC Based DSTATCOM & Pulse- Width Modulation for Power Quality Improvement", International Journal of Engineering Trends and Technology, Vol. 2, pp. 38-41, 2011.

[9] Singh, Bhim; Adya, Alka; Mittal, A. P.; Gupta, J. R. P, "Modelling and Control of DSTATCOM for Three-Phase, Four-Wire Distribution Systems", Conference onIndustry Applications, Vol. 4, pp. 2428-2434, 2005.

[10] [10] Ghosh, Arindam; Ledwich, Gerard, "Load Compensating DSTATCOM in Weak ACSystems", IEEE Transactions on Power Delivery, Vol. 18, pp. 1302–1309, 2003.

[11] Molina, M. G.; Mercado, P. E., "Control Design and Simulation of DSTATCOM with Energy Storage for Power Quality Improvements", IEEE/PES Conference on Transmission and Distribution, Latin America, Venezuela, pp. 1-7, 2006

[12] [12] Pinapatruni, Kiran Kumar; L Mohan, Krishna, "DQ Based Control of DSTATCOM for Power Quality Improvement", VSRD International Journal of Electrical, Electronics &Communication Engineering, Vol. 2 (5), pp. 207-227, 2012.

[13] Singh, Alka; Bhowmick, Suman; Shukla, Kapil, "Load Compensation withD-STATCOM and BESS", IEEE 5th India International Conference on Power Electronics, Vol. 20, December 2012.

[14] Wen Shao; Buhan Zhang; Chenxiong Mao; Yizhe Chen; Biao Mao; Yi Chen; JieZeng;Xun Chen, "Modeling and Simulation of the Asynchronous Wind Turbine," Innovative Smart Grid Technologies - Asia (ISGT Asia), 2012 IEEE , vol., no., pp.1,5, 21-24 May2012.

[15]] Elnahdy, A., "A Single-Phase Current Vector Control for a Dstatcom Installed in Distribution Systems", IEEE GCC Conference and Exhibition (GCC), Dubai, United Arab Emirates, pp.19-22, February 2011.

[16] [16] Chaikhy, Hamid; Khafallah, Mohamed; Saad, Abdallah, "Evaluation of Two Control Strategies for Induction Machine". International Journal of Computer Application; Vol.35, issue: 5, pp. 51-52, December 2011.

[17] Hosseini, S. H., Nazarloo, A.; Babaei, E., "Application of DSTATCOM to Improve Distribution System Performance with Balanced and Unbalanced Fault Conditions",IEEE Electrical Power and Eergy Conference, pp. 1-6, August, 2010.

[18] Salles, M. B. C., Freitas, W.; Morelato, A., "Comparative Analysis between, SVC and DSTATCOM Devices for Improvement of Induction Generator Stability", IEEE ElectroTechnical Conference, Vol. 3, pp. 1025- 1026, May 2004.

[19] [19] Singh, Bhim; Adya, Alka; Mittal, A. P.; Gupta, J. R. P., "Power Quality Enhancement with DSTATCOM for Small Isolated Alternator feeding Distribution System", Conference on Power Electronics and Drive Systems, Vol. 1, pp. 274-279, 2005.

[20] Alberti, L.; Bianchi, N.; Bolognani, S., "Field Oriented Control of Induction Motor: A Direct Analysis using Finite Element," Industrial Electronics, 2008. IECON 2008. 34thAnnual Conference of IEEE , Vol., no., pp.1206,1209, 10-13 Nov. 2008.

PRICE FIXING CARTEL AND ROLE OF CCI TO PREVENT ANTI-COMPETITIVE PRACTICE: AN ANALYSIS

Rajwant Rao[1] and Dr. Sandhya Kumari[2]
Research Scholar[1] (Ph.D) and Professor[2], School of Law, Galgotias University, Greater Noida
https://doi.org/10.5281/zenodo.10352824

ABSTRACT
One of the key elements that affects a product's consumability in a competitive market is price. Both consumers and the industry benefit from a symbiotic relationship in an ideal competitive society. However, it has been held that in a perfect scenario.

Since industries are driven by profit, which may be attained through increased sales, businesses strive to succeed in their specialised fields in order to offer high-quality goods at reasonable rates in a competitive market caused by the abundance of similar products.

However, it has been discovered that industries use unfair trade tactics to increase their profits.

In order to control these unfair business activities, the Indian Parliament created the Competition Act in 2002. This law's main goals are to encourage fair competition in the market and to punish businesspeople who engage in anti-competitive trade activities. The creation of cartels is one such tactic. A cartel is considered to be created when two or more businessmen get into a formal or informal agreement to further their own interests and obstruct fair competition in the market. Cartels can stifle free competition by setting prices for goods and services or by influencing non-price elements like manufacturing. In order to maintain market competition and provide customers with as many options as possible at lower prices, the present article focuses on the examination of price cartels and the role that competition law plays in regulating these cartels.

Keywords: Cartels, India, U.S.A, C.C.I., D.O.J,

INTRODUCTION
The cost of various things on the market is a crucial component of public policy. Our legislators have a responsibility to advance fair competition and safeguard consumers' interests in the marketplace. In addition to allowing fair entry into the market, competition law also assures healthy market competition so that the interests of consumers are well-served. "Cartelization" is one of the numerous restraints or unfair trade practises that the law names as impeding competition in an economy. It is a tool employed by businessmen to control the market to their advantage.

Under this scenario, the industrialists engaged in similar types of products or services typically form a group, either formally or informally, and agree to either set a fixed price for the products or to control the production of specific products. They may also agree to divide the market, either geographically or by product, among themselves in order to maintain control over the market and prevent new competitors from entering it. These agreements are made in order to give a select few industries a monopoly. A cartel can typically form at any step of production, including the manufacturer, distributor, wholesaler, and retailer. These agreements are also known as anti-competitive agreements because they limit market competition. The Competition Act of 2002 states:

"Cartel is defined includes an association of producers, sellers, distributors, traders or service providers who, by agreement amongst themselves, limit, control or attempt to control the production, distribution, sale or price of, or, trade in goods or provision of services"

The Supreme Court has defined the word cartel saying that:

"cartel, therefore is an association of producers who by agreement among themselves attempt to control production, sale and price of the product to obtain a monopoly in any particular industry or commodity. It may be any combination the object of which is to limit or control trade or production, distribution, sale or price of the goods or services."

Cartels' Origins:
Any economy must contend with cartel formation, which is not a new issue. The "Arthashastra" of Kautilya contains the earliest indications of cartels. In his book, he advocated for stiff penalties to be imposed on cartel agreements in order to prevent their formation. Distinct nations have different antitrust laws, but "Cartelization" is one concept that all antitrust laws have in common. Monopoly is the antidote to healthy competition, and creating cartels is one strategy that is seen to be harmful to it. Eight decades after the United States approved the

first modern antitrust law, the Indian Parliament passed its own antitrust law for the first time after independence in 1969, known as the Monopolistic Restrictive Trade Practices (MRTP) Act. However, due to the licencing Raj, which severely constrained and regulated Indian economy, these efforts did not yield any fruitful results until 1991. India's economy first experienced economic liberalisation in 1991. Following the implementation of the New Economic Policy, a number of market restrictions were lifted, including those relating to product price, production, and diversification restrictions. It might be claimed that after 1991, our formerly closed economy became accessible to the rest of the globe. Additionally, the licence regulations were relaxed.

Many new businesses entered the market at this time, and the economy began to transition from a socialist to a capitalist structure. MRTP commission ruled on seven cartel instances between 1991 and 1978, according to data. However, due to a lack of funding for thorough investigations, the commission was forced to reject the majority of the complaints. As a result, the MRTP Act utterly fails to expose and punish India's cartels. The Competition Act of 2002 was passed as a result of the MRTP Act's failure to exert control. The act creates the Competition Commission of India (CCI), which is given more authority and better resources to look into and prosecute cartels.

Different kinds of cartels:
According to research by Cuts International, there are four different types of cartels:

a) Price-fixing cartels: These are groups of industrialists who have agreed to control the price of a product.

Market sharing

(b) Cartels: These are the cartels in which the existing industrialists divide the geographical or product market in order to lessen competition.

c) Cartels that regulate the outputs: These are cartels in which merchants restrict the production of commodities to artificially deplete the market and maximise profits by limiting the flow of goods or services.

d) Bid rigging: "Bid-rigging" is defined as an agreement among parties engaged in the trade of comparable products or services where they band together to exclude a rival bidder or attempt to manipulate the bid.

Price Cartel:
Increasing market competition is one of the main goals of competition legislation. It made colluding among rivals to manipulate the price of products or services illegal. Due to the fact that this hinders healthy competition and limits the options available to end consumers. Price When rivals get together and agree on a price for goods or services, a cartel is formed. Typically, they come to an unofficial accord and fix things together. Due to collusion among the rivals, this agreement essentially decreases the level of market competition. The following are the basic characteristics of price cartels:

It is an association of independent enterprises, it is a horizontal trade disruptive element developed between competitors in the same industry, and it causes the industries to control prices as a result of lessening competition through these agreements.

d) The consumers are impacted since the price of the goods is unfairly increased to increase profit.

e) When there is an inelastic demand for the items, cartel formation is simple.

How does market cartelization impact consumers?
Cartel is a disruptive and extremely risky trade practise. In a constrained economy, the likelihood of cartel formation increases. as oligopoly predominates in the closed market. Cartel formation lessens producer competition, which has a long-term impact on the overall health of the economy. In nations where cartels hold a dominant position, consumer welfare suffers significantly as well. In accordance with OECD reports, cartels that are successful will actually drive up the cost of items on the market and prevent consumers from purchasing them at a price that is competitive. In the end, the consumer has two options: either refuse to pay and avoid purchasing the product altogether, or give the cartel operator his hard-earned cash. Second, the cartel protects its members from the effects of the market, which has increased prices and reduced spending on innovation. The demand-supply equation does not hold true in a cartel-dominated market. According to competition law specialist Bruce Wardhaugh, cartels "may extract a bigger social cost than even monopolies." He does so in the following way:

"given that innovation would require the expenditure of research and development costs (which would be unnecessary due to a cartel-wide agreed 'stand-still' on innovation), such investment would not be undertaken.

Since the monopolist, unlike the cartelist, must be concerned with other firms developing goods which may be less expensive substitutes for its goods, the monopolist may have greater incentive for research and development expenditure. Thus, these social costs of reduced product innovation may be greater with cartels."

The only method to control cartels, according to an OECD policy brief, is through severe penalties because money is also a factor in their formation.

Presence of a Cartel: A Classification of Evidence
A cartel's existence may be proven through direct confirmation, erroneous (fortunate) proof, or a combination of the two. Direct evidence includes written agreements between cartel members, an explanation from a cartel member who attended a meeting and reached an understanding with competitors, a reminder written inside an organization to report a meeting with competitors where an understanding was reached, records of phone conversations with competitors, or an announcement from a man who was persuaded to join the cartel.

However, cogent evidence is rarely produced since members of cartels frequently disagree verbally rather than in writing. Direct confirmation might be supported by backhanded (conditional) proof. Without anybody else's help, it might also show that a cartel exists, hence it's important to exercise caution when interpreting ambiguous evidence " Fortuitous proof is a different type of confirmation. Henry David Thoreau, an American academic, said that serendipitous confirmation can persuade, like when you find a trout in the milk. He suggested that the only explanation for this occurrence is that someone accidentally mixed trout and milk. When there is only one and only one explanation for an event, conditional confirmation is at its most useful. It is possible to use this principle when studying cartels. Only in cases when there is a cartel should one look for behavior that is encouraging. For instance, it would be suspicious behavior if all of the competitors in a certain industry announced at the same time that their prices would increase by the same amount. It makes one think that they all approved of the expense increase. However, there are other possible explanations as well, such as a data cost build that affected all of them similarly, a sudden shift in the demand for their product, or a quick rise in the price of a substitute item. The other potential explanations might be eliminated with more investigation. The straggling remnants, as the fabled English detective Sherlock Holmes put it, "must be reality" when the unimaginable has been eliminated. The only constant explanation for the abrupt identical price increase announcements, if all other intelligent explanations are eliminated, is that the competitors all discussed and agreed upon the price increases. That would be conditional approval of a cartel agreement in a deceptive manner ". In this vein, the various procurements under the Competition Act are shown. The MRTP Act's issues are examined to determine whether the Act resolves them. On the basis of two nation papers arranged by advisers working on this project, references are made to the experiences of two other large economies, the US and Brazil, as often as possible for correlation and in order to draw the necessary conclusions. The study concludes with a few recommendations regarding the CCI's strategy and operational issues as it relates to executing its mandate under the Competition.

Price fixing is an agreement (written, verbal, or derived from direct) between rivals that increases, decreases, or resolves costs or aggressive terms. The majority of the time, antitrust rules mandate that each organization establish prices and other terms alone, without consulting a rival. When consumers make choices regarding the goods and services they will buy, they anticipate that the price will have been determined purely on the basis of supply and demand, not by collusion among rivals. When rivals agree to restrict competition, the result is typically greater costs. Price regulation is unavoidably a significant concern for government antitrust regulation.

Whether expenses are agreed upon at the very least, at the most, or within a range, a simple agreement among competitors to adjust costs is frequently illegal. When two or more rivals agree to produce actions that have the effect of increasing, decreasing, or balancing out the cost of any good or service without a legitimate interest, this is known as illegal price-fixing. Price fixing schemes are frequently developed in secrecy and can be challenging to disclose, yet an agreement can be discovered via "fortunate" proof. For instance, illegal price settling may be the cause if related competitors have a case of unexplained same contract terms or price behaviour combined with various features (such as the absence of legitimate business clarity). Concerns can also be raised by offers to organise prices, such as when a competitor declares openly that it is willing to terminate a price war provided its rival is also willing to do so, and the conditions are so explicit that rivals can interpret this as an offer to fix prices jointly.

Not every price similitude or price change that takes place in the interim is a result of a price settlement. Actually, they frequently result from common economic circumstances. For instance, prices for commodities like wheat are typically the same since the commodity is essentially equal, and the prices that ranchers charge

all rise and decrease together without communication. Each and every affected rancher will pay more if a dry season results in a decline in the availability of wheat. An increase in consumer demand can also result in continually high prices for a limited-supply good.

Price fixing concerns both costs and various terms that affect costs to customers, such as shipping fees, guarantees, markdown initiatives, or financing rates.

Price cartel regulation under THE MONOPOLIES AND RESTRICTIVE TRADE PRACTICES ACT (MRTP) of 1969:

The MRTP Act is legally the first law in India that tries to prevent the exploitation of monopolistic corporate practises. Prior to this, an illegal agreement was addressed by the Indian Contract Act of 1872. Sec. 27 of the Contract Act states that "subject to the specific exception provided therein, every agreement by which any person is restrained from exercising a lawful profession, trade, or business of any kind, is to that extent void." Sec. 23 of the Contract Act states that "the consideration or object of an agreement is unlawful if the court regards it to be contrary to public policy and is void."

The need for competition law was really mandated by the Indian constitution. The Directive Principle of State Policy, which places an unique obligation on the future government to further the welfare of the people, is found in Part IV of the Indian Constitution. The primary goals and objectives of our first competition law are thus:

"to encourage fair play and fair deal in the market besides promoting healthy competition. They seek to afford protection and support consuming public by reducing Monopolistic, Restrictive and Unfair Trade Practices from the market."

Prior to 1991, the MRTP Act was a crucial piece of legislation that guaranteed Indian industries' independence while also advancing social justice. However, since the introduction of New Economic Policies in 1991, the emphasis of our economy has shifted from policing monopolies to encouraging competition. The MRTP Act is rendered ineffective by this change in the object.

The MRTP Act does not include a specific definition of cartels with regard to its requirements. The Act impliedly applied to cartels. The Act's ambiguity on the matter makes it difficult to prevent the creation of cartels.

MRTP Commission, in contrast to CCI, lacked extraterritorial jurisdiction.

Therefore, it could not apply to global cartels. The MRTP Commission was a more reforming organisation. Even though it could conduct investigations on its own, awards "can only be given on an application by the central government, state government, or a party suffering the loss or damage once the type and extent of loss or damage have been determined through an inquiry."

MRTP was therefore unable to stem the threat of cartels. International cartels were also a worry, particularly after 1991 when our economy became more globalised, but the Act lacked extraterritorial authority.

Provision under Competition Act 2002 to regulate price cartel:

For the first time, the term "global cartels" was specifically defined in the Competition Act because it recognises the shortcomings of the MRTP Act, 1969.

The Competition Act of 2002 was created with the following as its primary goal:

"An Act to provide, keeping in view of the economic development of the country, for the establishment of a Commission to prevent practices having adverse effect on competition, to promote and sustain competition in markets, to protect the interests of consumers and to ensure freedom of trade carried on by other participants in markets, in India, and for matters connected therewith or incidental thereto."

Under the Competition Act, cartels are viewed as anti-competitive practises. The board can issue a ruling against a foreign entity if it engages in any activity that has an appreciable adverse effect on competition (AAEC) in India, in addition to acting in cases of domestic cartels. The Act establishes the Director General (DG), COMPAT, and CCI as the three main enforcement agencies. CCI and its investigative wing, DG, have the authority to conduct investigations. The CCI may initiate an investigation into a cartel either suo moto, based on information or knowledge already in its possession, or upon receiving information or a referral from the government or a statutory entity. According to the Act, the Commission shall direct the DG to conduct an investigation if it appears to the Commission that there is a prima facie case of an anti-competitive agreement (cartels being one of them). The DG must do the tasks outlined in Chapter V of the Act while looking into the

case. The commission must receive the DG investigation's report following completion. Based on this study, if the commission determines that a cartel has been formed, anybody who is expressly or implicitly a part of this agreement will face severe punishment. Section 27(proviso)'s states that:

"Provided that in case any agreement referred to in section 3 has been entered into by a cartel, the Commission may impose upon each producer, seller, distributor, trader or service provider included in that cartel, a penalty of up to three times of its profit for each year of the continuance of such agreement or ten percent. of its turnover for each year of the continuance of such agreement, whichever is higher".

As far as cartels are concern the Act provided a very stringent provision when compared to penalties provided for other anti-competitive agreement. Appeal from CCI would lie in COMPAT.

Provision under Competition Act 2002 to regulate price cartel:
The MRTP Act, 1969's problems are noted in the Competition Act, which makes it the first time that the Act itself clearly defines global cartels. The Competition Act of 2002 was created with the following stated as its primary goal: "An Act to provide, in consideration of the economic development of the country, for the establishment of a Commission to promote and sustain competition in markets, to protect the interests of consumers, and to ensure freedom of trade carried on by other participants in markets, in India, and for matters connected therewith."

Under the Competition Act, cartels are viewed as anti-competitive practices. The board can issue a ruling against a foreign entity if it engages in any activity that has an appreciable adverse effect on competition (AAEC) in India, in addition to acting in cases of domestic cartels. The Act establishes the Director General (DG), COMPAT, and CCI as the three main enforcement agencies. CCI and its investigative wing, DG, have the authority to conduct investigations. The CCI may initiate an investigation into a cartel either on its own initiative, in reliance on knowledge or information already in its possession, or in response to information received or upon receiving a referral from the government or a statutory authority. According to the Act, the Commission shall direct the DG to conduct an investigation if it appears to the Commission that there is a prima facie case of an anti-competitive agreement (cartels being one of them). The DG must do the tasks outlined in Chapter V of the Act while looking into the case. The commission must receive the DG investigation's report following completion. Based on this findings, if the commission determines that a cartel has been formed, anyone who is a part of it whether directly or implicitly will face severe punishment. Section 27(proviso)'s reads as follows: "Provided that, in the event that any agreement referred to in Section 3 has been entered into by a cartel, the Commission may impose upon each producer, seller, distributor, trader, or service provider included in such cartel, a penalty of up to three times such producer's profit for each year of the continuance of such agreement or ten percent of such producer's turnover for each year of the continuance of such agreement, When compared to the penalties established for other anti-competitive agreements, the Act provided a fairly strict provision against cartels. CCI's appeal would be heard under COMPAT.

Many experts believe that preventing cartel activity is the most important function of an opposition office. They believe that since cartels harm customers the most, finding and proving these claims should be one of the main priorities for competition authorities. As cartels are envisioned and carried out in secrecy, arresting them may be the most difficult task given to rival governments. Administrators of cartels refrain from actively collaborating with competition authorities during investigations since they are aware that their behavior is illegal. As a result, obtaining evidence to show the existence of cartel understandings involves specialized investigative tools and skills. The following list illustrates the various types of evidence that can be used to identify cartels

CCI decisions on price cartel cases:
The MRTP Commission, created by the MRTP Act of 1969, has been succeeded by CCI. To make sure that no unfair practises have been used in the market, this commission has been given greater authority and resources. According to the Supreme Court, the CCI was authorised to take notice of agreements made before May 20, 2009. According to certain sources, CCI did extraordinary work in addressing the cartel issue. According to data from the CCI up until 2018, 63% of all cases that were looked into involved cartelization. The commission has assessed fines in five cartel proceedings since April 1, 2019.

Several current instances: Case of ACC Cement: Since it began operating in 2008, the Competition Commission of India has fined 11 significant cement makers a total of Rs 6,307 crore for cartelization, which is the largest penalty the agency has ever levied.

Modi Alkali and Chemicals Limited versus DG: There has been a criticism that some of the biggest businesses in northern India have banded together to increase the cost of their goods. In 1992, the cost of chlorine gas and

hydrochloric acid rose by 277% and 200%, respectively, during the course of six and four months. As a result, the parties came to an agreement to feign a scarcity in order to raise the price of their goods. Since the cost of power and sodium chloride as raw materials remained essentially unchanged, this would be a made-up crisis intended to manipulate the market and drive up the cost of their goods.

Flashlight Case The court, in this case, held that "there was no violation of Section 3 of the act even when the information had been exchanged between the competitors. The commission in this case noted that as there is no fixation of prices in their agreement, thus, the presumption of appreciable adverse effect on competition (AAEC) did not apply". Rajasthan Cylinders case: The Supreme Court in this case held that "despite the identical fixation of prices by the bidders and a trade association meeting, the court found out that there was no involvement of any collusive bidding. The parallel pricing fixation is the nature of the market and not the collusion". Madhya Pradesh Chemists and Distributors Federation V. Madhya Pradesh Chemists and drug association : The court, in this case, held that " any agreement which causes an adverse effect on competition but is not actually covered under section 3 of the Competition Act, 2002. However, in such concerning cases, the onus to prove the guilty side of the cartel is on Commission". Jeetender Gupta V. Competition Commission of India: In this case, the Appellate tribunal stated that "the legal machinery under the Competition Commission Act, 2020 cannot certainly be moved by a person who actually has no interest in whatsoever the subject matter of the information is."

In the matter of Rajasthan Cylinders, the Supreme Court reached the conclusion that there was no involvement of any collusive bidding, despite the fact that the bidders had fixed their pricing identically and that there had been a meeting of a trade group. The parallel pricing fixing is not the result of cooperation but rather the inherent nature of the market.

Chemists and Distributors Federation of Madhya Pradesh vs. Madhya Pradesh Chemists and Drug Association: Regarding this particular instance, the court came to the conclusion that "any arrangement which creates a detrimental effect on competition but is not genuinely included under section 3 of the Competition Act, 2002." In spite of this, the burden of proving which side of the cartel was responsible lies with the Commission in situations of such concern.

The Competition Commission of India v. Jeetender Gupta: In this particular instance, the Appellate tribunal made the following statement: "the legal machinery under the Competition Commission Act, 2020 cannot absolutely be moved by a person who truly has no interest in whatever the subject matter of the information is."

CONCLUSION:
Price cartels are an extremely risky business phenomenon. The wellbeing of the populace is put at risk when cartels are formed, although this is difficult to identify. The Competition Act of 2002 contains strict regulations that will prevent cartel formation. Data from the last ten years indicate that businesses are still participating in cartel formation. But at the same time, CCI's strict actions give us hope that the law will prevent the creation of this anti-competitive pact. enabling the market to operate freely.

Additionally, this would guarantee the buyer greater options and a better price, attaining the goal of citizen welfare set down in Part IV of the Indian Constitution.

REFERENCE
1. Cartelization is one of the horizontal agreements that shall be presumed to have appreciable adverse effect on competition under Section 3 of the Act.

2. James Chen, "Cartel", Investopedia, https://www.investopedia.com/terms/c/cartel.asp (Visited on November, 2022)

3. Competition Act, 2002, (12 OF 2003)S.2(c)

4. Union of India vs. Hindustan Development Corporation, SC 1994 AIR 988

5. Vijay Kumar, "Cartels in the Kautiliya Arthasastra", 6 Czech Economic Review 59 (2012)

6. The Sherman Act of 1890 and the Clayton Act of 1914

7. Aditya Bhatacharya and Ondrila De, Cartels and the Competition Commission, 47 EPW 14 (Sept.2012)

8. (https://cutsccier.org/pdf/Study_of_Cartel_Case_Laws_in_Select_Jurisdictions-Learnings_for_the_CCI.pdf)

9. Competition Act, 2002 (12 of 2003) S.3(3)(c)

10. Supra

11. Competition Act, 2002 (12 of 2003) S.3(3)(d)

12. The explanation to sub-section (3) of Section 3 of the Act

13. Australian Competition and Consumer Commission, Price fixing, https://www.accc.gov.au/business/anti-competitive-behaviour/cartels/price-fixing , (visited on November 5, 2022)

14. UNCTAD, Measuring the Economic Effects of Cartels in Developing Countries, https://unctad.org/Topic/Competition-and-Consumer-Protection/Research-Partnership/Platform/Economic-Effects-of-Cartels (visited on November, 5 2022)

15. OECD, Hard Core Cartels- Harm and Effective Sanction, https://www.oecd.org/competition/cartels/21552797.pdf (visited on November 5, 2022)

16. Supra

17. Udit Mishra, Explain Speaking why cartels can be even worse than monopolies, Indian Express, September 28, 2022 https://indianexpress.com/article/explained/why-cartels-can-be-even-worse-than-monopolies-7536426/

18. Craig W. Conrath, "Practical Handbook of Antimonopoly Law Enforcement for Economies in Transition or Development", Department of Justice (2003)

19. T. "Ramappa, Competition Law in India (Oxford University Press, New Delhi, 2nd edn., 2009)"

20. Constitution of India, art. 38 and art. 39

21. Notes on Competition Law SRCC https://www.srcc.edu/sites/default/files/B.com%20H_sem%20vi_Consumer%20affairs%20and%20Customer%20Care_Ms.%20Kavita%20Kamboj.pdf

22. Supra

23. Competition Act, 2002 (12 of 2003) S.33(1)(g)

24. Competition Act, 2002 (12 of 2003) S. 12B

25. Competition Act, 2002 (12 of 2003) S.1

26. Competition Act, 2002 (12 of 2003) S. 2(c)

27. https://www.cci.gov.in/sites/default/files/cci_pdf/competitionact2012.pdf

28. Competition Act, 2002 (12 of 2003)S. 3

29. Competition Act, 2002 (12 of 2003) S. 32

30. Competition Act, 2002 (12 of 2003) S. 19(1)

31. Competition Act, 2002 (12 of 2003) S. 53A

32. Competition Act, 2002 (12 of 2003) S. 2(c)

33. https://www.cci.gov.in/sites/default/files/cci_pdf/competitionact2012.pdf

34. Competition Act, 2002 (12 of 2003) S. 3

35. Competition Act, 2002 (12 of 2003) S. 32

36. Competition Act, 2002 (12 of 2003) S. 19(1)

37. Competition Act, 2002 (12 of 2003) S. 41

38. Competition Act, 2002 (12 of 2003) S. 2(l)

39. Competition Act, 2002 (12 of 2003) S. 53A

40. Excel Crop Care v Competition Commission of India (Civil Appeal 2480/2014)

41. Vivek Aggarwal, India: Cartels Comparative Guide, Mondaq, https://www.mondaq.com/india/antitrustcompetition-law/900272/cartels-comparative-guide, (visited November 5 2022)

42. Case No. 29 of 2010 (CCI)

43. 2002, CTJ 459 (MRTP)

44. Suo Motu Case 01/2017

45. Civil Appeal 3546/2014

46. Case 64/2014 40 Appeal 30/2014

47. Appeal 30/2014

48. Civil Appeal 3546/2014

49. Case 64/2014

50. Appeal 30/2014

AN ANALYSIS OF FINANCIAL EFFICIENCY OF PACS IN SATARA DISTRICT: A CASE STUDY

Bagade Swapnil Rajan
Research Scholar, K.P.B. Hinduja College, Mumbai
https://doi.org/10.5281/zenodo.10353113

ABSTRACT:
India's economy is based mostly on the growth of the agricultural and its allied sector that contributes about 21% of the country's (GVA). Over the period, the need for agricultural credit has been increased and that has given rise to organized and unorganized sector of lending. The current paper reviews the performance of PACS in the study area. The main objective focuses on the growth and development of primary agricultural credit cooperatives societies in Satara district of state Maharashtra. For the study, the statistical techniques like mean, coefficient of variance were used with the use of secondary sources of data to analyze the performance of the primary agricultural credit societies in the study area. The study finds that the growth of profitability is inconsistent or unstable during the study period and there is no satisfactory growth of PACS in Satara district.

Keywords: Primary agricultural credit cooperative societies (PACS), growth, development, Agricultural inputs, Credit, CAGR, NABSCOB

I. INTRODUCTION
PACS are the banks which are situated in rural area and play a very important role in rural credit system by performing their activities on co-operative principles and also these banks are worked under the District Credit Co-operative Banks. They provide short term and medium term loan to rural people to meet their financial requirements. But, the rural people still depend on unorganized sources such as money lenders in village, mandies, traders etc. So, various measures taken by Government to reduce these unorganized sources through the establishment of PACS in rural areas. In order know the role of PACS in agricultural development in India the study has been undertaken.

II. OBJECTIVES OF THE STUDY
1. To study the growth and development of the PACS in study area.

2. To study the performance of the PACS in the Satara District.

III. RESEARCH METHODOLOGY
Data collection is the most important step in the process of research work. The methodology of data collection for present research work is planned in such a manner that every bit of information pertains to different aspects of performance has been collected. The researcher has been used primary data and secondary data for the research purpose. The secondary data necessary for the present research work especially for the theoretical analysis has been gathered by the review of past literature and the statistical information is collected by personal visit to: DCC Satara, Wai, Javali, Koregoan and various talukas, Annual Report, Cooperative Societies, Published Unpublished Report, Nabscob Report, Various Reports of PACS, Journal, Article and News of Cooperative Sectors and Various Audit Report of Management

IV. REVIEW OF LITERATURE
Thirupathi, T. (2013), in the paper entitled "An analysis of financial performance of select primary agricultural cooperative credit societies in Mettur Taluk, Salem District".The goal of this research was to look at the profitability, liquidity, and solvency of the selected PACS. 2. To make a financial comparison. 3. Make recommendations to improve the financial performance of the PACS in question. The researcher used secondary sources to write the entire study. Finally, he found that the Navappaty PACS Gross Profit Ratio showed an upward tendency, and the debtor's turnover ratio grew.

Ramananda M. S, & Jayaprakash M. (2012), "Impact on Vyadyanathan Committee wangapally Primary Agricultural Cooperative Credit Society's Recommendations." The purpose of this article is to investigate the impact of the Vydhanathan committee's recommendations concerning the Wangapally Primary Agricultural Cooperative Credit Society. The purpose of this study is to look into the financial aspects of the Wangapally Primary Agricultural Cooperative Credit Society. This research used secondary data. The recent adjustment to the Vaiydhyanathan committee's recommendation that the government keep 25% of equity capital in the event of PACS should be seriously considered, according to the researcher. Attempts should be made to either completely remove government equity from the PACS or to recognize the PACS as quasi-government ventures with new performance standards.

V. HYPOTHESIS OF THE STUDY

Ho: There is no significant relationship between actual performance and organizational goals.

H1: There is no significant relationship between actual performance and organizational goals.

VI. ANALYSIS AND INTERPRETATION

A. Capital of PACS in India:

A Primary Agricultural Credit Society is organized at grass-root level of a village or a group of small villages. The details **Capital of PACS** in India are given in below table.

Table: 1: Table Showing Capital of PACS in India

Sr. No.	Year	Capital	AAGR
1	2008-09	700732	------------
2	2009-10	714842	0.020136086
3	2010-11	755117	0.056341122
4	2011-12	828010	0.096532061
5	2012-13	986830.9	0.191810365
6	2013-14	978880.4	**-0.008056598**
7	2014-15	1106828.6	0.130708716
8	2015-16	1228111	0.109576496
9	2016-17	1412155.4	0.149859744
10	2017-18	1414199.5	0.001447504
	Mean	**1012570.68**	**0.08315061**
	Max	**1414199.5**	**0.191810365**
	Min	**700732**	**-0.008056598**
	SD	**271691.0388**	
	CAGR	**0.072743453**	

Source: Annual Report

The above table shows that the capital of PACS in India from the years of 2008-09 to 2017-18 during this year the mean amount of total capital is Rs: 1012570.68 and its average annual growth rate are 0.08315061. The maximum capital amount is 1414199.5 and AAGR is 0.191810365. on the other hand the minimum capital amount is 700732 and its minimum AAGR is -0.008056 during the study period there were standard devotion amount is 271691.0388 as well as CAGR is 0.072. It is concluded that during the study period in the year of 2013-14 capital was decreased. After this year of there is continuously growth in the capital during the study periods. As per the data it is observed that very less growth of the capital during the study periods in India. Because lack of capital increased by the government for the PACS.

B. Profitability of PACS in Satara:

Profit equals a company's revenues minus expenses. Earning a profit is important to a small business because profitability impacts whether a company can secure financing from a bank, attract investors to fund its operations and grow its business. Companies cannot remain in business without turning a profit. Net income or net earnings is a measure of the profitability of a venture after accounting for all costs. The details of net profit of the selected PACS are given in below table.

Table: 2: Table showing profitability of PACS in Satara

Sr. No.	Year	Amount In Lakhs	AAGR
1	2009-10	89.59	
2	2010-11	119.45	0.333296
3	2011-12	122.95	0.029301
4	2012-13	111.16	-0.09589
5	2013-14	149.16	0.34185
6	2014-15	212.17	0.422432
7	2015-16	233.87	0.102276
8	2016-17	234.83	0.004105
9	2017-18	209.8	-0.10659
10	2018-19	223.91	0.067255

Avg. Mean	**1706.9**	**0.122004**
MAX	**1706.9**	**0.422432**
MIN	**111.16**	**-0.10659**
SD	**57.42379**	
CAGR	**0.095926**	

Source: Annual Report

The above table presents that the Profitability of PACS in Satara District from the year 2009-10 to 2018-19. The Average mean of Profitability amount is 170.6 and Mean of AAGR is 0.12. The Maximum Profitability is 234.83 and maximum Average growth is 0.42 during the study periods. The minimum profitability is 111.6 and minimum growth is -0.10 659. The amount of profitability standard deviation is 57.42 and Compound annual growth rate is 0.09 during the study periods. It is understood that there is growth of profitability very fluctuating in the study periods. Here seen that there is no satisfactory growth of PACS in Satara district.

C. Actual Target and Distribution of PACS Satara District:
The below table explains year wise target and distribution of loan in Satara district during the study period.

Table: 3: Actual Performance and organizational goals.

Sr. No	Year	Target	Growth	Distribution	Growth
1	2010-11	46495	0	56463	0
2	2011-12	53435	0.14926	64855	0.148628
3	2012-13	64300	0.20333	100703	0.552741
4	2013-14	76400	0.18818	107067	0.063196
5	2014-15	10080	12.1937	125142	0.16882
6	2015-16	1145	-0.8863	129678	0.036247
7	2016-17	1350	0.17852	105012	-0.19021
8	2017-18	1350	0	120386	0.146402
9	2018-19	1350	0	173342	0.439885
10	2019-20	1400	0.03703	155817	-0.1011
11	2020-21	1300	-0.0714	186308	0.195685
	Min	46495	-0.88636	56463	-0.19021
	Max	1008004	12.193	186308	0.552741
	Average	237898.7	1.792287	120580.3	0.140217

Source: Annual Report

The above table presents that the Actual Performance and organizational goals of PACS in Satara District from the year 2009-10 to 2018-19. It is observed that there is target mean value is 237898.7 and its average growth was 1.792287. There is actual distribution value is 120580.3 and its growth value is 0.14. It means that actual performance is more than organizational goals but there is negative growth in the last five years. There is need of increase the crop loan amount for the agricultural developments.

Testing of Hypothesis

H0: There is no significant relationship between actual performance and organizational goals.

H1: There is significant relationship between actual performance and organizational goals.

For this hypothesis researcher has set two variables target of loan (organizational goals) and distribution of loan (actual performance). After researcher has use paired sample T test. The below table explain in details.

Table: 4

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Actual performance	.4603	11	4.43	1.335
	Organizational goals.	.1328	11	.2161	.0651

The above table indicates that paired sample statistics of actual performance and organizational goals. The actual performance mean value is .4603 and mean value of Organizational goals .1328.

Table: 5

		N	Correlation	Sig.
	Paired Samples Correlations			
Pair 1	Actual performance & organizational goals.	11	0.20	0.57

The above table shows the paired sample correlation of actual performance and organizational goals there is correlation between two values is .010 it means there is low correlations.

Table: 6

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Actual performance and organizational goals.	.32759	4.43346	1.33674	-2.65085	3.30603	.245	10	0.511

It found that P value (Sig Value) is greater than level of significance (0.05), It means that accepted null hypothesis: **Ho:** There is no significant relationship between actual performance and organizational goals in the Study area is rejected.

VII. FINDINGS OF THE STUDY

1. It is understood that during the study periods there are ups and downs the AAGR after in the year 2014-15 there were AAGR is increased. It is Compound annual growth rate is very low.

2. It is understood that there is growth of profitability very fluctuating in the study periods. Here seen that there is no satisfactory growth of PACS in Satara district.

3. It found that actual performance is more than organizational goals but there is negative growth in the last five years. There is need of increase the crop loan amount for the agricultural developments.

VIII. SUGGESTION

1. **Analyze the Causes of Negative Growth:** Before increasing the crop loan amount, it's important to understand why there has been negative growth in the past five years. Conduct a thorough analysis of the factors contributing to this decline. This may involve assessing market conditions, weather patterns, agricultural practices, or policy changes.

2. **Increase Loan Amounts:** If the analysis suggests that increasing the crop loan amount is necessary, do so cautiously. Ensure that the increased loan amounts are reasonable and sustainable for farmers. Striking the right balance is crucial to avoid overburdening farmers with debt.

3. **Promote Diversification**: Encourage farmers to diversify their crops and explore alternative income sources. This can help mitigate risks associated with negative growth in specific crops and promote overall agricultural development.

IX. CONCLUSIONS

It concluded that over the study period, there have been fluctuations in the Average Annual Growth Rate (AAGR). In particular, there was an increase in AAGR after the year 2014-15, but overall, the Compound Annual Growth Rate (CAGR) remains low. This may indicate inconsistent or slow growth in some area or industry. Profitability growth has been inconsistent or unstable during the study period. Additionally, it mentions that there is unsatisfactory growth of Primary Agricultural Credit Cooperative Societies (PACS) in Satara district, which may be a concern for agricultural development in that region. It concluded that despite surpassing organizational goals, there has been negative growth in the last five years. To address this issue and support agricultural development, it is recommended to increase the amount of crop loans provided.

REFERENCES

- Kaur, H., & Dhaliwal, N. K. (2018). *Amity Journal of Agribusiness*, *Vol. 3*(1), 26–36.

- Thirupathi, T. (2013). An analysis of financial performance of select primary agricultural cooperative credit societies in Mettur Taluk, Salem District. *Research Front*, *Vol.1* (1), 19–24.

- Ramananda M. S, & Jayaprakash M. (2012). Impact on Vydhyanadhan Committee recommendations of wangapally primary agricultural co-operative credit society. *International Journal of Physical and Social Sciences*, *Vol. 2*(9), 82–93.

- https://nafscob.org/

- https://www.sataradccb.com

- www.agricoop.nic.in & http://desagri.gov.in

WIND CHARACTERISTICS IN WET-HUMID TROPICAL REGION OF INDIA: A CASE STUDY OF ASSAM, INDIA

Ujjal Deka Baruah and Nitashree Mili
Geography Department, Cotton University, Guwahati, Assam
https://doi.org/10.5281/zenodo.15132052
udbmail@cottonuniversity.ac.in, nitashree.mili@cottonuniversity.ac.in

ABSTRACT
We analysed the wind characteristics using both empirical (1943-2012) and reanalysis data (1948-2016) for the long term to assess the wind energy potential and anomaly in the Assam. The Weibull Probability Density Function method was applied to evaluate the pattern of wind speed. It was found that the wind in the region was non-uniform and irregular in nature. The spatial distribution of zonal and meridional wind was assessed to evaluate the variability of the wind speed. Karbi Anglong Hills acts as a wind break bifurcating the zonal wind. The anomaly in wind speed was high in the north eastern and southwestern part of the region. The scale factors indicate potentiality of the wind speed was not adequate for harnessing wind power.

Keywords- Wind, Weibull Probability Density function, NCEP/ NCAR Reanalysis data, Assam.

1. INTRODUCTION

Renewable sources are considered a bridge to the future energy demand (Dincer, 2000; Mabel et al., 2008). Wind characteristics and its potential is widely studied across the world to harness its energy (Chang et al., 2003; Ramachandra et al., 2005). India with highest annual growth in wind energy installation ranks fourth in terms of installed capacity (Mabel et al., 2008). Expected power requirement of Assam is predicted to be 2,534 MW by 2021-22, which is twice that of 2011-12 (Karmakar, 2018). So far hydropower (457 MW) is the only source of renewable energy contributing towards total installed capacity (1710 MW) as on July, 2019 in Assam (CEA, 2019). It has become an indispensable necessity to harness power from other alternate source to meet the ever-increasing demands of the state.

Even in terms of plants growth and its ecosystem services, including regulating water balance, air quality, and ground surface temperatures, winds play a vital role (Bang et al., 2010). These plant responses are directly linked with mechanical effects of wind speed and, may occur throughout the growing season of a crop (Cleugh et al., 1998). Change in growth rate – parts of the plant (e.g. changes in the root: shoot ratio) or the whole plant; change in morphology and final grain yields are the direct effects of wind speed. The dry weight of plants decreases with an increase of wind speed (Whitehead, 1962). Some of the direct and indirect effects of wind on different process includes wind erosion, plant damage, turbulent mixing of heat, transport pathways for pollens, pollutants and pathogens, etc. (Cleugh, 1998). Cirro-stratus and alto stratus clouds mostly brings rain during Monsoon period in India (Gupta et al., 2011). The travel distance of these type of rain bearing clouds depends on the nature and speed of winds. Although, anecdotal and published evidence over the last 50 years suggests that windbreaks may significantly affect precipitation, animal productivity, pasture and crop (Cleugh, 1998). Therefore, wind speed needs to be assessed for its potential as energy source (Azada et al., 2014), control of weather and climate and drivers of crop growth. Henceforth, we try to assess and evaluate the pattern of wind speed in parts of tropical humid-wet region of North East India (89°-96° 5′E & 23° -28° 30′N) with special reference to Assam, India.

2. STUDY AREA

The study area is confined within 23°-29° N and 89°-97° E bounded by lofty mountains international boundary of China, Myanmar, and Bhutan in the North-North East, and Bangladesh in the south. Assam is located in the north eastern part of India (Figure 1), where agriculture still holds the main economy of the state. More than 50% of the workforce are engaged in agricultural activities, which includes cultivators and agricultural labourers. This part of the Indian sub-continent enjoys humid wet type of tropical climate. The region receives more than 90% of their rainfall during the monsoon season (June-September) (Baruah, 2018). Annual maximum temperature is increasing at a rate of 0.11°C/ decade (ASTEC, 2011; DoEF, 2011), as well as rainfall in Brahmaputra and Barak basin has decreased significantly (Deka et al., 2012).

These anomalies in climatological parameters bears a great significance for the agricultural activities in Assam. Uncertainties in climate indices may lead to crop failures due to unprecedented rainfall causing floods (Anom, 2014a; Mandal, 2010; Mandal, 2014) and rise in temperature leading to drought like situations (Anom, 2014b; Anom, 2017; Borah et al., 2012; Pant et al., 1981; Parida et al., 2015) . Along with temperature and rainfall, wind pattern plays a vital role in growth and yield of agricultural crops.
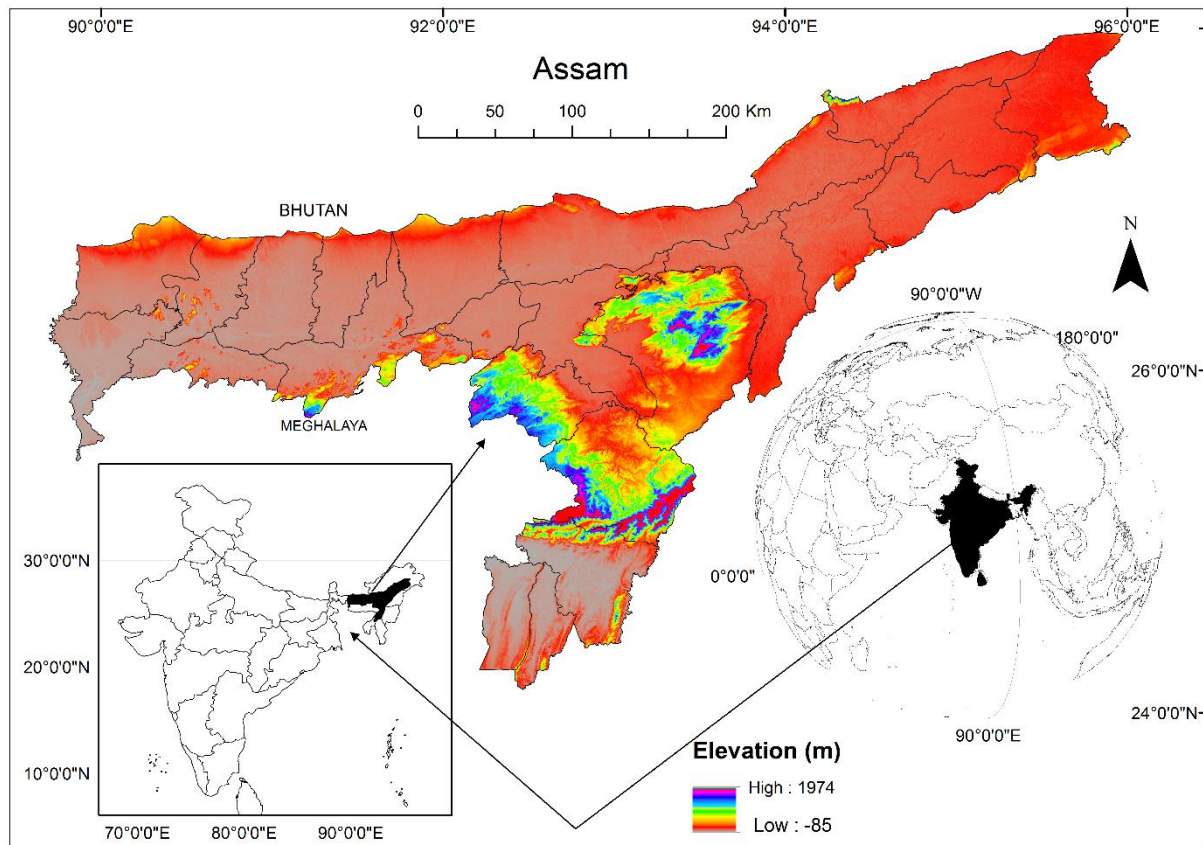
Figure 1 Location of the study area

3. DATABASE AND METHODOLOGY

The wind data were collected from the four airport of Assam viz. Dibrugarh, Guwahati, Tezpur, and North Lakhimpur for the period 1943-2012. There were 48 number of observation in time series with 16 years missing data. We also used NCEP/ NCAR Reanalysis wind data for the period 1948-2016 (http://www.esrl.noaa.gov/psd/) provided by the NOAA/OAR/ESRL PSD, Boulder, Colorado, USA during 1948-2016 to compare the statistics with the ground station data.

In order to assess the strength distribution and energy of wind, the Weibull distribution is used (Nage, 2016; Yürüşen et al., 2016). The Weibull was identified as the best 2-parameter distribution and performs better than some 3-parameter distributions (Ouarda et al., 2015). The Weibull 2-parameter is by far the most widely used distribution to characterize wind speed (Ouarda et al., 2015) and is given by:

$$f(v) = \frac{k}{\lambda} \left(\frac{v}{\lambda}\right)^{k-1} \exp\left(-\left(\frac{v}{\lambda}\right)^k\right)$$

λ is the Weibull scaling factor in m / s, a measure of the wind velocity characterizing the time series. λ is proportional to the average wind speed. k is the Weibull form or shape factor is equal to the slope of the regressed line in a probability plot. It specifies the form of the distribution and assumes a value between 1 and 3. A small k-value (k<1) indicates very variable winds with failure rate decrease over time; whereas variable winds with larger k-value (k>1) indicates increase in rate of failure over time or power is more likely to fail as time goes on; k=1 indicate constant winds with constant failure rate over time. The value of k remains closer to 2, which means that the wind wave is regular and uniform in nature. It varies 1 to 4 according to the nature of wind wave (Azada et al., 2014). To test the significance, if p-value is less than (or equal to) α null hypothesis (H_o) is rejected, in favour of the alternative hypothesis (H_1). Weibull and Rayleigh Probability Density Function (pdf) are most widely used to analyse wind speed data. Wind speed was also assessed both in terms of zonal or x-coordinate (u) and meridional or y-coordinate (v) components. Scalar averaged wind is 'standard' arithmetic mean of wind speed while vector averaged winds are averaged wind direction and can be used to compute a type of average wind speed which is different from scalar averaged wind speed (Grange, 2014). Anomaly in wind speed were analysed in Assam with 1981-2010 as base period using airports empirical data.

4. RESULTS AND DISCUSSION
4.1 Descriptive Statistics on Wind Speed
The average annual wind speed was observed to be 1.13 m/s. 50% of wind blowed at a speed below 1.10 m/s during 1943-2012. The maximum average of 1.85 m/s and a minimum of 0.67 m/s wind speed was observed during 1943-2012. The average monthly wind speed was at a maximum during April (1.85 m/s) and at a minimum during December (0.59 m/s). The shape of the data is highly symmetrical (skewness=0.19) as and mesokurtic (excess kurtosis= -0.17) indicating normal distribution (Table 1).

Table 1 Descriptive statistics on wind speed of Assam during 1943-2012 (m/s)			
Mean	1.13	Std. Error of Kurtosis	.674
Standard Error	0.04	Skewness	0.19
Median	1.10	Std. Error of Skewness	.343
Standard Deviation	0.27	Range	1.13
Sample Variance	0.07	Minimum	0.67
Excess Kurtosis	-0.71	Maximum	1.85

4.2 Wind speed distribution and trend
The histogram and the two parameter ($\gamma=0$) Weibull distribution curve indicates that half of the time, wind blows at speeds, less than 1.10 m/s. The shape of the curve is determined by shape factor of 4.845. The shape factor (k=4.845) indicates that the wind is irregular and non-uniform with the rate of failure likely to increase over time. The distribution is almost symmetrical but a little right skewed (positive skewed). The scale factor (λ) of 1.21(m/s) indicates the potentiality of wind of the region. Therefore, the maximum probability of occurrence of wind speed is always less than 1.1m/s concentrated on the left of the mean in the Weibull probability density function (Figure 2b). Weibull distribution may vary, both in shape and scale factor, in different location depending on the climatic conditions, local topography and land surfaces configuration.

(a)

(b)
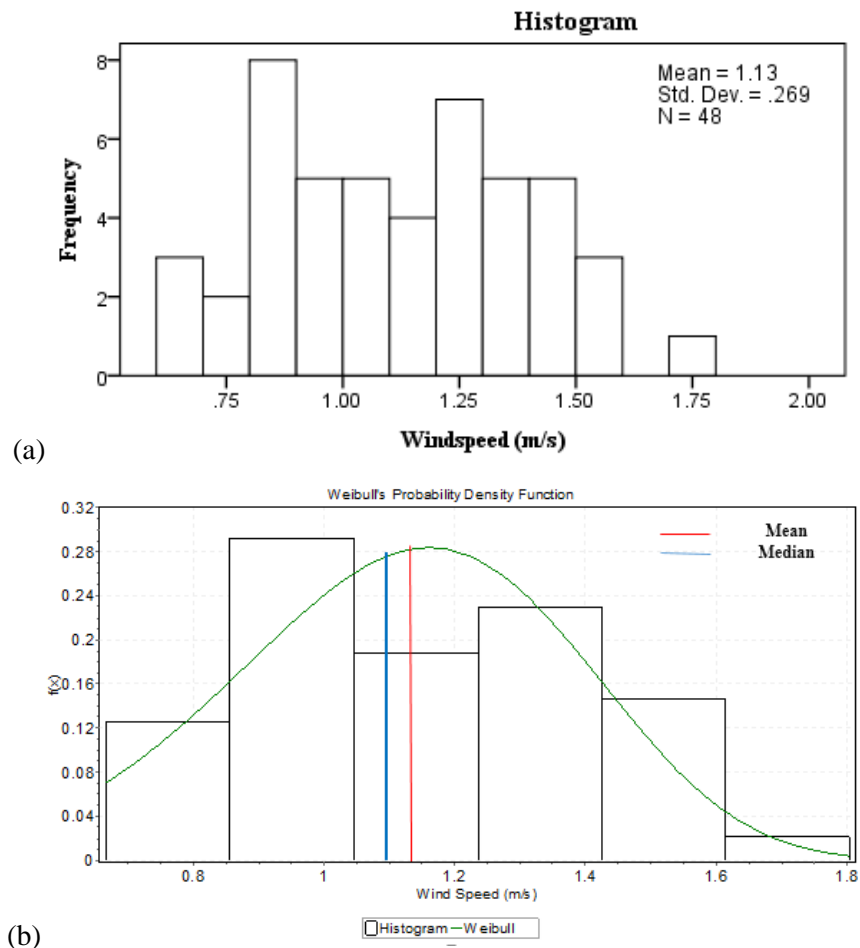
Figure 2 (a) Histogram of wind speed (m/s) during 1943-2012 in Assam; (b) Weibull's Probability Density Function results in a shape factor (k) =4.845 & scaling factor (λ) =1.2174

The various methods of significance revealed that it failed to reject the null hypothesis, since the p-value was greater than α, not in favour of alternate (Table 2). This indicates there was no significant trend in wind speed during 1942-2012. The annual average wind speed was decreasing at a rate of 0.124/ year, although it is not statistically significant.

Table 2 Significance test at various level for 48 wind speed obervation

Weibull Probability Density Function					
Kolmogorov-Smirnov					
Statistic P-Value	0.09455 0.74858				
☐	0.2	0.1	0.05	0.02	0.01
Critical Value	0.1513	0.17302	0.19221	0.21493	0.23059
Reject?	No	No	No	No	No
Chi-Squared					
Deg. of freedom Statistic P-Value	48 1.7394 0.78355				
☐	0.2	0.1	0.05	0.02	0.01
Critical Value	5.9886	7.7794	9.4877	11.668	13.277
Reject?	No	No	No	No	No

4.3 Mean wind speed spatial distribution
The spatial distribution of mean wind speed (indicates high wind speed in the north western (3-3.6 m/sec) and south western part of the region (2.7-2.85 m/sec) at 1000 mb during 1948-2016. The presence of Karbi Anglong hills acts as windbreak and bifurcates the easterly wind. The wind speed decreases from northern to southern part of Assam (Figure 3).
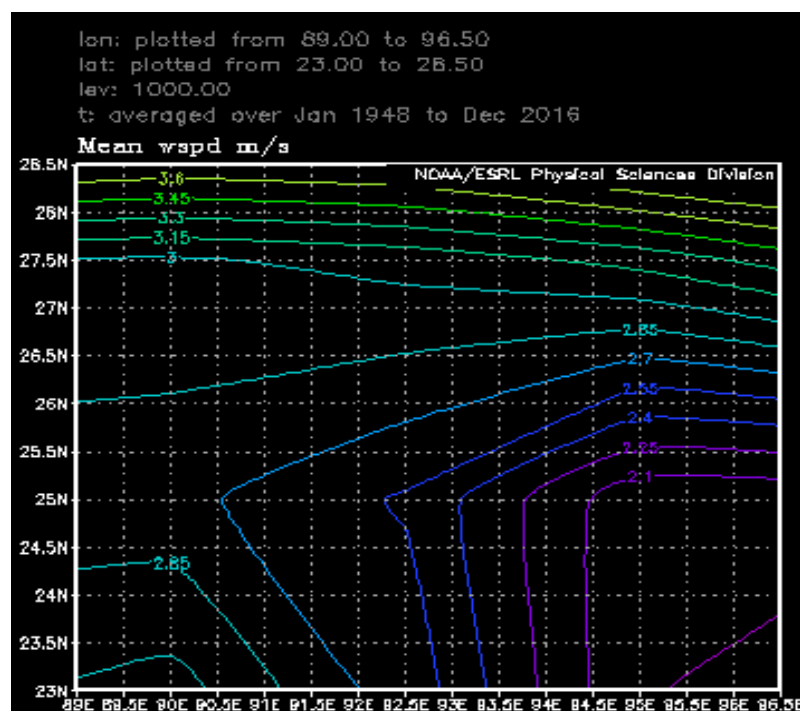
Figure 3 General pattern of wind speed for the region (23.00-28.50 N & 89-96.50 E) at 1000mb, 1948-2016

4.3.1 Zonal Wind Pattern

Zonal winds are positive was wind blows in the west-east direction and negative if it blows in east-west direction. Zonal wind speed ranged between -1.5 to 2 (m/s) and a decreasing trend of wind speed in east-west direction was observed during mid-1970's to mid-1990's. There was a shift in the direction of wind leading to a weakening of the E-W winds and strengthening of (W-E) winds during mid-1970 to mid-1990. The wind tended to blow in a W-E (westerly) direction from the mid-1990 onwards and the magnitude of wind speed decreased as compared to the pre-1970's (Figure 4a and 4b). The anomaly of wind speed (-0.12 to 0.32 m/s) and increased towards north western part of the region and its neighbouring states as observed based on NCEP/NCAR data during 1948-2016 (Figure 4d). The negative anomaly was observed post mid-1990 and increasing thereafter (Figure 4e). Maximum wind speed of 1.25 m/s and minimum of 0.5 (m/s) (Figure 4f) was observed using NCEP/ NCAR Reanlysis data during 1948-2016, which closely approximates the values derived from four ground stations data from Assam (maximum 1.8 m/s and a minimum 0.67 m/s) during 1943-2012.
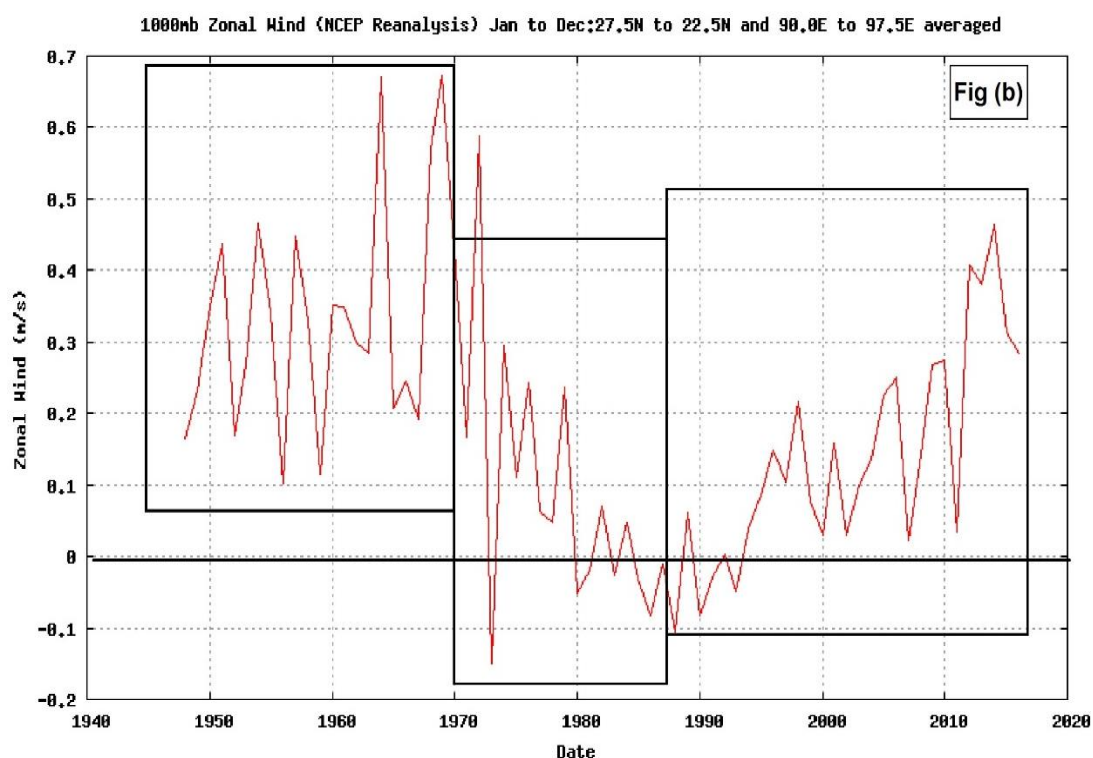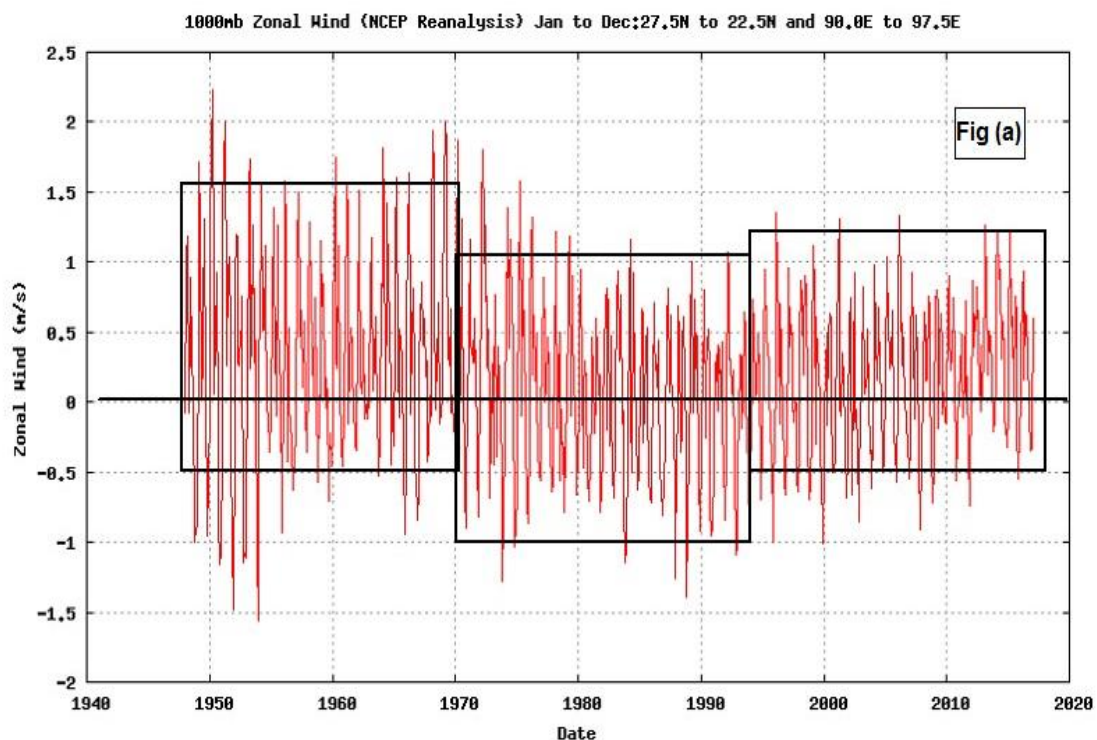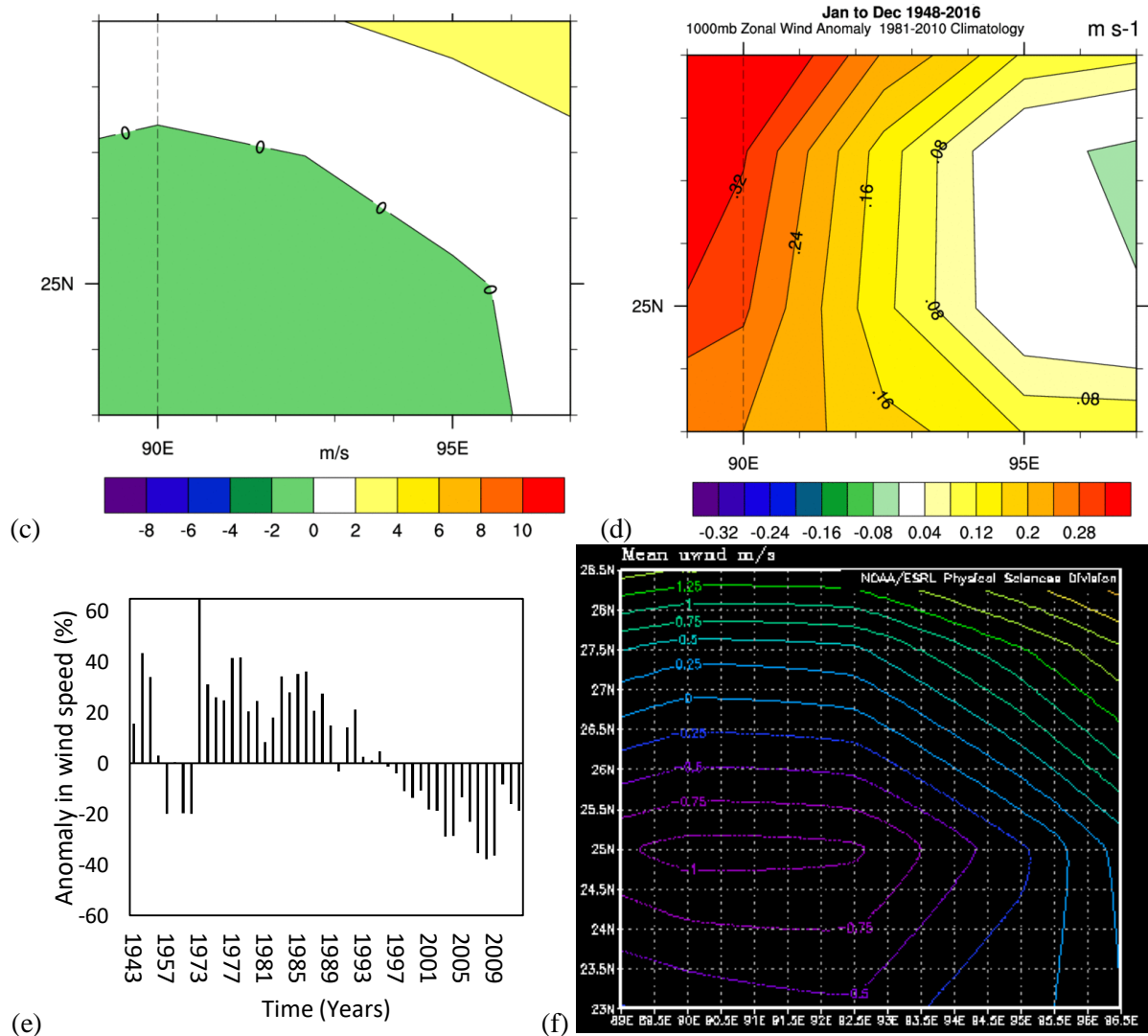
Figure 4 (a) & (b) Daily mean and annual mean zonal wind speed (m/s) resp. during 1948-2016 at 1000mb using NCEP/NCAR reanalysis data; (c) Long term mean/normal wind speed with 1981-2010 as the base period; (d) Mean zonal wind anomaly for the period Jan-Dec, 1948-2016 between 23°-28°50′N and 89°-96°59′E at 1000mb using NCEP/NCAR Reanalysis data; (e) Anomaly in zonal wind speed (%) over Assam during 1943-2012; (f) Mean U-wind (m/s) at 1000mb using NCEP/NCAR Reanalysis data during 1948-2016

Mean zonal wind speed seasonal characteristics in the troposphere was observed for DJF, MAM, JJA, and SON for long term mean base period 1981-2010 (Figure 5). Wind speed is maximum during spring season (MAM) with an average zonal speed of 1.57 (m/s) and minimum during autumn (SON) 0.76 (m/s).

Table 3 Zonal mean wind speed (m/s) based on ground station data and NCEP/NCAR reanalysis data, 1943-2012

Zonal Wind Speed (m/s)			
DJF	MAM	JJA	SON
0.84	1.57	1.16	0.76

During summer (JJA) and autumn (SON), gentle and regular flow of air is observed (Figure11) through-out the region. The direction of wind during summer is observed to be westerly and easterly in the region, while wind during autumn are generally easterly. The zonal wind speed during winter (JJA) and spring (MAM) are 0.84 and 1.57 m/s respectively during 1943-2012. The flow of wind is very complex during winter and spring as evident from the figures (Figure 5) in the region. High speed winds during spring season brings in pre-monsoon rainfall along with them. The winds in north-eastern part of the region are predominantly easterly winds with moderate to high speeds (0.25-3.25 m/s) during spring. Other parts of the region witnessed westerly winds during spring. Similar patterns were observed during winter as well. Thus, both easterly and westerly winds prevailed in the region during both winter and spring.
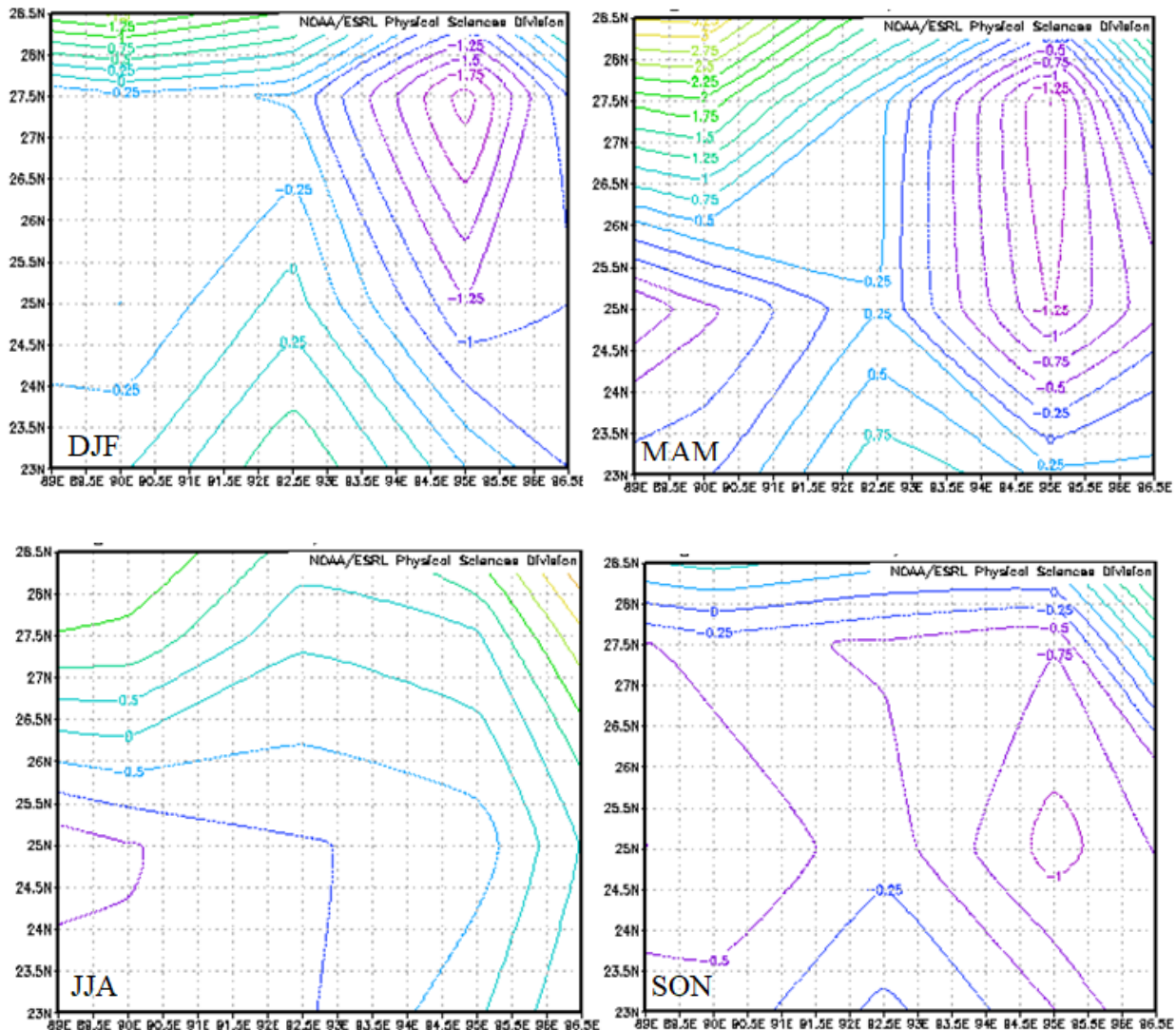
Figure 5 Mean zonal wind speed ,U-Winds (m/s), for the four seasons: December-February, March-May, June-August, and September-November, based on long term mean,1981-2010; region 23-28.5 N and 89-96.50 E (positive and negative value indicates westerly and easterly wind components)

4.3.2 Meridional Wind Pattern

Meridional wind speed decreased from north to south (0.3-2.4 m/s) during 1948-2016 at 1000mb (Figure 6a). This may be due to the presence of lofty Eastern Himalayas, which presents a high downslope towards the Brahmaputra plains. The meridional wind speed during the summer season was higher than during the other seasons, perhaps due to the increased heating during this season. Wind blew mostly from a north-east direction except during summer, when it blowed in a south-north direction. The flow pattern of meridional winds in the region was not uniform during spring and summer seasons and speeds varied according to their local geographical settings. The anomaly in meridional wind was higher in central part in comparison to the other parts of the study area (Figure 6b).
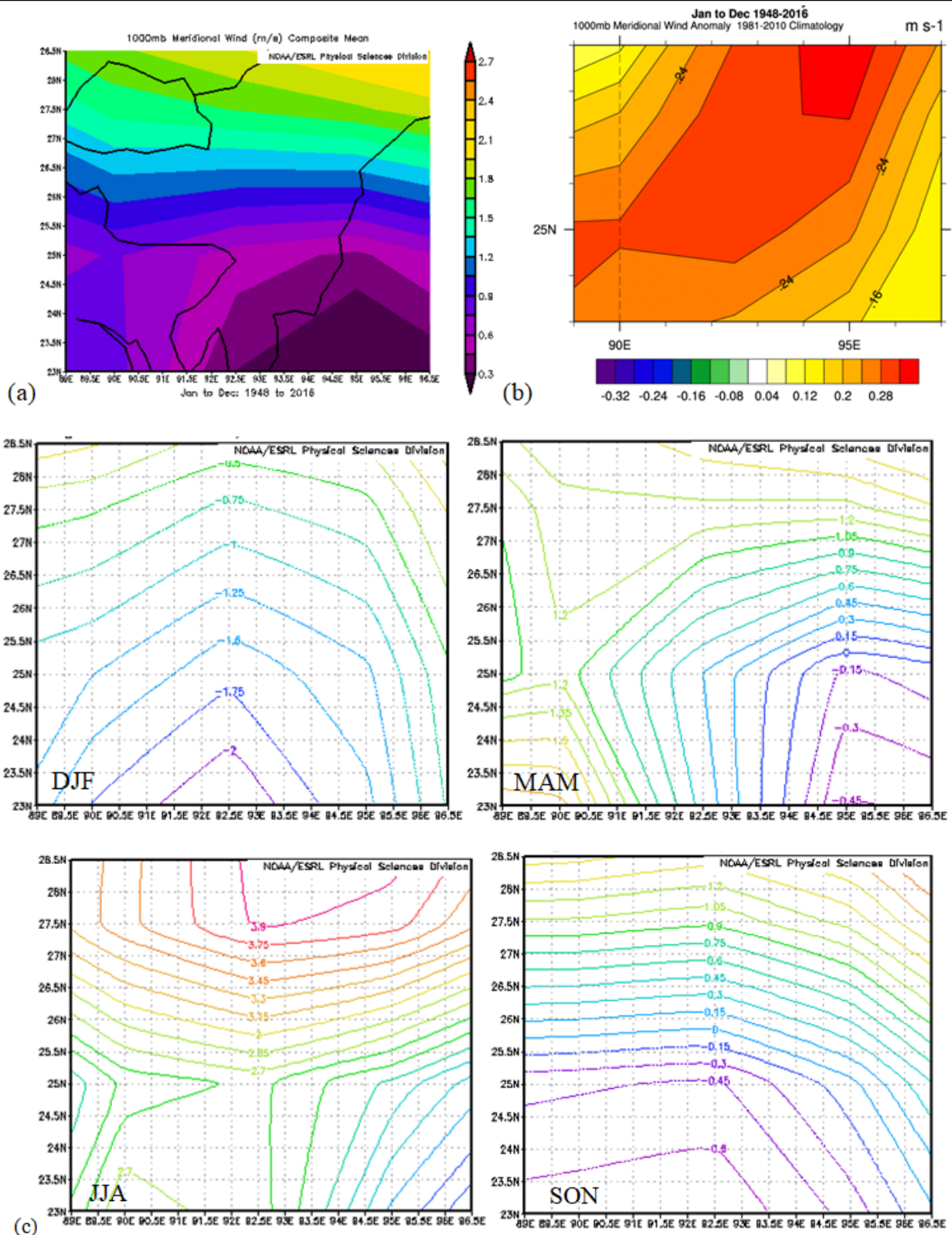
Figure 6 (a) Mean V-wind (m/s) at 1000mb using NCEP/NCAR Reanalysis data during 1948-2016 (b) Meridional Wind anomaly, 1948-2016; (c) Mean zonal wind speed ,V-Wind (meridional) (m/s); for the four seasons: December-February, March-May, June-August, and September-November, based on long term mean,1981-2010; region 23-28.5 N and 89-96.50 E

6. CONCLUSION

The study area is characterised by lack of research emphasizing on assessment of wind speed and distribution pattern. This study followed an empirical approach to study the potential wind energy and distribution pattern in Assam. Wind pattern in this part of Assam was found to be non-uniform and irregular. The Weibull scale factor (λ) of 1.21(m/s) indicates the low potentiality of wind in the region, which was not enough for generation of

wind power. The easterly winds are generally high during spring season than any other season. Meridional winds are responsible for the bringing the rain bearing clouds during monsoon season. The winds flowing downslope of Eastern Himalayas and enters the Brahmaputra valley. This results into high wind speed anomaly in the northwestern part of the region. Therefore, hydropower may be an alternative to wind energy as renewable resource because of abundance water availability from different sources.

REFERENCE

Anom. (2014a). 67 Dead, Over 42 Lakh Hit by Floods in Assam in 2014: Govt. Retrieved 10 Jan, 2017, from http://www.outlookindia.com/newswire/story/67-dead-over-42-lakh-hit-by-floods-in-assam-in-2014-govt/862201

Anom. (2014b). Drought-like situation in 14 Assam districts. Retrieved 17 Aug, 2017, from http://www.thehindubusinessline.com/news/national/droughtlike-situation-in-14-assam-districts/article6288048.ece

Anom. (2017). Drought-like situation hits Assam districts. Retrieved 16 Aug, 2017, from http://sentinelassam.com/story/guwahati-today/0/drought-like-situation-hits-assam-districts/2017-08-09/1/316740#.WZNa6VUjHIU

ASTEC. (2011). Recommendations for State of Assam's Strategy and Action Plan on Climate Change First Draft (pp. 37p.). Guwahati, Assam (India): Assam Science Technology and Environment Council.

Azada, A. K., Rasula, M. G., Alamb, M. M., Uddinb, S. M. Ameer, & Mondal, Sukanta Kumar. (2014). *Analysis of wind energy conversion system using Weibull distribution.* Paper presented at the Procedia Engineering, 10th International Conference on Mechanical Engineering, ICME 2013, Dhaka, Bangladesh.

Bang, C., Sabo, J. L., & Faeth, S. H. (2010). Reduced wind speed improves plant growth in a desert city. *PLoS One, 5*(6e11061). doi: 10.1371/

Baruah, Ujjal Deka. (2018). *Crops and Farmers' Responses to Climate Change: A Case study of Assam.* (PhD), Gauhati University, Guwahati.

Borah, A., Devi.S, & Medhi, M. (2012). Impact of Climate Change on Marginalized Women-An exploratory study across 6 districts in Assam: Centre for Environment, Social and Policy Research (CESPR), and Rashtriya Gramin Vikas Nidhi (RGVN) with Indian Network on Ethics and Climate Change (INECC), Guwahati, Assam, India.

CEA. (2019). All India Installed Capacity (in MW) of Power Stations *Installed Capacity-Monthly Report*. New Delhi: Central Electricity Authority, Ministry of Power, Government of India.

Chang, T. J., Wu, Y. T., Hsu, H. Y., Chu, C. R., & Liao, C. M. (2003). Assessment of wind characteristics and wind turbine characteristics in Taiwan. *Renewable energy, 28*(6), 851-871.

Cleugh, H. A. (1998). Effects of windbreaks on airflow, microclimates and crop yields. *Agroforestry Systems, 41*(1), 55-84.

Cleugh, H. A., Miller, J. M., & Bohm, M. (1998). Direct mechanical effects of wind on crops. *Agroforestry Systems, 41*, 85-112.

Deka, R. L., Mahanta, C., Pathak, H., Nath, K. K., & Das, S. (2012). Trends and fluctuations of rainfall regime in the Brahmaputra and Barak basins of Assam, India. *Theoretical and Applied Climatology, 114*(1-2), 61-71. doi: 10.1007/s00704-012-0820-x

Dincer, I. (2000). Renewable energy and sustainable development: a crucial review. *Renewable and Sustainable Energy Reviews, 4*(2), 157-175.

DoEF. (2011). Assam State Action Plan on Climate Change, 2012 - 2017 draft, Department of Environment & Forest Government of Assam: The Energy and Resources Institute, New Delhi.

Grange, S. K. . (2014). Technical note: Averaging wind speeds and directions: avergaed scalar and vector wind unpublished manuscript School of Environment, University of Auckland, New Zealand.

Gupta, P., & Kapoor, R. (2011). Cloud Classification. In Project Report ASL 720 (Ed.). Delhi: Indian Institue of Technology.

Karmakar, S. (2018, July 3). Assam power need to go up, *The Telegraph-online edition*. Retrieved from https://www.telegraphindia.com/states/north-east/assam-power-need-to-go-up/cid/1453654

Mabel, M. C., & Fernandez, E. (2008). Growth and future trends of wind energy in India. *Renewable and Sustainable Energy Reviews, 12*(6), 1745-1757. doi: 10.1016/j.rser.2007.01.016

Mandal, R. (2010). Cropping Patterns and Risk Management in the Flood Plains of Assam. *Economic and Political Weekly, 45*(33), 78-81.

Mandal, R. (2014). Flood, cropping pattern choice and returns in agriculture: A study of Assam plains, India. *Economic Analysis and Policy, 44*(3), 333-344. doi: 10.1016/j.eap.2014.08.001

Nage, Girma Dejene. (2016). Analysis of Wind Speed Distribution: Comparative Study of Weibull to Rayleigh Probability Density Function; A Case of

Two Sites in Ethiopia. *American Journal of Modern Energy, 2*(3), 10-16. doi: 10.11648/j.ajme.20160203.11

Ouarda, T. B. M. J., Charron, C., Shin, J. Y., Marpu, P. R., Al-Mandoos, A. H., Al-Tamimi, M. H., . . . Al Hosary, T. N. (2015). Probability distributions of wind speed in the UAE. *Energy Conversion and Management, 93*, 414-434. doi: 10.1016/j.enconman.2015.01.036

Pant, G. B., & Parthasarathy, S. B. (1981). Some aspects of an association between the southern oscillation and Indian summer monsoon. *Archives for meteorology, geophysics, and bioclimatology, Series B, 29*(3), 245-252.

Parida, B. R., & Oinam, B. (2015). Unprecedented drought in North East India compared to Western India. *Current Science, 109*(11), 2121.

Ramachandra, T. V., & Shruthi, B. V. (2005). Wind energy potential mapping in Karnataka, India, using GIS. *Energy Conversion and Management, 46*(9-10), 1561-1578. doi: 10.1016/j.enconman.2004.07.009

Whitehead, F. H. (1962). Experimental studies of the effect of wind on plant growth and anatomy. *New Phytologist, 61*(1), 59-62.

Yürüşen, N. Y., & Melero, Julio J. (2016). Probability density function selection based on the characteristics of wind speed data. *Journal of Physics: Conference Series, 753*, 032067. doi: 10.1088/1742-6596/753/3/032067

MANUSCRIPT SUBMISSION

GUIDELINES FOR CONTRIBUTORS

1. Manuscripts should be submitted preferably through email and the research article / paper should preferably not exceed 8 – 10 pages in all.

2. Book review must contain the name of the author and the book reviewed, the place of publication and publisher, date of publication, number of pages and price.

3. Manuscripts should be typed in 12 font-size, Times New Roman, single spaced with 1" margin on a standard A4 size paper. Manuscripts should be organized in the following order: title, name(s) of author(s) and his/her (their) complete affiliation(s) including zip code(s), Abstract (not exceeding 350 words), Introduction, Main body of paper, Conclusion and References.

4. The title of the paper should be in capital letters, bold, size 16" and centered at the top of the first page. The author(s) and affiliations(s) should be centered, bold, size 14" and single-spaced, beginning from the second line below the title.

<center>

First Author Name1, Second Author Name2, Third Author Name3

1Author Designation, Department, Organization, City, email id

2Author Designation, Department, Organization, City, email id

3Author Designation, Department, Organization, City, email id

</center>

5. The abstract should summarize the context, content and conclusions of the paper in less than 350 words in 12 points italic Times New Roman. The abstract should have about five key words in alphabetical order separated by comma of 12 points italic Times New Roman.

6. Figures and tables should be centered, separately numbered, self explained. Please note that table titles must be above the table and sources of data should be mentioned below the table. The authors should ensure that tables and figures are referred to from the main text.

EXAMPLES OF REFERENCES

All references must be arranged first alphabetically and then it may be further sorted chronologically also.

- **Single author journal article:**

Fox, S. (1984). Empowerment as a catalyst for change: an example for the food industry. *Supply Chain Management*, *2*(3), 29–33.

Bateson, C. D.,(2006), 'Doing Business after the Fall: The Virtue of Moral Hypocrisy', Journal of Business Ethics, 66: 321 – 335

- **Multiple author journal article:**

Khan, M. R., Islam, A. F. M. M., & Das, D. (1886). A Factor Analytic Study on the Validity of a Union Commitment Scale. *Journal of Applied Psychology*, *12*(1), 129-136.

Liu, W.B, Wongcha A, & Peng, K.C. (2012), "Adopting Super-Efficiency And Tobit Model On Analyzing the Efficiency of Teacher's Colleges In Thailand", International Journal on New Trends In Education and Their Implications, Vol.3.3, 108 – 114.

- **Text Book:**
Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2007). *Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies* (3rd ed.). New York: McGraw-Hill.

S. Neelamegham," Marketing in India, Cases and Reading, Vikas Publishing House Pvt. Ltd, III Edition, 2000.

- **Edited book having one editor:**
Raine, A. (Ed.). (2006). *Crime and schizophrenia: Causes and cures.* New York: Nova Science.

- **Edited book having more than one editor:**
Greenspan, E. L., & Rosenberg, M. (Eds.). (2009). *Martin's annual criminal code:Student edition 2010.* Aurora, ON: Canada Law Book.

- **Chapter in edited book having one editor:**
Bessley, M., & Wilson, P. (1984). Public policy and small firms in Britain. In Levicki, C. (Ed.), *Small Business Theory and Policy* (pp. 111–126). London: Croom Helm.

- **Chapter in edited book having more than one editor:**
Young, M. E., & Wasserman, E. A. (2005). Theories of learning. In K. Lamberts, & R. L. Goldstone (Eds.), *Handbook of cognition* (pp. 161-182). Thousand Oaks, CA: Sage.

- **Electronic sources should include the URL of the website at which they may be found, as shown:**
Sillick, T. J., & Schutte, N. S. (2006). Emotional intelligence and self-esteem mediate between perceived early parental love and adult happiness. *E-Journal of Applied Psychology*, 2(2), 38-48. Retrieved from http://ojs.lib.swin.edu.au/index.php/ejap

- **Unpublished dissertation/ paper:**
Uddin, K. (2000). A Study of Corporate Governance in a Developing Country: A Case of Bangladesh (Unpublished Dissertation). Lingnan University, Hong Kong.

- **Article in newspaper:**
Yunus, M. (2005, March 23). Micro Credit and Poverty Alleviation in Bangladesh. *The Bangladesh Observer*, p. 9.

- **Article in magazine:**
Holloway, M. (2005, August 6). When extinct isn't. *Scientific American, 293*, 22-23.

- **Website of any institution:**
Central Bank of India (2005). *Income Recognition Norms Definition of NPA*. Retrieved August 10, 2005, from http://www.centralbankofindia.co.in/ home/index1.htm, viewed on

7. The submission implies that the work has not been published earlier elsewhere and is not under consideration to be published anywhere else if selected for publication in the journal of Indian Academicians and Researchers Association.

8. Decision of the Editorial Board regarding selection/rejection of the articles will be final.

INTERNATIONAL JOURNAL OF RESEARCH IN MANAGEMENT & SOCIAL SCIENCE
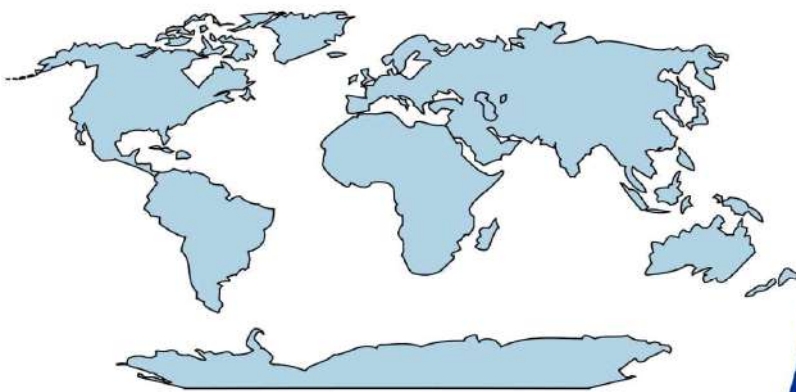
International Journal of Research in
Science and Technology

Volume 6, Issue 2: April - June 2019

INDIAN ACADEMICIANS AND RESEARCHERS ASSOCIATION

Membership No: M / M – 1365

Certificate of Membership

This is to certify that

XXXXXXXX

is admitted as a

Fellow Member

of

Indian Academicians and Researchers Association

in recognition of commitment to Educational Research

and the objectives of the Association

Date: 27.01.2020

Director

President

INDIAN ACADEMICIANS AND RESEARCHERS ASSOCIATION

Membership No: M / M – 1365

Certificate of Membership

This is to certify that

XXXXXXXXXX

is admitted as a

Life Member

of

Indian Academicians and Researchers Association

in recognition of commitment to Educational Research

and the objectives of the Association

Date: 27.01.2020

Director

President

INDIAN ACADEMICIANS AND RESEARCHERS ASSOCIATION

Membership No: M / M – 1365

Certificate of Membership

This is to certify that

XXXXXXXX

is admitted as a

Member

of

Indian Academicians and Researchers Association

in recognition of commitment to Educational Research

and the objectives of the Association

Date: 27.01.2020

Director

President

IARA Organized its 1st International Dissertation & Doctoral Thesis Award in September'2019

ALGORITHMIC COMPOSITION In Hindustani Music
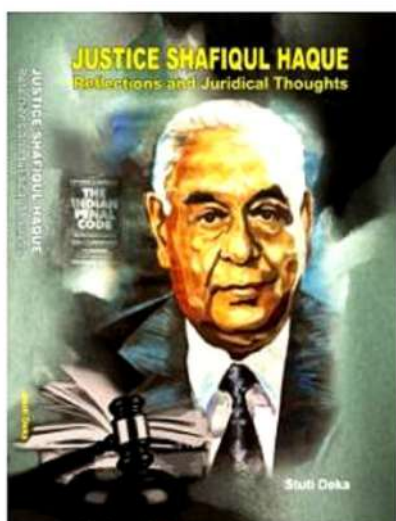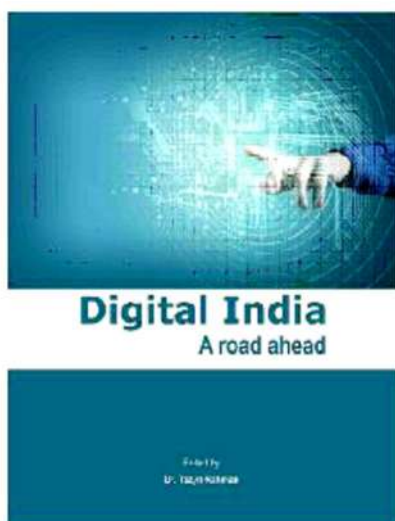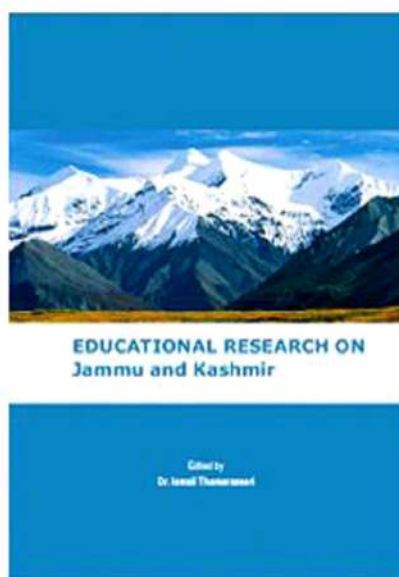
Ashish Kumar Sinha, Dr. Soubhik Chakraborty
Dr. Amritanjali
ISBN : 978-81-930928-8-0

Business Perspectives in Emerging Markets
Business Management Cases
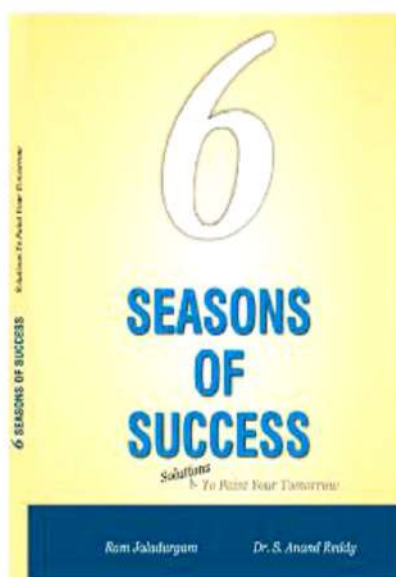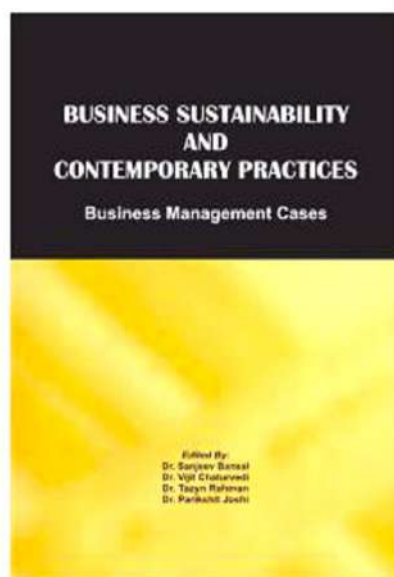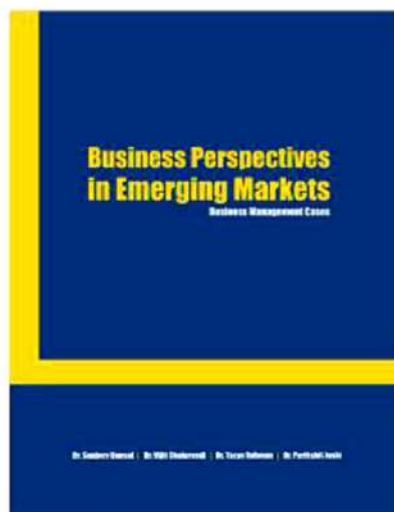
Dr Sanjeev Bansal, Dr. Vijit Chaturvedi
Dr. Tazyn Rahman, Dr. Parikshit Joshi
ISBN : 978-81-936264-0-5

Performance Management Practices FOR IT COMPANIES

Dr. Jyotsna Golhar
Dr. Sujit Metre
ISBN : 978-81-936264-6-7

FINANCIAL PERFORMANCE EVALUATION OF Product Innovation
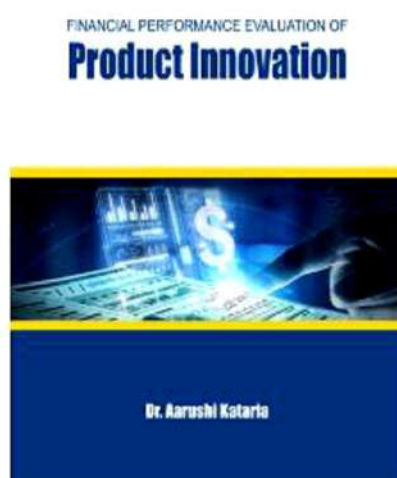
Dr. Aarushi Kataria
ISBN : 978-81-936264-3-6

COMPUTER BASED MASTERY LEARNING VS TRADITIONAL LEARNING
AN EMPIRICAL STUDY
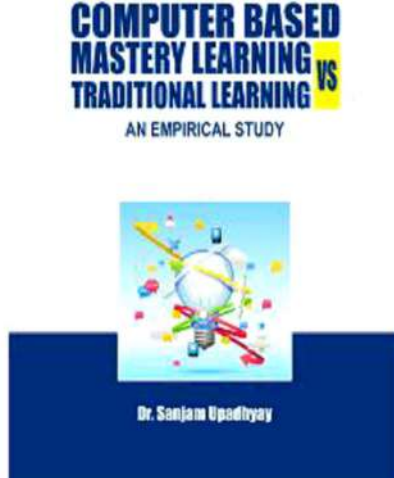
Dr. Sanjam Upadhyay
ISBN : 978-81-936264-5-0

HRD Practices in LIC
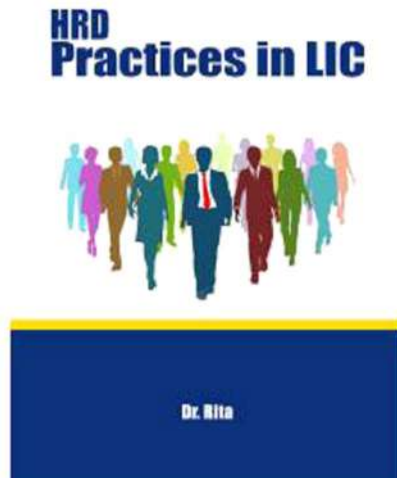
Dr. Rita
ISBN : 978-81-930928-7-3

Price Competitiveness of Indian Banking Sector in Post Liberalisation Era : An Empirical Analysis

Dr. Manas Ranjan Panda, Dr. Prabodha Kr. Hota
ISBN : 978-81-930928-4-2

NATIONAL CONFERENCE ON INNOVATIVE TRENDS IN CIVIL ENGINEERING
April 13 - 14, 2018

DEPARTMENT OF CIVIL ENGINEERING
POORNIMA UNIVERSITY
PROCEEDINGS
ISBN: 978-81-936264-7-4

Poornima University
ISBN : 978-8193-6264-74

MIDITOC 2K18
PROCEEDINGS OF THE CONFERENCE ON MARKETING IN DIGITAL INDIA:
TRENDS, OPPORTUNITIES & CHALLENGES
THEME: INDIA INTERNET MARKETING

Institute of Public Enterprise
ISBN : 978-8193-6264-4-3

Vitamin D Supplementation in SGA Babies

Dr. Jyothi Naik, Prof. Dr. Syed Manazir Ali
Dr. Uzma Firdaus, Prof. Dr. Jamal Ahmed

Gold Nanoparticles: Plasmonic Aspects And Applications

Dr. Abhitosh Kedia
Dr. Pandian Senthil Kumar

Dr. Abhitosh Kedia
Dr. Pandian Senthil Kumar

Social Media Marketing and Consumer Behavior

Dr. Vinod S. Chandwani

Dr. Vinod
S. Chandwani

Select Research Papers of Prof. Dr. Dhananjay Awasarikar

Prof. Dr. Dhananjay
Awasarikar

Recent ReseaRch Trends in ManageMenT

Dr. C. Samudhra Rajakumar, Dr. M. Ramesh
Dr. C. Kathiravan, Dr. Rincy V. Mathew

Recent ReseaRch Trends in Social Science

Dr. C. Samudhra Rajakumar, Dr. M. Ramesh
Dr. C. Kathiravan, Dr. Rincy V. Mathew

Recent Research Trend in Business Administration

Dr. C. Samudhra Rajakumar, Dr. M. Ramesh
Dr. C. Kathiravan, Dr. Rincy V. Mathew

Recent Innovations in Biosustainability and Environmental Research II

Dr. V. I. Paul, Dr. M. Muthulingam
Dr. A. Elangovan, Dr. J. Nelson Samuel Jebastin

Teacher Education: Challenges Ahead

Sajid Jamal
Mohd Shakir

Dr. R. Emmaniel
ISBN : 978-81-939070-3-0

The *théâtre engagé*
American Drama from the '29 Crash to World War II

Dr. Sarala Barnabas
ISBN : 978-81-941253-3-4

Corporate
Entrepreneurship

AUTHORS
Dr. M. Banumathi
Dr. C. Samudhra Rajakumar

Dr. M. Banumathi
Dr. C. Samudhra Rajakumar
ISBN : 978-81-939070-5-4

VIJANAN
COMMERCE AND MANAGEMENT

Dr. (Mrs.) Rohini Kelkar
ISBN : 978-81-941253-0-3

Recent Research Trends in
Management and Social Science

Dr. Tazyn Rahman
ISBN : 978-81-941253-2-7

VIJANAN
INFORMATION TECHNOLOGY

Dr. N. Lakshmi Kavitha
Mithila Satam
ISBN : 978-81-941253-1-0

Emerging Research
Trends in Management and Social Science

Dr. Hiresh Luhar
Prof. Arti Sharma
ISBN : 978-81-941253-4-1

Life of Slum Occupants
& Saving Pattern

Dr. Hiresh S. Luhar
Dr. Ashok S. Luhar
ISBN : 978-81-941253-5-8

Computerised Information System:
Concepts & Applications

Dr. Babita Kanojia
Dr. Arvind S. Luhar
ISBN : 978-81-941253-7-2

SKILLS FOR SUCCESS

SUCCESS

SK Nathan
SW Rajamonaharane

Dr. Sw Rajamonaharane
SK Nathan
ISBN : 978-81-942475-0-0

Witness Protection Regime
An Indian Perspective

Aditi Sharma

Aditi Sharma
ISBN : 978-81-941253-8-9

Self-Finance Courses:
Popularity & Financial Viability

Dr. Ashok S. Luhar
Dr. Hiresh S. Luhar

Dr. Ashok S. Luhar
Dr. Hiresh S. Luhar
ISBN : 978-81-941253-6-5

SMALL SCALE INDUSTRIES MANAGEMENT
Issues, Challenges and Opportunities

Dr. B. Augustine Arockiaraj

Dr. B. Augustine Arockiaraj
ISBN : 978-81-941253-9-6

SPOILAGE OF VALUABLE SPICES BY MICROBES

Dr. Kuljinder Kaur

Dr. Kuljinder Kaur
ISBN : 978-81-942475-4-8

Financial Capability of Students: An Increasing Challenge in Indian Economy

Dr. Priyanka Malik

Dr. Priyanka Malik
ISBN : 978-81-942475-1-7

THE RELATIONSHIP BETWEEN ORGANIZATION
CULTURE AND EMPLOYEE PERFORMANCE:
HOSPITALITY SECTOR

Dr. Rekha P. Khosla

Dr. Rekha P. Khosla
ISBN : 978-81-942475-2-4

A GUIDE TO
TWIN LOBE BLOWER AND ROOT BLOWER TECHNIQUE

Dilip Pandurang Deshmukh

Dilip Pandurang Deshmukh
ISBN : 978-81-942475-3-1

SILVER JUBLIEE
COMMEMORATIVE LECTURE SERIES
2019-SNGC

Dr. D. Kalpana
Dr. M. Thangavel

Dr. D. Kalpana, Dr. M. Thangavel
ISBN : 978-81-942475-5-5

Indian Commodity
Futures and Spot Markets

Dr. Aloysius Edward J

Dr. Aloysius Edward J.
ISBN : 978-81-942475-7-9

Correlates of Burnout Syndrome Among Servicemen

Dr. Rosemary Obiageeri Ekechukwu

Dr. R. O. Ekechukwu
ISBN : 978-81-942475-8-6
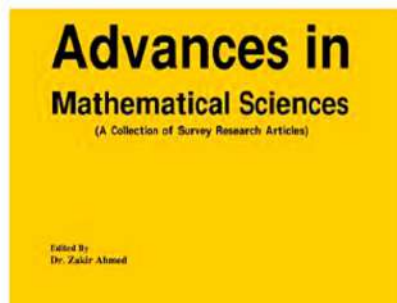
Advances in
Mathematical Sciences
(A Collection of Survey Research Articles)

Edited By
Dr. Zakir Ahmed

Dr. Zakir Ahmed
ISBN : 978-81-942475-9-3

Fair Value
Measurement
Challenges and Perceptions

Dr. (CA) Ajit S. Joshi
Dr. Arvind S. Luhar

Dr. (CA) Ajit S. Joshi
Dr. Arvind S. Luhar
ISBN : 978-81-942475-6-2
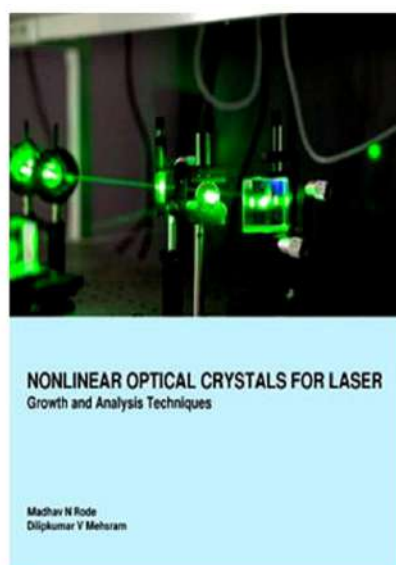
NONLINEAR OPTICAL CRYSTALS FOR LASER
Growth and Analysis Techniques

Madhav N Rode
Dilipkumar V Mehsram

Madhav N Rode
Dilip Kumar V Mehsram
ISBN : 978-81-943209-6-8
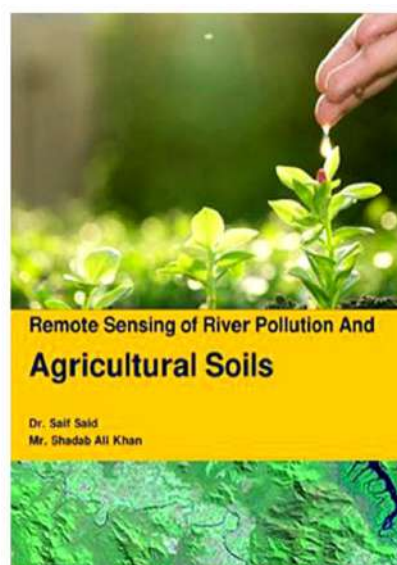
Remote Sensing of River Pollution And
Agricultural Soils

Dr. Saif Said
Mr. Shadab Ali Khan

Dr. Saif Said
Shadab Ali Khan
ISBN : 978-81-943209-1-3
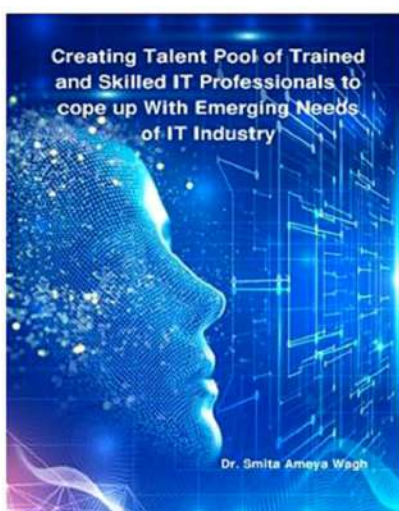
Creating Talent Pool of Trained and Skilled IT Professionals to cope up With Emerging Needs of IT Industry

Dr. Smita Ameya Wagh

Dr. Smita Ameya Wagh
ISBN : 978-81-943209-9-9
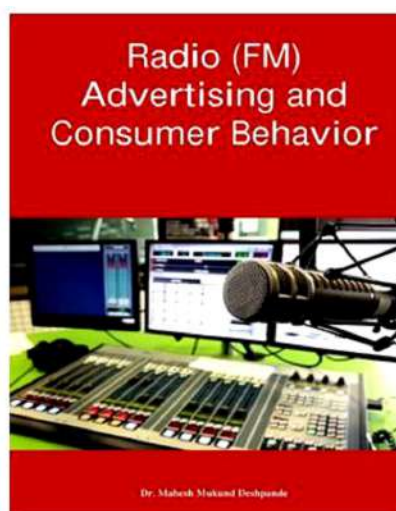
Radio (FM)
Advertising and
Consumer Behavior

Dr. Mahesh Mukund Deshpande

Dr. Mahesh Mukund Deshpande
ISBN : 978-81-943209-7-5
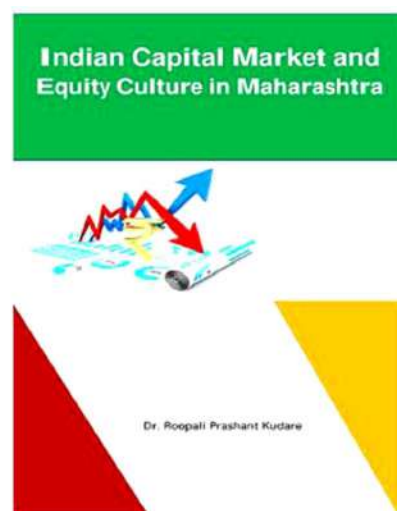
Indian Capital Market and
Equity Culture in Maharashtra

Dr. Roopali Prashant Kudare

Dr. Roopali Prashant Kudare
ISBN : 978-81-943209-3-7

PRIMER ON WEED MANAGEMENT

M. Thiruppathi
R. Rex Immanuel
K. Arivukkarasu

FOOD BIORESOURCES AND ETHNIC FOODS OF MANIPUR, NORTH EAST INDIA

Dr. Th. Anand Singh
Dr. Prakash K. Sarangi
Dr. Neeta Sarangthem

SOCIAL FORESTRY AND AGROFORESTRY: PAST TRIUMPHS AND FUTURE HORIZONS

R. Rex Immanuel
M. Thiruppathi
A. Balasubramanian

Small and medium Enterprises

Dr. Omkar Gadre

Dr. Omkar V. Gadre

Gamma Radiation Effects on Low –Z Materials

Madhav N Rode
Rameshwar R Bhosale

Madhav N Rode
Rameshwar R. Bhosale

INDIAN ELECTRONIC MEDIA AND GLOBALIZATION

Dr. Sapna M. S.
Dr. Radhika C. A.

Dr. Sapna M S
Dr. Radhika C A

National Conference and Technical Symposium

On

"Emerging Trends in Science & Technology"
(ETST - 2020)
28th & 29th February 2020

Organized by

PG & Research Department of Electronics and Physics
Hindusthan College of Arts and Science
Coimbatore

Approved by AICTE and Govt. of Tamilnadu
Affiliated to Bharathiar University
Accredited by NAAC
An ISO Certified Institute

PROCEEDINGS

Hindusthan College

Swing

Stories of Women Inspiring New Generation

Journey of Women Chartered Accountants
Composed by CA Kshitija Kankariya (Jain)

Swing

Self-Awareness Effective Communication Critical Thinking Problem Solving Decision Making

Dr. Bhagyashree Dudhade

A Text book of unified syllabus of Practical Botany (B.Sc. 1st year)

S. Saad, S. Bushra, A.A. Khan

S. Saad, S. Bushra, A. A. Khan
ISBN: 978-81-944069-9-0

Radiology: A Bridge in Biophysics

Prashant S. Kore
Pravina S. Ugile-Pawar
Madhav N Rode

Prashant S. Kore
Pravina S. Ugile-Pawar
Madhav N Rode
ISSN: 978-81-944069-7-6
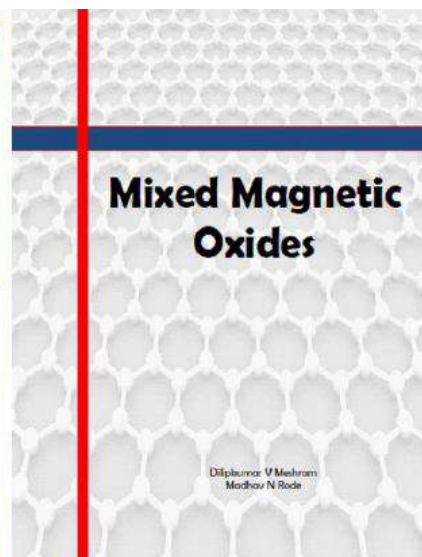
Mixed Magnetic Oxides

Dilipkumar V Meshram
Madhav N Rode

Dilipkumar V Meshram and Madhav N Rode
ISSN: 978-81-944069-6-9

QUALITY OF WORK LIFE – A SERVICE PERSPECTIVE
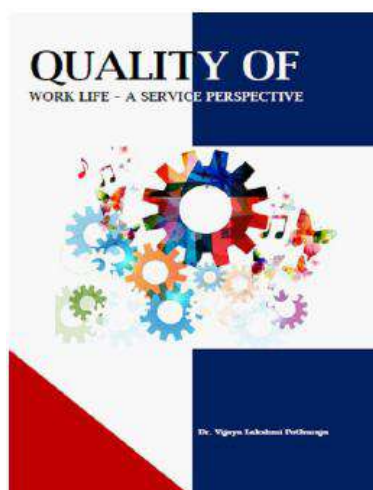
Dr. Vijaya Lakshmi Pothuraju

Dr. Vijaya Lakshmi Pothuraju
ISBN : 978-81-943209-2-0

National Level Seminar
On
'E-Business: A Paradigm Shift in the 21st Century'
January 30th & 31st 2020

Organized by
Department of Commerce & Management

Sponsored by
Savitribai Phule Pune University, Pune
(under Quality Improvement Programme)

Kamala Education Society's
Pratibha College of Commerce and Computer Studies,
Accredited by NAAC with "B" Grade (CGPA 2.60)

PROCEEDINGS

Pratibha College
ISBN : 978-81-944813-2-4

STATE LEVEL SEMINAR
on
'Emerging Environmental Challenges
&
Its Sustainable Approaches'
7th & 8th, February 2020

Sponsored by
Savitribai Phule Pune University, Pune
(under Quality Improvement Program)

PROCEEDINGS

Organized by
Department of Environmental Science
Kamila Education Society's
Pratibha College of Commerce and Computer Studies,
(Accredited with NAAC "B" Grade)
Tel. (Off.) : 860010094245,020-65111411
www.pccs.org.in

Pratibha College
ISBN : 978-81-944813-3-1
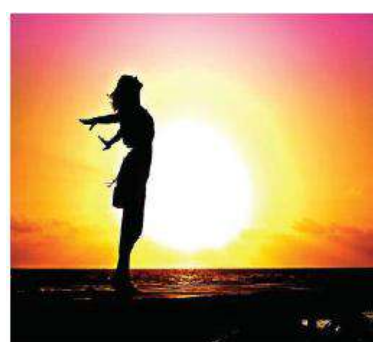
Women Empowerment

Dr. Tazyn Rahman

Dr. Tazyn Rahman
ISBN : 978-81-936264-1-2
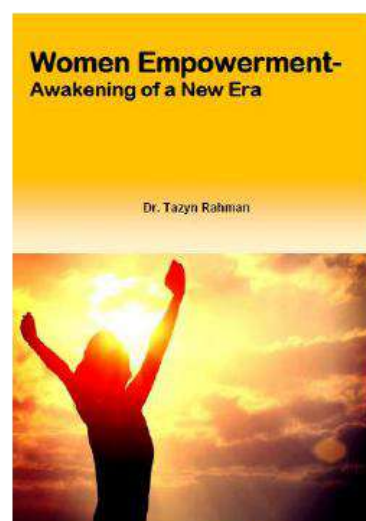
Women Empowerment- Awakening of a New Era

Dr. Tazyn Rahman

Dr. Tazyn Rahman
ISBN : 978-81-944813-5-5
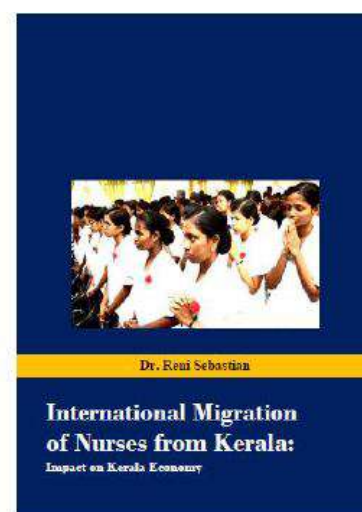
Dr. Reni Sebastian

International Migration of Nurses from Kerala:
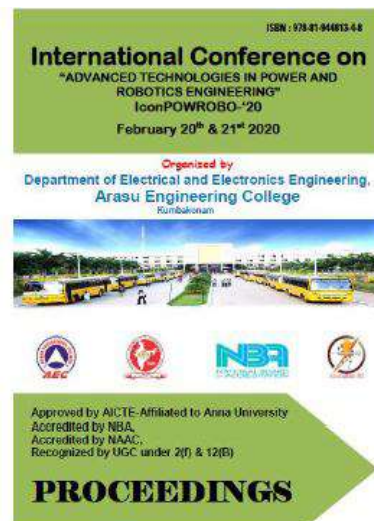Impact on Kerala Economy

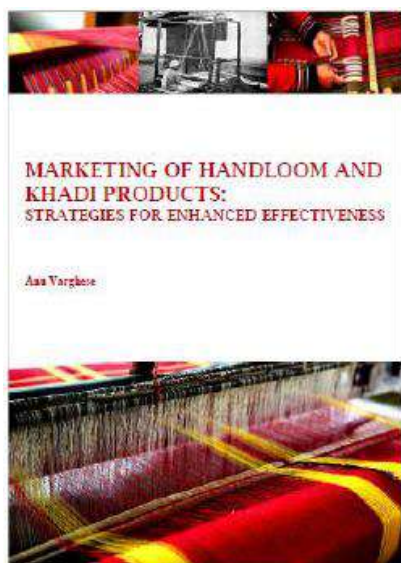**Dr. Reni Sebastian**
ISBN : 978-81-944069-2-1
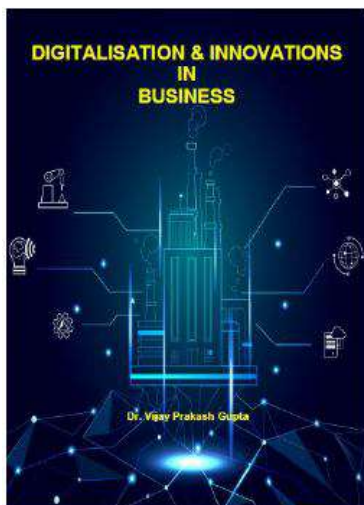
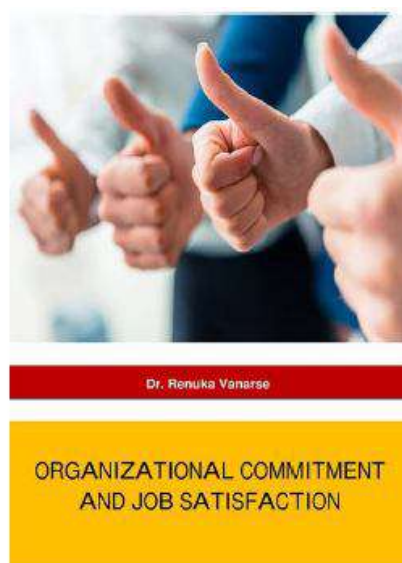**Dr. Vijay Prakash Gupta**
ISBN : 978-81-944813-1-7
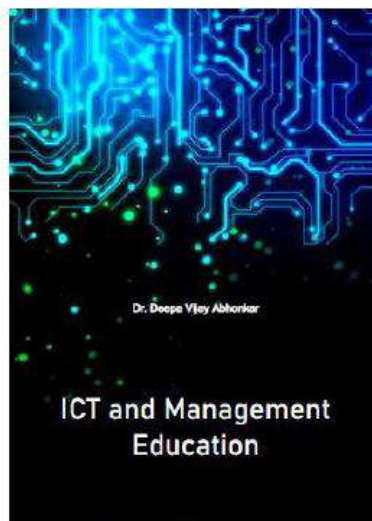
Dr. Deepa Vijay Abhonkar
ISBN : 978-81-944813-6-2

Arasu Engineering College
ISSN: 978-81-944813-4-8

Dr. Anu Varghese
ISBN : 978-81-944069-4-5

Dr. Renuka Vanarse
ISBN : 978-81-944069-1-4