ST. ANN'S P. G. COLLEGE FOR WOMEN
MALLAPUR

ST. ANN'S DEGREE COLLEGE FOR WOMEN
MALLAPUR

Emerging Strategies for Sustainable Development

- Global and Indian Context

EMERGING STRATEGIES FOR SUSTAINABLE DEVELOPMENT - GLOBAL AND INDIAN CONTEXT

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PREFACE

A National Conference on "Emerging Strategies for Sustainable Development - Global and Indian Context" organised through online mode on 20th August 2020 by Department of Business Management and Department of Commerce, St. Ann's Degree & P.G. College for Women, Mallapur, Hyderabad has given an opportunity to compile and publish a book on topics closely connected to Strategies for Sustainable Development.

In this ever-changing global scenario, it has become imperative to adapt to change so as to be in equilibrium with the external environment. It is through sustainable practices that such equilibrium can be achieved. Sustainable Development as a norm has been accepted worldwide ever since the publication of the Brundtland Commission Report in 1987. The aim of sustainable development is to satisfy the needs of the present without jeopardizing the capacity of future generations. It strives to establish a balance between economic growth, care for the environment and social wellbeing. In order to achieve a sustainable life, a balance between economic, social and environmental needs must be embraced by governments, businesses and society.

Knowledge is the new global currency. Higher Education Institutions as stakeholders have a role to play in the implementation of the Sustainable Development Agenda 2030, as a universal call to action, to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.

Good Research can help policy makers make good decisions. Hence this endeavour of bringing out this book to promote awareness and sustainable solutions for business and society. Academicians from institutions of higher learning and industry practitioners and students have contributed around 30 articles which have addressed various issues and strategies for sustainable development.

We hope this book cultivates a sense of responsibility towards sustainable development among its readers and helps gain valuable insights into how to work proactively for a sustainable future.

Prof. Y. Sucharita
Head Department of Business Management
St. Ann's P.G. College for Women

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Almighty's blessings on us, in making this endeavor possible, are uncountable. Our deep sense of gratitude to God, for being the guiding light and helping us reach a milestone of bringing out a book publication from our Institution.

We wish to express our heartfelt gratitude to Prof. R. Nageshwar Rao, Head, Dept. of Business Management & Director, IQAC, Osmania University, Hyderabad, Prof. Prashanta Athma, Chairperson BOS, Dept. of Commerce, Osmania University , Hyderabad, Prof. M.Usha, NAAC Advisor, St. Ann's Degree and P.G. College for Women, Mallapur, Hyderabad, for their valuable suggestions and guidance.

We hereby acknowledge and are grateful for the active role played by of our Correspondent Rev.Sr. Shyamala.

Our Principal Rev.Sr. Emmy Gracy Vas has been a source of constant support and motivation in making the dream of our first book publication, a reality. Her touch of quality assurance is seen throughout the pages of the book.

Prof. Y. Sucharita, Head, Dept. Of Business Management, St. Ann's P.G. College for Women, Mallapur, Hyderabad and Chief Editor has poured in months of efforts and inputs and has been the driving force in completing this task adhering to the standards set and within the timeframe planned. Our heartfelt gratitude to her.

We wish to thank members of the editorial board Dr. M. Lavanya and Ms. M. Ashwini for their untiring efforts in coordinating with the authors, collating the papers and bringing out the book.

Our deep sense of gratitude to Mrs. K. Sunitha, Head, Dept. of Commerce, St. Ann's Degree College for Women, Mallapur, Hyderabad and Mrs.C.Vimala Devi, Senior Faculty member, Dept. of Commerce for being great support and helping in various technical aspects of the book publication. Special thanks go out to all our colleagues of Department of Business Management and Department of Commerce for behind the scenes support rendered by them.

We cannot thank enough, all our dear authors who have contributed in an enormous way to the repertoire of knowledge that this book is today.

A heartfelt Thankyou goes out to Mr.P. Yadagiri for his unconditional and never-ending support to the team in processing the ISBN number and other aspects of the book.

We are grateful for the cooperation and support extended by the team of Srinivasa Printers, Tarnaka in the publication of this book.

Editorial Board

MESSAGE

I am immensely happy that the Departments of Business Management and Department of Commerce of our College has jointly organized a One-day National Conference on a much talked and debated theme - "Emerging Strategies for Sustainable Development- Global and Indian Context"

Sustainable development is not just about the environment. Its focus is much broader than that. It's all about meeting the diverse needs of people in different communities, social cohesion, creating equal opportunity to ensure a strong and healthy society. Understanding sustainable development and its goals is the first step to learning what we can do to make it happen. There are many initiatives already in place, but still many blockades to sustainable development that have to be overcome.

No doubt the conference has thrown light on this burning issue and provided deeper understanding to take steps towards fostering a sustainable future.

I congratulate both the Departments for providing a platform for this interaction through this Conference.

The Conference Committee has been very enthusiastic and putting sincere efforts in publishing a book, "Emerging Strategies for Sustainable Development- Global and Indian Context" with compilation of paper presentations made during the National Conference held on 20th August, 2020. My sincere appreciation to the Committee members.

I wish that the publication brings great inspiration and learning to all the Readers.

Thank you.

Sr. Emmy Gracy Vas

Principal,
St. Ann's Degree & P.G. College for Women,
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CONTENTS

1. FOSTERING SPIRITUALITY AND SUSTAINABILITY IN HIGHER EDUCATION

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Abstract

The new and recent buzz words are spirituality and sustainability. Because they are completing, one does not exist without the other. Spirituality is essential for sustainable development because questions of sustainability is ultimately rooted in morality and ethics. The three pillars of sustainability are ecological, social and economic integrity and these pillars must therefore rest on a foundation of spirituality. Spiritual Intelligence helps in knowing about self, connecting with higher self and ultimately resulting in wisdom to connect with community, the interconnectedness leads to inclusive and holistic view that helps in fostering Sustainability. With enhanced level of spiritual intelligence, we can use our spirituality to bring meaning, importance, and general enrichment to our lives. Sustainable development is a process that must begin 'internally', within the individual. The individual who is transformed from within, will transform the society and the world and this transformation can be brought about through education. The education is a means that enables individuals to become self-actualized members of society, looking for meaning, developing their own inner potential and cooperatively generating solutions for a sustainable future. The current paper focuses on the importance of fostering Spiritual Intelligence in graduating students and its connections to sustainability. A total of 146 graduating students across various disciplines were selected using simple random sampling technique. All the students were evaluated based on the Spiritual Intelligence Self Report Inventory (SISRI- 24) questionnaire and the results were analysed. The results of the study facilitated to recommend strategies that could significantly assist graduating students in creating greater self-awareness and to promote the spiritual side and the sustainable outcome.

Keywords: Sustainable development, Sustainability, Spiritual Intelligence, Spirituality, Graduating students, Higher education.

Introduction

Over the past decade the much talked about and debated terms are 'spiritual Intelligence' and 'Spirituality', 'sustainable development' and 'sustainability'. There is a strong connection between these terms. Because they are completing, one does not exist without the other. Spirituality is essential for sustainable development because questions of sustainability is ultimately rooted in morality and ethics. Meaningful and significant societal change commences with individual change. One cannot do for a community or society or world what one cannot do for one's self. Rohana Ulluwishewa (2014, p.xi) in his book writes, Sustainable development as a process that must begin 'internally', within the individual, rather than externally, in the natural environment or society. It begins internally with the spiritual transformation from 'selfishness' to a 'self' that values 'selflessness'. Individual behaviour creates the underpinning factor for action in social, economic, and environmental sustainability. It guides one's ability to work with the another to make life-sustaining decisions. It is a matter of bringing into line our day-to-day behaviours with one's well-stated values that will result in greater sustainable community action and this is possible through education. The education is a means that enables individuals to become self-actualized members of society, looking for meaning, developing their own inner potential and cooperatively generating solutions for a sustainable future. In this view a sustainable world cannot be formed without the full and active involvement of all members of society; a sustainable world without involvement and democracy is unconceivable. When it comes to attaining the sustainable development

goals (SDGs), students are the key participants. As present and future decision makers in society, they acquire essential knowledge and skills to be able to contribute to building a sustainable world. The educational institutions can to fill this gap best possible way than any other organizations. The higher educational institutes could stress on topics spirituality and sustainability in the regular teaching- learning process so the young students could learn to build a better tomorrow. The current paper focuses on the importance of Spiritual Intelligence or spirituality in graduating students and its connection to sustainability.

To establish a proper connection between spirituality with sustainability, teaching strategies must focus on components relating to the processes of learning, not just focus on gathering of knowledge—to develop graduates with competences to improvise, to adapt, to innovate, to expand and to be more creative. Teaching learning process should help to develop not only their cognitive dimension but other emotional, social and spiritual dimension. They should study skills such as interdisciplinary thinking, critical thinking, problem solving, team working, and holistic thinking and these skills are combined by the pedagogy of problem-based learning (PBL). A conducive positive and learning environment must be made available for holistic learning to take place. This present study comprises primary data as well as secondary data which are collected from various sources such as research papers, books, periodicals, journals and websites. In this paper the researcher gives a brief introduction to the topic at hand, provides Review of Literature, further explains the methodology used for the research, gives brief review and discussion, presents the future perspectives to follow, concluding observations and indicates some aspects for further research in this area.

Objectives

- To identify the level of Spiritual Intelligence in graduating students.
- To recommend strategies that can assist graduating students in creating greater self-awareness, promoting the spiritual side and the sustainable outcome.

Literature Review

Spirit, Spiritual Intelligence and Spirituality

Latest findings in neuroscience disclose human beings are gifted with the ability to get connected with the Spirit and to become who we actually are. The Spirit is that part of us which animates us, which gives us life. It is that part of us which seeks transcendence, mystery, the other, that which seeks the BIG picture. It provides an essential faith in the future, a grounding for hope (John E. Carroll, 2004). Once we are connected and become one with the Spirit, its oneness articulates itself through us as an inner urge to serve others.

The term ‘Spiritual Intelligence’ is made up of two words. ‘Spiritual’ meaning something related to the Spirit and ‘Intelligence’ meaning the ability to acquire and apply knowledge. So, the term Spiritual Intelligence means the capacity to acquire and apply the knowledge of Spirit. Different researchers have interpreted ‘Spiritual Intelligence’ in different ways. Commonly, it can be understood as a way of thinking which enables longing capacity for meaning, vision and value. According to Wolman (2001) Spiritual Intelligence is the human ability to ask ultimate questions about the meaning of life, and to at the same time experience the seamless connection between each of us and the world in which we live (pp.84- 85). Considering ‘Spiritual Intelligence’ as ‘the ground on which morality stands’ (p.115), he stated Spiritual Intelligence as the foundation of moral choices and problem-solving decision making. Spirituality helps

to realise the deeper and higher aspirations of humanity that can play a major role in resolving the conflicts and to control actions motivated by greed and self-centredness.

Spirituality is an awakening, which starts with looking within oneself for self-discovery and continues on until one realises that one is an essential part of the natural world. This process of self-discovery helps one to realise the higher truth and intrinsic value that lies within each element of life and the universe and starts to understand the interconnections and interdependencies among the various elements of the creation. Eventually, one becomes more conscious of one's actions and their consequences and this leads to remarkable positive change in one's lifestyle and attitude towards other human beings and the natural world. The innate Spiritual Intelligence forms the sustainability theory which articulates that a distinct spiritual unity demonstrates in all life forms guiding to spiritual growth. (Korten, 2013). Lack of spiritual intelligence might lead to gap in transitioning to sustainability, encompassing higher level of thinking, developing ethical values, meaning and hope.

Sustainable Development and Sustainability

The concept 'Sustainable Development' was popularised by Brundtland Commission (1986). A development is directed and shaped by its underlying motivating force. In case of sustainable development, this motivation can be seen as a concern for providing good living conditions to future generations without endangering other lives and natural resources. The concept of sustainability is associated to the social, economic, cultural, ethical and spiritual domain of our existence and it differs over time and space. It can be discussed at different levels of combinations and viewed through different perspectives. ‘Sustainable development’ is the ethically founded response which not only protects private and economic interests, but also shapes the profile of educated young people (Altner & Michelsen, 2005). A new learning culture is very much essential which does not confirm academic traditions but studies its potential for a sustainable future, in an open-minded and participative process. It has to be related to one’s own sphere of influence and desires. Ideally, individual and societal learning should be related, for sustainable development.

Four steps to Sustainability

- *Responsiveness towards the endangered Environment*: Sustainability requires awareness of the facts of environmental degradation, and resource depletion resulting from our present modes of actions. Students should be constantly made aware of the consequences and impacts of our actions in the future, and should be familiar with sustainable choices over unsustainable ways of today.
- *Realisation of Facts and urgency to act*: Realisation of the facts threatening the environment is essential in creating a sense of emergency and to provide an urge for reviving the harmonious relationship between humans and the natural environment. Many are conscious of the threats to the natural environment, however very few of them are able to see these threats, try to take steps towards curbing such threats and contribute to a sustainable future.
- *An empathetic orientation toward nature*: Do we care about nature and its value? Are we concerned enough to provide a better value of life for every living being on the earth? Today, this step is the key to sustainability. It motivates us to transform our knowledge into actions, and to achieve a sustainable future through love and care for nature and other living beings.
- *Action towards a sustainable future*: This step follows from the previous three steps. If we are conscious of the facts that cause threat to our environment, able to realise the emergency that has

arisen from these facts and care about sustaining a better quality of life on the earth, then we undoubtedly and naturally will act to restore our planet now for a sustainable future.

An Integrated Approach: connection between Spirituality and Sustainability

Spirituality and Sustainability are interrelated, both invoking a higher sense of purpose and meaning among individuals and organizations embracing either or both concepts. Spirituality is the key of a healthy society by all means, it is the engine of sustainability. Nass (1989) suggests humanity is inseparable from nature; if humanity harms nature, we are harming ourselves. Cristian Bogan Onete et.al (2019) writes Spirituality is all about being conscious. When individuals increase their level of consciousness, they start to be aware of the inner and outside worlds. They begin to accept and empathize with the surrounding environments. From spirituality results intelligence, progress, innovation, self-protection, quality, preservation and conservation of things. Spirituality grants us a deep feeling of interconnectedness with the universe. One realises reciprocal interrelation of all things in the surrounding world that leads one not to undermine the other's role in creation. As a consequence, notions of sustainability such as justice, equity, freedom for everybody, and so on become the very base of society and help endorse responsibility towards society and the natural environment, mutual respect and better understanding among individuals, communities and nations.

Today we need an overview which looks at the world in as holistic way as possible. A spiritual dimension, which is almost lost today in our social, economic and political systems, can help to establish a base, carrying certain values, for these systems, and can motivate us to be sustainable. As Bender (2000b), an architect and Feng-Shui practitioner puts it: Sustainability requires a true transformation of our basic values, the development of a spiritual core to our lives and society, and a building of institutions that direct our actions in harmony with these values, (p. 4)

Research Methodology

Data Collection: The research methodology used to analyse the data in Descriptive Research Methodology. The data is used for study is primary and the secondary as well. The primary data will be collected from the Graduating students across various disciplines using survey method.

Sample Size: 146 graduating students from MBA, B. Com, and B.Sc.

Sampling technique used: Simple Random Sampling.

Procedure: The questionnaire, Spiritual Intelligence Self Report Inventory (SISRI- 24) developed by D. King (2008) was administered to the participants to analyse the spiritual intelligence of students and responses quantified.

The questionnaire used here takes into account the four components of the Spiritual Intelligence i.e., Critical Existential Thinking (CET), Personal Meaning Production (PMP), Transcendental Awareness (TA), Conscious State Expansion (CSE).

The components of SI are defined in the following **Table 1** given below. Responses for the survey have been recorded in the form of rating using, Likert Scale. Rating taken as 1– Not at all true of me | 2– Not very true of me | 3 – Somewhat true of me | 4 – Very true of me | 5 – Completely true of me.

Table: 1- Components of Spiritual Intelligence

Components of Spiritual Intelligence	➢ **Transcendental Awareness (TA) -** The capacity to observe the "Big Picture" that is not material and goes beyond normal experiences. This awareness of spiritual existence can be recognized in others and personally observed. ➢ **Conscious State Expansion (CSE) -** The power to control and move into higher spiritual planes (e.g. pure consciousness, cosmic consciousness, unity, oneness) through deep meditation, prayer, or contemplation ➢ **Critical Existential Thinking (CET)-** The contemplation of one's purpose or existence and connection to the universe as well as such topics as life, death, reality, truth, or justice. ➢ **Personal Meaning Production (PMP)** - The capacity to create meaning and sense of purpose in one's life and discern purpose from both mental and physical experiences even in failure

Result and Discussion

Spiritual Intelligence helps in knowing about self, connecting with higher self and ultimately resulting in wisdom to connect with community, the interconnectedness leads to inclusive and holistic view that helps in fostering Sustainability. Persons with high Spiritual Intelligence are able to find deeper connection with their own self, find meaning and sense of purpose in their life and they find easy to envision and give up materialistic approach, their choices are wise and are more grounded and connected to the world as they are hopeful and trust the goodness in and around them. So, developing higher level of spiritual intelligence in students is essential as it can significantly assist in creating greater self-awareness and this self-awareness is so critical in developing engaged citizens and sustainable individuals who behave with wisdom, deepest sense of meaning and sense of community.

The level of Spiritual Intelligence in students

The students who have chosen who chose very true of me and completely true of me in the given questionnaire possess high level of Spiritual Intelligence. Following table gives the frequencies of Students from various disciplines having good degree of Spiritual Intelligence (SI).

Table 2- Frequency of responses

		Spiritual Intelligence				
		2.00	3.00	4.00	5.00	Total
Discipline	B. Com	2	8	51	18	79
	B.Sc.	1	3	22	6	32
	MBA	0	6	19	10	35
Total		3	17	92	34	146

The above table shows that out of 146 students who chose very true of me and completely true of me were 69 From B.com, 28 from B.Sc., and 28 from MBA.

Accordingly, the– 87.3% of B. Com, 87.5% of B. Sc., and 82.8 % of MBA students show high level of Spiritual Intelligence.

The overall 85.8 % of the students across various disciplines have demonstrated high level of Spiritual Intelligence, the below mentioned strategies would be successful in prompting sustainable outcome in higher education.

Recommendations: Strategies to foster spirituality and Sustainability

Teachers are the caretakers to the spiritual dimension in the classroom, they can play a quantum role in educating young people by reflecting on their own spiritual autobiographies while they discern the mysteries of their lives, and develop the self-awareness and self-acceptance that enables them to model genuine "teaching presence" (Kessler, 1991, p. 10) with integrity, and some sense of its importance (Sunley, 2005; Kelly, 2008; Palmer, 1998; Hunt, 1992) and this will help to model the scope of human experience and transformative learning. They are the only persons who have learnt to value their own wellbeing and praxis can alter the act of teaching into a holistic involvement with mind, body and spirit for others. The following strategies are recommended to be adopted in higher education for building a sustainable future.

- *Generating a positive environment* in educational Institutions helps teachers to guide students to care and respect themselves and others and their views, show empathy towards nature, and inculcate proper ethical and moral standards while they pursue academic endeavours. An open culture that nurture the spirit of students so that they don't despair even in the face of difficult and tough situations.
- *Conscious reflection* on spiritual questions is effective to deepen students' spirituality. Inspirational questions like, "Why do we exist?", "Where are we going?", "Is there any life after death?" help students to have conscious reflect on personal growth and the life goals of this world and of the metacognitive world.
- *Meditation* is another strategy that can help students to augment their spirituality. meditation is a technique to reduce stress and gives a peaceful mind.
- *Spiritual practices in daily activities* in order to contribute to a more sustainable environment, moving from selfishness to selflessness, becoming aware of the need to empathize more and demand less, considering long-term effects on short-term actions, replacing victimhood with infinite being, replacing mutual criticism with constructive community thinking, learning from ever sacrificing Nature.
- *Promoting values* Rohana Ulluwishewa (2014) Social values are important to sustainability in that social relationships help shape ethical values. Ethical values may be learned from parents, teachers or others. However, social values provide no incentives to ensure justice for people with whom we have no personal relationships. In addition, the ethical values that have evolved out of past social relationships obviously, are not adequate to address the ecological, social or economic challenges of today. Though social values are necessary but not sufficient for sustainable development. The ethical values are the only values sufficient to ensure equity and justice within and among generations.
- *Learner-centred environment* helps to improve the quality of learning by encouraging discovery and enhancing knowledge. In the learner-centred environment, students and faculty cooperatively construct knowledge and relationship between students and faculty is fostered within and across courses, disciplines, and departments. Those that seek to develop solutions to sustainability issues must have the capacity to collaborate with people from all walks of life and examine problems from a global viewpoint with an understanding of the connectivity between all things.
- *Training in Skills* such as critical and creative thinking, interdisciplinary thinking, problem solving, team working, and holistic thinking.
- *Problem-based learning (PBL)* provides students with occasions to learn to reason, precisely 'how to think' rather than 'what to think,' and possibly within the context of sustainability.

To sum up, a positive environment in Institutions is essential for promoting connection between Spirituality and sustainability. This helps teachers to develop a sense of faith in students through the exercises of reflection, meditation, and spiritual practices, to care and respect one another, care for nature and thus bring them together to achieve higher goals which helps establishing a strong bond that lays a foundation for the institution to grow stronger to promote sustainability. The wisdom and foresightedness of the Principal provides confidence and support to the faculty members which ultimately results in churning out future generation who are able to connect with their own self, with fellow members as well as with the larger community.

Conclusion

Spirituality grants us a sense of gratitude towards creation, and a sense of reverence and care for nature, which in turn makes us consciously unable to destroy or pollute the ecosystem and guides us towards a sustainable future. Sustainable development is a global call for action and all institutions, especially educational institutions, have a key part to play in this grand endeavour. They can take a 'holistic' approach to education for a sustainable future.

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2. REAPING A HARVEST THROUGH GREEN HRM INITIATIVES

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Abstract

Human Resource Management is one of the most essential functions of an organization. For an organization to function properly, effective management of its human capital is of utmost importance. The productivity of the organization verily depends on her employees. In the pursuit of sustainable development, organizations realize that the policies and programs of the HRM department play an important role. An organization could proactively ensure that the recruitment, compensation, training and motivational initiatives are formulated keeping a green perspective in mind. To that end, our paper illustrates with case studies, how the sustainable development agenda is sought to be achieved by some companies. The benefits of having a Green HRM stance are highlighted and the prerequisites for ensuring that the societal focused policies gain firm roots in an organization are identified. Green Human Resource Management, on the other hand called Green HRM, is characterized as the arrangement of approaches, practices, and frameworks that invigorate a green conduct of an organization's representatives so as to make a naturally delicate, asset effective and socially dependable working environment. The realization of a sustainable competitive advantage is the fruit that Green HRM program seeks to realize.

Keywords: Green HRM, Sustainability, Green Workforce, Environment-friendly policies, Innovation

Introduction

In today's world, concepts like global competition, technological changes and development, environment and its problems are getting common with the increase of globalization. Hence, business and individuals are working on fresh dynamics to cope up with the global change. Human Resource is one such segment in an organization that constitutes the fundamental elements for change and development. Moreover, this fact is well perceived around the globe- "Environment problems occur due to the human perception that the world resources are endless and offer free goods". The outcomes of such perception have been unimaginably worst.

Human Resource Management (HRM) is a significant part of the executives that manages the most important resources of an association which is HR. The entire setting of HRM is as of now being considered in the light of sustainability overall. So, such cases bring up the need for environment conscious (green) activities at individual, organizational and community levels. Sustainable development has now become need of the hour. To ensure that this world remains a good place to live in, environment friendly policies should be adopted. In the light of this, one of the most important concepts is Green Human Resource Management.

Objectives

The main purpose of this paper is to:

- Have a basic understanding of what Green HRM is and its importance.
- Give a detailed explanation of the various Green HRM practices that can be implemented in an organization.
- Highlight the Green HRM practices followed by taking couple of companies as reference and how they have benefitted from it.

Methodology

This study is mainly based on secondary data, obtained from various articles and websites.

What is Green Human Resource Management?

The term Green HRM or GHRM has become the topic of discussion now a days in the business world and the increase in its importance and significance is also drastically increasing with the passage of time since the awareness of sustainable development and environmental conservation.

GHRM is a sustainability program that can be characterized as the arrangement of approaches, practices, and frameworks that invigorate a green conduct of an organization's representatives so as to make a naturally delicate, asset effective and socially mindful working environment and generally speaking association.

Why GHRM?

We have been going through a lot of news regarding how our environment is undergoing massive degradation because of the misuse or overuse of its resources. So, it is of utmost importance that remedial steps are taken to stop this degradation from happening and this can start only at the level of people.

Green HRM is one such initiative in the business world where the employees are made aware of such situations and are encouraged to implement environment-friendly strategies to go about their business development. Researchers argue that it is the employees who must be inspired, empowered to take up green initiatives. A company's human resource function can be powerful in encouraging an exhaustive way to deal with making a culture of manageability.

The technique incorporates actualizing changes to the various elements of HR like recruitment, induction, training, and development, conducting performance appraisal, and determining employee compensation.

Benefits of Green HRM

Green Human Resource Management assumes a significant part in industry to advance nature related issues. Associations must detail HR strategies and practices, train individuals to build mindfulness about the earth, and actualize laws identified with natural insurance. This may likewise support the businesses, producers in building brand picture and notoriety.

Firms need to direct an ecological review, accordingly, changing the authoritative culture, contemplating waste administration, contamination, and helping the general public and its kin, those are getting influenced by contamination.

It will likewise make workers and society individuals mindful of the use of normal assets even more monetarily and support eco-accommodating items.

Specialists have distinguished the advantages of GHRM, which are referenced underneath:

- Helping organizations to cut down expenses without losing their ability.
- Organizations have immense development openings by being green and making another agreeable condition, which helps in colossal operational reserve funds by decreasing their carbon impression.
- It aides in accomplishing higher representative occupation fulfillment and responsibility, which prompts higher profitability and supportability.
- Create a culture of having worry for the prosperity and wellbeing of individual specialists.
- Improvement in the consistency standard of the representative.

- Improved public picture: Any time a firm adds a green activity to its working environment, it can utilize the occasion to produce positive advertising. Associations can elevate natural commitments to the media through official statements to win the consideration of expected clients and conceivable new deals.
- Promote worker confidence.
- Improvement in drawing in better representatives. Dolan's (1997) investigation of USA MBA understudies found that most of the alumni would take a lower compensation to work for naturally capable associations.
- Reduction in the ecological effect of the organization.
- Improved intensity and expanded execution.

Practices and policies of Green HRM

Green HRM is a step-by-step initiative where modifications are made at every level of the traditional HR aspects like recruitment and selection, Job design, HR operations and Onboarding, Performance Management and Appraisals, Learning and Development, Leaving the Company.

Job Design and Recruitment

Green Human Resources Management starts even before getting new employees inside the company, during the process of designing or approving, together with other departments, job descriptions (JD) for the newcomers. It is important to have JDs that highlight tasks related to environmental protection.

Selection Methods

After making the first screening of CVs, HR can make sure that the next steps of the selection process will evaluate the candidates' aptitude to have green behaviors. An ordinary question about climate change during an interview or a group dynamic that mixes a business case with sustainability issues are two easy ways to understand someone's degree of ecological awareness. In the end, a green score can also be given to each candidate and added to the overall spreadsheet of scores that will ultimately rank the top candidates.

HR Operations and Onboarding

Technology allows companies to become paperless and for HR this can well start with newcomers. Online portals and folders can be used to archive employees' documentation such as offer-letters, credentials, CVs, or recommendation letters. Not to mention that nowadays CVs are mostly sent through the Internet, with no need for being printed. It can as well be used with current employees' health insurance or car contracts, salary, or information on other benefits

Furthermore, when the newcomers first arrive at the office, induction programmes should be designed in such a way as to facilitate the integration of these new employees with the company's culture of green consciousness. This way, besides presenting the company, its history, culture, departments and so on, these programmes should also highlight the company's concerns with environmental issues.

Performance Management and Appraisals

Performance management (PM) is the process by which employees are prompted to enhance their professional skills that help to achieve the organizational goals and objectives in a better way. Therefore, in order to create a greener company, performance appraisal (PA) systems can include sustainability goals (that come from a sustainability strategy done previously) measured with specific metrics.

When it comes to the PA of managers, green targets, goals, and responsibilities such as creating green awareness in their teams and encouraging them to get involved in green activities of the company can also be considered. In the end, the goal of green PM is to have a measurable outcome of an organization's

ability to meet its ecological objectives and targets set forth in the organization's environmental plans or policies.

Learning and Development

Learning and development is a practice that focuses on developing employees' skills, knowledge, and attitudes. The goals of green training and development are:

- To create awareness about the current environmental problems happening worldwide – through newsletters or briefings with environmental organizations from time to time.
- To educate more employees about working methods that allow to reduce waste, save energy and resources – e.g. recycling, turning lights off or shutting down laptops.
- To teach more operational employees and business decision makers about processes along the companies' value-chain that allow to reduce waste, save energy and resources – like applying circular economy to waste or rethinking the sources of energy.
- To encourage workers to find out opportunities in their jobs to help their companies become more sustainable.
- Overall, to push for an environmental protection mindset on a company's workforce, wishing that it acts consciously today and is alert for opportunities to become more sustainable in the future.

Leaving the company

For the strict compliance of the green strategies and policies and depending on the seriousness of the mistake and its impact, companies can take certain actions where ecologically unfriendly behavior may constitute a breach of contract and possible ground for dismissal. If this happens, it is important to make exit interviews to evaluate the perception of employees on the company's ecological practices.

Employee Engagement in Sustainability

Worldwide, organizations of all sizes are starting to grasp the estimations of corporate social responsibility (CSR) and sustainability. In any case, most chiefs have not made sense of how to draw in representatives in everyday exercises that set up those qualities as a regular occurrence.

One CSR pioneer, the customer products monster Unilever, has embraced the trademark, "little activities can have a major effect." Unilever genuinely incorporates this – the organization effectively urges representatives to act reasonably in the work environment.

"The way to making a dynamic and reasonable organization is to discover approaches to get all representatives, from top chiefs to gathering laborers, actually occupied with everyday corporate endeavors," Paul Polman, Unilever's CEO, wrote in the Stanford Social Innovation Reviews.

Employee commitment is a significant part of Green HRM. It is fundamental in changing your business' supportability objectives into the real world. Making the principal strides are straightforward, by appropriately teaching and connecting with, you can manufacture a reasonable culture in your work environment. Since workers are the essential significant assets in any association, their greatest commitment into the business is of most extreme significance to change the business into a supportable one.

Commitment is a person's feeling of direction and centered vitality, apparent to others in the presentation of individual activity, flexibility, exertion, and perseverance coordinated toward individual and hierarchical objectives that typify a mutual "higher reason".

Representative commitment for supportability can empower change toward manageability, anticipate authoritative achievement, monetary execution, and worker results, for example, maintenance and fascination. Exploration shows a "frameworks" way to deal with representative commitment for

manageability can be capably fruitful. At the point when we associate with the Whole "thinking, feeling, willing, social self" – representatives all through the association react in astonishing manners.

Contemporary Green HRM practices witnessed in some companies

Since sustainability and environment-friendly activities are increasing becoming the need of the hour, organizations across the globe are making sure to achieve sustainability and become environmental-friendly as much as possible. One of the aspects being implementation of Green HRM practices, two Indian companies, one a PSU and the other private, are mentioned and an insight of how the green HRM practices have helped them to position themselves in a greater position in the market is indicated.

GAIL (Gas Authority of India Limited)

One of the Navaratna Public Undertakings in India, GAIL is known to be following the best Human Resource management practices which are prevalent and are followed by some of the top companies. It has an immense potential of growth in the coming time as it is expanding its base in India for increasing its usage of Green energy. Saving of Taj mahal from air pollution, reformative steps in New Delhi, Surat etc., have paved a great path for the company's excellence. It is one of the safest public sector companies not to have reported any industrial hazard cases or any such accidents over the years. The main contributing factor to such an achievement is its effective Human Resource department's work commitment. The company is one of the top-level corporate citizens in the world. The best of management systems has been in use for several years. It is a very fair and transparent company. Its customer satisfaction level is very high. Its employees are among the best paid and most satisfied employees due to its good Human Resource Management practices. It has contributed significantly to the socio-economic development of the nation and its prospects of growth are very high. The company has proved that following the best Human Resource practices yields organizational excellence and sustainability.

ITC

ITC is one of India's foremost private sector companies with a strong commitment towards its business. It has been a frontrunner in adopting eco-responsible processes, much ahead of legislation – setting benchmarks for the industry to follow. It has made a very diversified presence in the market amongst its competitors, providing various services like cigarettes, hotels, paper boards and specialty papers, packaging, agribusiness, packaged foods etc. For the first time in India ITC has launched an environment friendly multipurpose paper 'Paperkraft Premium Business Paper', for office and home use using a new technology 'Ozone Treated Elemental Chlorine Free Technology' replacing Elemental Chlorine which was conventionally used in the bleaching process during paper manufacture. Apart from Company's business, it upholds the values which are at the core of their HR Philosophy - trust, teamwork, mutuality and collaboration, meritocracy, objectivity, self-respect and human dignity. These values form the basis of their HR management systems and processes. The HR function in their department is contributing significantly to the green management practices of the company. The Company attaches great importance to a healthy and safe, green work environment. ITC is committed to providing good physical working conditions and encouraging high standards of hygiene and housekeeping. The Company believes that commitment to sustainable development is a key component of responsible corporate citizenship and therefore is accorded the highest priority. Accordingly, the Company is committed to Best Practices in environmental matters arising out of its business activities and expects each business to fully demonstrate this commitment. In addition to complying with applicable laws and regulations, they have established procedures for assessing the environmental effects of their present and future activities. Saving of Taj

Mahal from air pollution, reformative steps in New Delhi, Surat, Mumbai and a number of other cities is a living example of its excellence. It is one of the safest public sector companies with no reported cases of industrial hazard or accidents in any of its plant over several years. It is because of the high level of commitment of work in its human resources. It is contributing two percent of its Profit After Tax (PAT) to the social causes. It is a very big help to lakhs of poor and needy people of India. It is rated as one of the best employers in the nation as for the reports of Hewitt International which is an internationally recognized survey company.

Conclusion

Green Human Resources Management is based on the green movement and sustainable management, related to the protection of the environment and to save the planet Earth from future disasters and through such practices, it is aimed to achieve sustainability. To defend & improve the human environment for present and future generation has become a crucial goal for mankind. The companies that are mentioned in the previous section are in a greater position in the market and they strive towards green business management. Indeed, in these associations, however progressively in different organizations too, internationally, Green HRM is good to go to assume a significant function in the business to advance nature related issues by embracing it, in the board theory, HR strategies and works on, preparing individuals and execution of laws identified with Environment Protection. Green HRM has the capability of making a colossal effect on the different partners included along these lines changing the authoritative culture, considering waste administration, contamination and helping the general public and its own kin (the individuals who are getting affected by contamination). It will likewise make workers and society individuals mindful of the usage of regular assets all the more monetarily and empower eco-accommodating items. It is apparent that Green HRM is the trendy expression for the occasions to come.

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3. FACTORS INFLUENCING EFFECTIVENESS OF MOOCS AND ITS ROLE IN SUSTAINABLE HRM

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Abstract

Today's Organizations have greater focus towards Sustainability. It is seen as an adjunct of strategic HRM and dispense a novel approach to people management with the focus on long-term human resource development, regeneration, and renewal. Management practices that are sustainable are a lot more supported than many of the conventional ones. Skill development and training of employees are key patrons of Employer sustainability. Massive Open Online Courses (MOOCs) can be used as a technique of improving skill that reaps major profits to all the employees and employers. The present research aims to find out factors in MOOCs that make it more effective as a skill update technique and its role in sustainable HRM. To analyse the variables that influence user experience while browsing through the MOOCs websites, data has been collected from different respondents (students and employees) who took online courses. The impact of various factors on the usage of MOOCs have been analysed. The research tries to understand how the proficiency of these variables can help the organization improve its training process. The study is most appropriate in today's context because corporate usage of the MOOCs and role of employee training has various inferences for organizational sustainability

Keywords: Sustainability, Skill Development, MOOCs, Employee Training, Human Resource Development, Regeneration, Renewal.

Introduction

Sustainability is the ability to survive constantly. The term sustainability is commonly used to symbolize developmental initiatives that meet present needs while not compromising the availability of resources to the future generations to meet their needs. It is considered as an adjunct of strategic HRM and dispense a novel approach to people management with the main focus on long-run human resource development, regeneration, and renewal. Implementation of sustainability has historically targeted on the three pillars of economic social, and environmental sustainability, or triple bottom line of individuals, planet and profits. The term sustainability in its initial kind was used mostly to cite environmental sustainability. Now it has a wider scope and includes most aspects of management. Organizations try to amplify competitive advantage by seeking to improve the use of their human resources and the way the organization is structured, and this is where the triple bottom line becomes relevant. The importance of human resource management (HRM) in organizational sustainability has been studied by several researchers. When HRM is incorporated into the strategic planning process, it significantly escalates the possibilities of successful implementation of sustainability; HRM can be used to set the seal on larger alignment of policies, processes and systems and help line managers in understanding and expressing the value of employee growth through their behavior. Sustainable HR practices also accord to employer branding initiatives as they play a role in attracting and retaining precious employees. Thus, in all ways, sustainable HRM contributes to the sustainability of individual employees. It also contributes to the sustainability of business organizations by collaborating with top executives and other key stakeholders working towards goals for economic, ecological, social, and human sustainability. When HRM goals are aligned with the organization's sustainability goals, the organization is better placed in attaining sustainable outcomes. Organizations mostly have shown the propensity to focus their efforts on the

economic aspect of sustainability while not giving the environmental and social elements the regard they deserved.

Need for the study

To spot and understand the varied factors influencing effectiveness of MOOC's and its role in Sustainable HRM.

Scope of the study

The research was conducted on students and employees. The respondents of the questionnaire were mainly Post Graduate Students and Professional Employees who have undertaken online courses.

Objectives

- To study the impact of MOOCs on Sustainable HRM
- To understand the varied factors influencing effectiveness of MOOC's that's considered, as a skill update Technique which implicates organizational sustainability

Limitations

- The questions within the questionnaire are close-ended questions which limits the power of the report back to provide unique insights.
- Limited sample size was an obstacle during this study.
- The study findings can't be generalized because the characteristics and capacities of usage of MOOCs might be different for various people (Students and Professional Employees).

Literature review

In much recent years, sustainability has become one of the primary objectives of organizations soon become the agents of sustainable development, which is understood because the type of development which meets the wants of current generations without hindering future generations to satisfy their economic, social and environmental requirements (Jabbour and Santos, 2008a). During this respect, the strain on sustainability in human resource management (HRM) context has expanded in both research and practice (Clarke, 2011; Jabbour and Santos, 2008a, Kramar, 2014).Additionally thereto, Jabbour and Santos (2008a) indicated that human resource management plays a central role in achieving organizational sustainability by contributing to strengthen the economic (innovation management), social (diversity management) and environmental (continuous improvement of environmental management) performance which are mentioned because the three pillars of organizational sustainability. Further, Senthilnathan and Arulrajah (2014) argued that organizations need to equally balancing the set of HRM practices to support social, economic and environmental management to form sure the organizational sustainability. During this context, recently, a replacement approach has been evolved in HRM, labelled as sustainable HRM that seeks to link HRM and sustainability (Kramar, 2014). Moreover, Freitas et al. (2011) revealed that sustainable human resource management is contributing to understand organizational sustainability through the event of human resources policies, strategies and practices that support the economic, social and environmental dimensions. Therefore, organizations must pay a special attention on developing and implementing sustainable HRM practices to strengthen the organizational sustainability.Wikhamn explored the impact of sustainable HRM practices on customer satisfaction in Swedish hotels. Guerci et al. raised the field of sustainable HRM by exploring sustainable HRM from the stakeholder perspective. Mostly, Employer reserve based perception represents organization as assortment of competencies,

information accumulation and knowledge(Wheelen, 2009).Moreover, if organizations need to stay competitive and sustainable then the sole approach is through skills' development and continuous learning and so the individuals are the reason for an organization's sustainability; Human Capital theory is outlined by Schultz (1961) as "the information and skills that folks acquire through education and coaching being a form of capital that this capital may even be a product of deliberate investment that yields returns (Nafukho, 2004).According to the thought, the amount spent on coaching & development, education, care etc. are investments in capital that are being created on human. This coaching and education provided sure enriches his information and skills that ultimately escalates his worth additionally as his future financial gain (Becker, 1994). He conveys that human capital may even be some way of production into that further investment yields further output.

Employee training and learning are very significant for organizational sustainability. Lozano (2014) highlighted the relevance of newer techniques of employee earning to grant to organizational sustainability. Training refers to an orderly structure where employees are instructed and technical knowledge issues related to their jobs are taught. Training and development programs are designed based on the requirements of the organization, the type and skills of the trained personnel, the end goals of the training and the profile of the employee. Online training delivers benefits for employee development. Web-based online training allows people to connect from anywhere: home, work or mobile. To both individuals and organizations, it is beneficial. For online training that suits them best, users can pick and learn at their time and pace. It's left to their choice and by engaging in the learning process as per their choice leads to better training and development. It is also cost-effective because it directly addresses the largest cost of training- individual training time. This in turn makes a significant positive difference to the bottom line and increases personal time.

The introduction of Massively Open Online Courses (MOOCs) has opened up many chances and prospects for employee training and learning. Initial talk concentrated on the role of MOOCs in higher education. However, now it has changed the way organizational training is executed study materials that are typically used in a traditional educational setting for students-such as examples, lectures videos, study materials and problem sets. MOOCs play a key role in virtual. Virtual HRD is viewed as the newest step in an organization's knowledge management initiatives. In the looming years, techniques like mobile learning, social learning, video learning, gamification etc. will govern the conventional learning. E-learning is one of the fastest growing industries since the year 2000. During the last decade, the popularity of e-learning has increased significantly, due to benefits like time fruitfulness, affordability, flexibility and more importantly in-demand skill development for both professionals and students (Economic Times, 2017). Time-fruitfulness, affordability, flexibility, getting inaccessible training material/topics and skill development are some of the reasons which makes users prefer online training over conventional methods. Hence people prefer online training over traditional methods. This study aims to find out why or how MOOCs can help in sustainable Human Resource management (HRM). Present literature has established the role of human resource practices in corporate sustainability. Employees have a very significant role to play in sustainability and having the right skills in place is important. The role of employee training and learning on organizational productivity and therefore on organizational sustainability has also been established by earlier researchers. With the aim of promoting sustainable adaptation to the disruptive and complex challenges of environmental sustainability within the business context, sustainable HRM practices are very important. Continuous employee skill development is very important given the dynamic environment and this has become an integral part of employee performance management in organizations.

The rise in the number of MOOCs can be considered an important wave in the educational revolution that is happening around us. From the current trends, one may assume that MOOCs are the most easily implemented form of education and learning. If one looks at the way online education has evolved from its crude initial stages, MOOCs can be considered the newest stage. They provide access to quality education and training through open educational resources for interested people around the globe.

The fast-paced developments in the virtual learning environments and technology have given the much deserved propel to online learning. Such technological changes facilitate the self-driven learning process and acts as the primary mechanism through which instructors and students interact. Thus, MOOC platforms provide opportunity for social learning as well. There are several advantages of MOOCs. Firstly, they are large scale. The students have the freedom to choose courses that suit them from a pool of a wide range of options. Secondly, these programmers are open. As a combined effort of education service providers to make such courses reach the masses. An online course with open access and web-based electronic participation is a massive open online course (MOOC). MOOCs are self-organized and are accessible to all people who are familiar with and have access to technology. The learner can pace the course to suit his or her learning style and capability. MOOCs are designed to take the teaching and learning processes several steps ahead. On one hand, MOOCs give teachers the opportunity to interact a large number of students around the world globally, on the other hand, they give students access to high quality educational content provided by world renowned and reputed universities. MOOCs are also beyond locational constraints. All these factors make MOOCs more appealing to larger audiences. Employee training is a well-planned activity that happens with defined goals. There are various models of instructional design that are available and these models help in approaching the training activities scientifically. When the approach towards training is structured, the entire activity becomes more organized. The common models of instructional design and training are ADDIE (Analysis, Design, Development, Implementation and Evaluation) model, Morrison, Ross, and Kemp Model (1985), the Seels and Glasgow Model (1990), the Dick and Carey Model (1990). ADDIE happens to be the most natural appealing and widely used model. It offers a certain amount of flexibility and underlies every instructional design process. This research article tries to understand the factors that influence the experience of MOOCs users and how these findings can be used to optimize the steps in the ADDIE model.

Research methodology

Data Collection: The research methodology used to analyze the data is Descriptive research methodology. Both primary data as well as secondary data was used for my study. Primary data was collected by using survey method from the Students and Professional Employees

Sample Size: 62

Sample technique used: Simple Random Sampling.

Questionnaire Design: The survey questionnaire is split into two different sections. Section A includes the demographics of students and Employees. In Section B, all variables are evaluated using interval scale. The six independent and a dependent variable are designed into a sort of five-point Likert scale. Five-point Likert scale is suggested for many survey settings because it gives enough differentiation and an easy understanding by survey respondents (Brace, 2004). The respondent's scale vary from “Strongly Disagree” to “Strongly Agree”, with middle options as “Disagree”, “Neutral” then followed by “Agree”. Respondents were asked to fill in their demographic information in Section A. In Section B, the perceptions of respondents towards the various Factors influencing effectiveness of MOOC's and its role in Sustainable HRM were identified. Correlation is performed on the data obtained.

Data Analysis: It is performed on the data obtained from the respondents who were Students and Professional Employees, here the dependent variable is taken as Sustainable HRM and independent variables are Overall Quality (Audiovisual,Website,Instructor),Pace, Skill Building,Relavance of Topic and Content, Course Expenses and Ease of Use. The following table defines both the dependent and independent variables i.e., Table 1.

Table 1.

Independent Variables	Overall Quality	OQ-1: Did the videos of MOOC's helped you to complete the course?
		OQ-2: Quality of Website and Interface used was Assessed to complete the course?
		OQ-3: Did the Quality of Content and Course used added value to your Knowledge and Skill?
	Pace	PA-1: Flexibility of Mooc's has helped you to acquire latest Skills in certain domain?
		PA-2: The Validity and Duration of the Course is more important for you to enroll?
	Skill Building	SB-1: How far you agree that Skill improvement is there with Mooc's?
		SB-2: Do you agree that Skill building helps in your Professional Progress?
	Relevance of Topic & Content	TC-1: Is it tough to explore the right Topics in Mooc's?
		TC-2: Do you expect more Topics in Mooc's in Future?
		TC-3: How far do you agree that Content Delivery in Mooc's is good?
		TC-4: Do you feel you can understand Course through Content when you don't have time to see videos?
	Course Expenses	CE-1: Do you feel Free Courses were more popular?
		CE-2: Are you willing to pay for high quality courses from reputed universities?
	Ease of Use	EU-1: How far do you agree it is easy to choose and complete relevant course in Mooc's?
Dependent Variable	Sustainable HRM	SH-1: Are these factors (Overall Quality ,Pace, Skill Building,Relavance in Topic and Content ,Course Expenses and Ease of Use) really influence the effectiveness of Mooc's and its role in Sustainable HRM

Results and Analysis

Tools used

To analyze the relationship between the dependent and independent variables, analysis of data has been performed in MS Excel using Data Analysis

Correlation Analysis

Hypothesis is used to test the strength of relationship between the dependent and independent variables.
Null Hypothesis $\mathbf{H_0}$: There's no significant relationship between the dependent and independent variables.
Alternative hypothesis $\mathbf{H_1}$: There's significant relationship between dependent and independent variables.
In Correlation, if the correlation coefficient is <0.3 it represents a weak relationship between the variables, 0.3 – 0.7 represents a moderate relationship while the strong relationship between the variables is represented with the values >0.7.
The results obtained are as follows, in the below (Table 2)

Table 2.

	Overall Quality	Pace	Skill Building	Relevance in Topic and Content	Course Expenses	Ease of Use	Sustainable HRM
Overall Quality	1						
Pace	0.673719	1					
Skill Building	0.682666	0.744748	1				
Relevance in Topic and Content	0.637628	0.690219	0.640596	1			
Course Expenses	0.691689	0.804921	0.667656	0.819884343	1		
Ease of Use	0.582484	0.76316	0.575528	0.533497871	0.65021	1	
Sustainable HRM	0.589214	0.675141	0.816481	0.532062116	0.561065	0.604220669	1

Null hypothesis $\mathbf{H_0}$ **is rejected** and Alternate Hypothesis $\mathbf{H_1}$ **is accepted** i.e., there is a significant relationship between all the independent variables (Overall Quality, Pace, Skill Building, Relevance of Topic and Content, Course Expenses and Ease of Use.) and the dependent variable Sustainable HRM.
And also, there is a significant relationship between the individual independent variables with the dependent variable Sustainable HRM.

Findings

- There is a moderate relationship between the Overall Quality (**0.589214221**), Pace (**0.675141**), Relevance of Topic and Content (**0.532062116**), Course Expenses (**0.561065**) , Ease of Use(**0.604221**)and MOOCs role in Sustainable HRM which implies that these five factors (Overall Quality, Pace, Relevance of Topic and Content, Course Expenses and Ease of Use.) are positively related to dependent variable(Sustainable HRM).i.e., change in one variable will have a greater impact and affect on the other in the same way.
- There is strong relationship between Skill Building (**0.816480549**) and Sustainable HRM when compared to rest of factors. That means, the Variable Skill Building positively effects the MOOCs role in Sustainable HRM.

Conclusion

Sustainable HR policies are amalgamated into the strategic planning process, which prominently increases the chances of successful implementation of sustainable organizational practices. Employee training and development is an important aspect contributing to individual and organizational sustainability, if such training is given through e-learning, then it has a competitive edge. MOOCs is a revolutionary introduction that impacts sustainability, especially in terms of skill update, resource saving and reuse .As the platform or service provider plays an important part in the success of MOOCs ,the understanding of the factors affecting the user experience will help improve the training process. The research investigates on various factors influencing the effectiveness of Mooc's and its role in Sustainable HRM ,it has been found that the factor Skill Building positively effects the MOOCs role in Sustainable HRM .It is also seen that people find it little tough to choose appropriate course with different levels of complexity and duration, and some felt the courses were great and appreciated more courses with a lot of audio visuals, so MOOCs designers should emphasize on differentiating courses based on duration,level,based on skill and free or paid courses. The factors of content, quality, price and time are considered, so we can bring some improvement to the MOOCs that will lead an organization towards sustainable development. In a nutshell, the results obtained of this study may be useful in order to properly guide the users and help them make the right decisions regarding the selection and completion of courses in turn leading to organizational goal accomplishment. Last but not least, we hope that the results of this study can be used as a reference for future researchers.

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4. A STUDY ON EMPLOYEE PERSPECTIVE ON GREEN HRM PRACTICES

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Abstract

It is crucial for organizations to have environmentally-friendly policies in the work environment. We will have to make decisions that will help the environment and the people in the long run. Organizations will have to integrate business operations with sustainable practices. The responsibilities of the HR department included managing, developing, and retaining the right talent. But now, Green HRM has widened the boundaries. Green HRM means to enhance sustainable use of resources within business firms and more generally promotes environmental sustainability. Green HRM also enhances efficiency in the organization. Green initiative can maintain green culture among the employees. This study focusses on the fundamental understanding of Green HRM. Also, this paper presents a survey of professionals who state their response with respect to Green HRM and Sustainability. The survey was done to understand the employee perspective on Green HRM practices. The results of the survey show that employees are keener towards Green HRM and sustainability practices.

Keywords: Sustainability, Utilization, Communication, Green HRM functions.

Introduction

In today's scenario many industries are inclined towards Green Human Resource Management. Resources as we know are scarce and they must be used with caution. The organizations are working their way towards making themselves more sustainable. Sustainable development is concerned with meeting the goals of the present days without compromising the needs and resources of the future generations. Green HRM refers to introducing environment friendly practices in HR related activities like sourcing, recruiting, training, compensating, rewarding, performing etc. Green HRM promotes green culture in the workplace. It aims to increase efficiency and reduce the costs of the organization. These challenge for the HR managers is to help their employees understand what Green HRM is and then taking steps towards working. The firms will have to work towards Green HRM and simultaneously build strategies that will bring them closer to their business goals.

Objectives

The objectives of the paper are to

- To spread awareness and gain an understanding of Green HRM
- To understand environment related issues.
- And finally, to understand Green HRM and sustainability in an professional perspective.

Hypothesis

H0: Green HRM practices matter to the employees of the organization.

H1: Green HRM practices do not matter to the employees of the organization.

Methodology

The paper includes practices in Green HRM. Also, it has the survey results of 30 plus professionals and their understanding of the Green HR practices. The survey results will help us understand employee's approach towards sustainability and Green HRM.

Analysis

Green HRM is an emerging concept. It is concerned with greening the organization with traditional business approaches. The Green movement around the world gave birth to Green HRM. Human Resource is responsible for managing, developing, retaining the employees in an organization. After Industrialization and globalization many firms started operating. Large number of goods were used as office supplies. The goods included paper, books, plastic. The result of this was the waste that was being generated by the organizations. Due to this, the earth's natural resources have started to deplete. It has depleted oceans, air, forests and water. Hence, it is of utmost importance for the organization and employees to realize their contribution towards the environment and work towards sustaining environment and the business.

The definition of sustainability infers that the organizations need to possess environmental, social and economic performance to sustain themselves. Now a days, most of the firms want to position themselves as sustainable companies. Employees wish to work for companies that are more sustainable. The consumers wish to buy products that are environmentally friendly. The products or the goods people use should have the ability to be recycled, reused.

Employees are the backbone for every organization. The firm must make sure that all of their employees understand the concept of Sustainability. In case there is a gap in the understanding, suitable training sessions could be conducted. The HR employees have a huge challenge to work on. They will have to manage utilization and productivity of the employees while also meeting to the Green HRM challenges.
Some of the companies are bringing Green HR practices in their daily operations. The firms have adopted no pen paper approach. They encourage usage of digital notepads for making notes. The campuses have many trees. Usage of the natural light is maximised. The organizations are working towards using renewable sources of energy in their operations. The companies are also using Car pooling to transport their employees. Firms have adopted online training methodologies. Interviews too are being conducted online. This not only gives better analytics but also helps in contributing to environmentally friendly ways.
Let us now look at the survey questions. The aim of the questionnaire is to comprehend the employee understanding of Green HRM. Also, to understand the opportunity cost, or the cost employees are ready to forgo to move towards Greener ways. Perception level questions have been asked and Likert scale has been used to mark the answers. The results of the questionnaire have been computed using averages, median and mode. Statistically, it would be appropriate to use median or mode as the average values will deflect towards the higher values.

Findings

The sample size is 33 and the results of the questionnaire are the following:

- Out of the 33 professionals surveyed, 69.7% (23 out of 33) of the respondents strongly agree that business should have environmental, social and economic performance, while 30.3% (10 out of 33) agree with the same.

- 75% (25 out of 33) of the respondents strongly agree that the firms should utilize renewable sources of energy to carry out business operations, while 87% of the respondents consider that it is of extreme importance to have proper waste disposal and waste management practices at the organization. Additionally. 81% (27 out of 33) strongly agree that firms must bring out water conservation methods.
- With a rise in cases of mental illness, organizations and the HR department should address these issues. They need to consider the wellbeing of their employees. 78% of the respondents strongly agree with the above statement.
- 57.6 % (19 out of 33) respondents strongly agree that their morale will be boosted to work for organizations that implements Green HRM practices. This is a huge number. To retain better talent, the organizations will have to work on their sustainable methods.
- 66.7%(22 out of 33) and 24.2% (8 out of 33) strongly agree, agree (respectively) that they will be able to hire employees by looking at their resumes online. They do not need hard copy. This saves paper.
- Statistically, the median and mode values are 5, which means the employees strongly agree with the questionnaire.

Conclusion

The paper gives us a generic idea of Green HRM practices. The results of the survey too, look very promising. It shows that employees are keener towards green HRM and sustainability. They would also want to enhance their contribution on their part. The respondents have also mentioned about their organizations- planting trees and solar panels. The firms also try to reduce plastic consumption by distributing metal bottles to the employees. This stops employees from using paper cups in the office. The respondents have also mentioned that energy efficiency is also a norm at their organizations. Hence, the Hypothesis H0 should not be rejected.

The green HRM practices involve reducing carbon footprint, using less paper. It also focusses on employee health and well-being. Organizations will have to create awareness or training programs to bring all the employees on the same page. Green practices will boost the employee morale and also will motivate the employee in the work environment, provided the employee understands the bigger picture.

Suggestions and Recommendations

The suggestions and recommendations are as follows

- Green HR practices should be included in the firms' mission and vision statements.
- Employees who are responsible towards sustainability must be rewarded.
- Firms must position themselves as companies that follow Green HRM functions.
- Organizations must train employees to and encourage green culture in the HRM functions and other functions of the organizations.

Limitations

Green HRM practices are about strategically positioning the business in the long run. It is about going far than going fast. The cost associated with the process are high. Additionally, not all the employees will have a similar outlook on the environment. Adding on, it is difficult to measure the sustainable practices on an employee level. Finally, the time taken by every employee to get acquainted to the Green HRM practices may vary.

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5. ROLE OF HIGHER EDUCATION IN FOSTERING SUSTAINABLE LEADERS

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Abstract

Leader plays a momentous role in accomplishing the goals of Sustainable Development. A new view of leadership is required that can promote sustainability both at individual and group level. Nurturing proficient leaders to work collaboratively to discourse intricate sustainability challenges should be encouraged as early as possible. Considering how gargantuan the task of creating a sustainable future is and also the immense number of troubles and challenges, HEIs can play a significant role in developing sustainability leaders. This paper recommends diverse educational practices to strengthen sustainable leadership. The paper also explores and assembles literature on sustainable leadership, capacity building, and sustainability to insinuate optimal implementations of leadership programmes in Higher Education Institutions.

Keywords: sustainable leadership, Higher Education Institutions, learners, future leaders

Introduction

Education plays a notable role in educating the leaders to become better civilians who can orate complicated and hushed-up challenges of sustainability. Encouraging and advancing quality education that enhance people's lives is critical for moving towards sustainable development (UNESCO, 2014). Sustainable Development Goal (SDG)s specifically focused on refining the value of education, and learning outcomes, while the Millennium Development Goals emphasized on growing student enrolment. The 4th SDG was constituted with a particular goal emphasizing on importance of education that promote sustainable development to safeguard that all learners gain the knowledge and training required to foster sustainable development.

In the present moment education that include sustainability concept can support to update the attitudes, and behaviours of individuals as consumers, producers, and people to perform their shared duties, and responsibilities. As the immensity of sustainable challenges increases, higher education definitely should portray crucial role in evolving sustainability leaders. Addressing sustainability issues often involves stakeholder conflict, uncertainty, and interrelated problems, all of these highlight the need for leadership skills to familiarise sustainability (Shriberg , 2012). A new view of leadership is required that can provmote sustainability both at individual and group level.

This paper focus on to demonstrate the importance of fostering leadership skills in Higher Education Institutions for sustainable leadership, and also emeplify how to advance leadership skills in the context of diversity. It commences by examining Sustainable Leadership (SL), followed by the literature regarding sustainable leadership and its application in Hiher Education Institutions (HEI) that support Sustainable Development (SD), practices and barriers to enhance capacity building. Although sustainable leadership touches varied aspects of human life, in this article the discussion is restricted to strategies to foster sustainable leadership in HEIs.

Review of literature

Moving towards sustainability requires an understanding of society and awareness on environmental problems. In order to build strong sustainable leadership skills a paradigm shift is needed in HEI to support reflective, collaborative and experiential learning to future leaders.

Understanding of sustainability leadership by students plays crucial role in leadership programs and pedagogical strategies. Heather L. Burns (2015), in their action research methodology found most influential pedagogical strategies include developing a feel of community, learning from surveys, and learning from experiences support the development of sustainability leadership in HEI.
Research shows that studies (Michael Shriberg and Lindsey M, 2013) on sustainability leadership program designs and teaching strategies in order to understand the best methods for program design emphase on implementing experiential learning, building communities, integrating disciplines and validating sustainability knowledge.

While integrating sustainability activities into various disciplines of HEI there is a need to consider the issues related teaching and instructor capabilities. K. Ceulemans et al., (2010) considered a teacher's manual for the integration of SD in curricula of HE is a strong tool focusing on teachers' knowledge for SD integration within their discipline. Teacher's knowledge on preparing practical and ready-to-use exercises help students in analysing sustainable issues. The study gives more inputs on usefulness and practicality of the manual and can be used for exchange of experiences and knowledge on teaching sustainability.

It is important to understand the interdependence of 17 SDGs to achieve the core of global goal for a sustainable future. In order to identify the strong connection among Target 4.7 and other SDGs and its targets Shulla, K. et al. (2020) have done a statistical analyses and the study found prevailing components of education for sustainability development has strong interconnection with Goals 2, 3, 4, 7, 11, 12, 13, 15. The study helps us in identifying the importance of multi-stakeholder networks. Moving towards sustainable future requires a greater contribution from researcher on economic, social and ecological changes and challenges. As universities and colleges are learning hub, the present study focuses on role of Higher Education Institutions in fostering Sustainable Leadership.

Objectives of the study

- To examine sustainability leadership.
- To explore the importance of building sustainable leadership capacity.
- To examine the various possible ways of fostering sustainable leadership in HEI.

Methodology and data base

The proposed study methodology is a comprehensive literature review on the basis of secondary data. The data were collected from various working papers, eminent books, online journals and the internet. The present study is purely prepared by qualitative analysis.

Sustainable leadership

Sustainable development combines the aspects of nature and humanity and focuses on reducing the effect humanity has on nature to prevent overloading the capacity of natural systems and solving the social challenges faced by humanity in achieving this goal.

Leadership helps to influence outcomes and achieve desired goals. "Historically, leadership has been viewed through an industrial lens characterized by management, power, productivity, and authority" (Rost, 1991). Leadership is a trait mostly referenced in political and industrial spheres, but the critical thinking and perseverance of a leader and the group are required for spearheading obstacles and achieving tough goals. The definition of leadership was resituated by Burns and was cited by Rost (1991) as "Transforming in nature that postindustrial conceptualizations predicated on group process, collaboration, and shared goals increased in prominence".

Sustainable leadership is a collective responsibility to make sure that human or natural resources and not unduly depleted while avoiding any negative damage on economical or educational environment. It builds the base for good ideas and successful practices in communities of shared learning, application, and development. Sustainability leaders often face complex social issues or ecological problems with multiple systems. Complex challenges are hard to tackle unless future leaders are trained to address complex issues in a relational model model of leadership.

The traditional leadership involves the guidance from an expert in the field and following organized plans, but sustainable leadership is a remarkable shift from the traditional model, focusing on the group effort. Kezar et al.(2006) said "The social change model of leadership development is congruent with definitions of leadership focused on social responsibility and benefits from its broad use on college campuses". The model was developed specifically to be used with students in HEIs and specifies leadership as a meaningful, a process based on values, cooperative and collaborative work that results in positive social change.

Principles of sustainable leadership

- "Sustainable leadership creates and preserves sustaining learning" (Bajunid, 2006) –Develop something that promote sustainability is the first principle. Sustained learning lasts and nurtures the student's creative skills, interactivity, communication, social and emotional skills rather than results, learning is the driver in this style of teaching. Teaching with a focus on learning creates a cycle of students who can pass their skills further, hence creating a sustainable environment. Higher Educations' prime responsibility is to sustain learning.
- "Sustainable leadership addresses issues of social justice" (Bajunid, 2006) – Sustainable leadership benefits everyone as it is a collaborative effort and is interconnected with institutions in a local area. For instance, if all the institutions in an area are interconnected, they can have shared use of the best resources from each institution this creating a web of information exchange and sustained learning
- "Sustainable leadership develops rather than deplete human material resources" (Bajunid, 2006) – Sustainable leadership by itself provides time and opportunity for the leaders to work, support each other, and pass on their knowledge by mentoring more talent. This ensures that resources are not being wasted on a single person causing resource depletion and promotes responsible use of learning. Encouraging the formation of a network of leaders ensures that none of the individuals are being overused and stressed out. In case there wasn't any interconnection, the leaders would eventually face problems and get drowned under pressure.

Role of higher education

To benefit and help everyone, leaders are expected to take informed decisions about managing and improving human capital in every aspect of life. Building authentic relationships, resilience, and adaptivity to change, awareness of surroundings and creative thinking to solve problems is fundamental to healing the earth and developing sustainable human communities. The understanding of the complex interconnected world and attacking the problems we face with a relational model of leadership than an individualistic model will help future leaders create a sustainable future for everyone.

The goal and nature of Higher education are to create an place for learning, growth, creating, and spreading Knowledge. Knowledge is developed in both implicit and explicit forms. Implicit Knowledge is engrained in the memories of anyone who learns it and is passed down to future generations. Explicit knowledge is enhanced in physical form such as documents, books, procedures, and also in forms of perceptions, views, expressions, etc. Higher Educational Institutions (HEIs), by their nature, enhance knowledge in day-to-day activities and the academic processes.

Generating knowledge that reflect understanding of complexity of social issues , behavior enables learners to take future oriented decisions and promote global responsibility. HEIs in general, are considered more formal educational institutions. The focus when discussing the role of HEIs in promoting sustainable future is mostly on studies and academia related courses and programs. HEIs offer much more than just academia, they are hubs for creativity and skill-building. HEIs provide informal education in many ways such as volunteering, group activities, learning beyond academics by utilizing the faculty, staff, etc. All the above methods are not usually a concern of the administration or staff and depend more on the initiative by the students themselves. As a new culture sustainable education does not confirm academic tradition rather examines its ability for sustainable future, that needs an open-mind and colaborative process.

Future leaders would need a much better skill set than what we are seeing currently. Their skills should include and employ concepts from ethical theory, human rights, climate change. This changes their perspective towards the problems faced to create a sustainable future and encourages work with distinct interests and value systems to find common goals (Dale and Newman, 2005). Within this perspective, it is crucial to consider the Higher Education Institutions as a place of learning life and the world itself. On the other hand, individual and societal learning, and the influence they have on sustainable learning is negotiable.

Considering how gargantuan the task of creating a sustainable future is and also the immense number of troubles and challenges, HEIs can and should play a significant role in developing sustainability leaders and must have a clear cut path that can foster the concept of Sustainability in higher education in a variety of ways.

Ways to foster sustainable leadership skills in higher education

Sustainable development literacy encompasses understanding both, the global scale of problems affecting sustainability and understanding the problems faced at a local level. With the world facing previously unknown and accelerated effects of climate change and global warming, the education being imparted at the level of HIEs plays an important role and forges the path to making leaders and making the necessary changes in the world. The three primary expectations of Sustainability education are knowledge of

sustainability issues, the skills to act sustainably, and learning the personal and emotional attributes that enable sustainable behavior among individuals and groups of people alike.
Complex issues such as climate change, poverty, and human rights – require knowledge and skills from distinct disciplines in an integrated manner. Future leaders are required to understand these complex problems and be able to provide sustainable solutions. Interdisciplinary education if implemented properly promotes the learner's ability to understand these complex problems and act on them, aligned to the expected outcomes from education for sustainable development.

Leadership can also be built with general student involvement in activities like role-play pedagogy give students an opportunity to apply their knowledge to a given situation to reflect on issues, illustrate the ideas by placing themselves in a real world context, and to exemplify the complexity of decision-making. This process support effective learning for responsible leadership.

Learning approaches play an vital role in the framework of Sustainability. Few examples of effective learning approaches are problem-based, inquiry-based, experiential, and collaborative learning methods. These methods help integrate the change to newer thought practices such as "how to think" rather than "what to think" in HEIs. This shift in mindset must be led by the higher education system because HEIs develop and manufacture future leaders. This vision will require significant educational change in both short and long-term, resulting in noval leadership and commitment by colleges and universities. The definition of basic human needs will change drastically in the future and this requires a major shift in the thinking, values, and actions of all individuals, groups, and institutions in their relationship and the role they play in the natural order of the world.

Sustainable leadership education builds future societies and its citizens, who are informed and committed to the betterment of the world. Education facilitates and nurtures visionary problem-solving skills, social literacy that encourages individual as well as group activities with commitment. Higher Education is a robust tool for building strong bridge between the classroom and community and requires a collective paradigm shift. This shift emphasizes teamwork, collaboration, and cooperation, rather than stressing on individual learning at local level.

According to Capra & luise, (2018) for a sustainable life community institutions and practices must co-operate with the processes of nature. The theoretical foundation that is provided in the classroom must be coupled with practical work and community engagement to help future leaders understand the interrelated complex systems. This is an example for participative learning method. Community engagement activities in colleges encourage practical application of theories, create enthusiasm, develop a new perspective towards society, and can develop confidence in learners.

Colleges need to respond to an incresing demand for creating next generation sustainable leaders. Due to the complex nature of sustainability-related problems, the need for leadership in sustainability requires specific skills and thinking than using power to influence. This require a leadership theory and implementation that suits global and system oriented thinking and plan of action. Hence, higher education have a difficult task in transforming students to become future leaders for sustainability. This task of higher education goes beyond the problem definition, programs should focus on experiential learning methodology in fostering sustainability leaders.

To achieve this, future leaders can be trained with experiential, participative, interactive, and reflective learning methods to achieve sustainable communities. Sustainability leadership reflects an emerging consciousness of living in ways that account for ecological and social impacts. The principles of sustainability leadership respond to the challenges of an increasingly complex world. To best teach and model sustainability leadership, leadership education itself can nurture and promote the values and principles of sustainability leadership in youngsters and adults alike. This includes an direction towards a model systems that reflects collaborative approach in teaching and learning.

Challenges

Due to the complex nature of economic, social and environmental interrelated issues, it is challenge for heis to identify programs and encourage learners towards sustainable development. The multidisciplinary character of SL can be an obstacle to teachers as it requres a lot of coordination among stakeholders and the workload of teachers can be seen as a core issue. Learner encouragement and commitment towards education for sustainability requires orientation and dedicated instructors. With 26.3% gross enrolment ratio as of 2018-19 into Higher education in India , there is a need for more research and encouragement into formal and informal education in forstering sustainability leaders.

Conclusion

A new view of leadership skills are required to take informed decisions at the times of complex situations that can promote sustainable future. The pedagogical practices that can nurture leadership development with learners is the need of hour. The present study indicate that adopting sustainability leadership activities at HEI are important for developing competencies in future leaders. Designing a course that promotes a variety of skills for collaboration , an opportunity to understand ecological system and a focus on building competencies to face complex problems , can bring sustainability leadership as key outcome. Empowering learners as collaborative leaders is indeed a worthy goal for HEI in persuit of sustainable development.

Limitations and scope for further study

The main focus the present study is to explore the concept of sustainable leadership as it is important to analyse before implementing. The paper did not include effects of the political , socio and economic aspects on HEIs while designing and implementing the sustainable leadership programs. Further , experical evidences can provided on the above discussed leadership capacity building programs.

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6. SUSTAINABILITY CONSCIOUSNESS: IT'S ROLE IN PURCHASE OF GREEN COSMETICS

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Abstract

From being a very Utopian concept, Sustainable development has now emerged to become the need of the hour. Gone are the days when brand could get away with causing harm to the environment in the name of progress. Today's consumers have a voice; A voice which demands Responsibility and Accountability from brands. The beauty and cosmetics industry which has been notorious for its methods of production and testing Ex. Animal testing, usage of petroleum and release of toxic waste, has been brought under a lot of scrutiny. So much so that the industry has witnessed sudden mushrooming of 'Green cosmetic brands'. Green cosmetics is defined as being a multifaceted construct for the preservation of the environment, minimisation of pollution, responsible use of non-renewable resources, and animal welfare and species preservation (McEachern and McClean 2002). One of the most important factors driving the preference for green cosmetic brands is the impact of 'sustainability consciousness. Sustainability consciousness is the sum total of knowledge gained and experiences around sustainable development. The paper aims at exploring the role of sustainability consciousness as a purchase driver of green cosmetics. Using qualitative methodologies, the study has found that within purchasers of green cosmetics or skin care products, owing to factors like conditioning, moral values, know-how and community influence there exist varied level of sustainability consciousness across four different consumer cohorts identified in the study

Keywords: Sustainability consciousness, Ethical consumerism, Green cosmetics, Organic skin care products

Introduction

Gandhi Ji has said that 'Nature has enough for human needs and not their greed' – This quote makes one realise the need for human race as a collective to take more responsibility for their greed. Long gone are the days when sustainability was a distant futuristic vision. Global debates on Climate change being real have made us all realise that from being a distant futuristic vision, Sustainability has evolved into an important and immediate goal for mankind.

As a part of the global initiative, the UNDP has given 17 sustainability goals (SGDs) to be achieved and worked towards by 2030. A goal that concerns the economy as a whole is – Goal No.12 -Responsible Production and Consumption.

Time and again, corporate giants were brought down to their feet, trying to cover up their unethical methods of production. The global cosmetic industry in the past has been on the receiving end of a lot of flak for its own share of unethical production practices. To name a few - animal testing, use of harmful chemicals like parabens, use of palm oil and dumping tonnes of plastic and chemical waste. Considering this context, it becomes all the more important for cosmetic manufacturers to try to move towards more sustainable methods of production. An attempt towards the same has been observed in the sudden mushrooming of 'Green Cosmetic Brands' and increasing preferences for these brands from the consumers end. While a lot of research has been done in the west, in trying to understand perceptions and attitude that drive purchase decisions around green cosmetics; very less research has been done in

evaluating sustainability consciousness among Indian consumers and its role in driving the purchase decisions around green cosmetics. This research is an attempt to explore the same

Research objectives

To explore Sustainability consciousness among millennial consumers and its role as a trigger in purchase decisions.

To attain this main objective the study will encompass the following sub objectives

- Exploring overall perceptions and attitudes towards green cosmetics
- Understanding triggers and barriers for purchase
- Evaluation of sustainability consciousness as a factor in driving purchase choice
  - What role does it play in purchase decision
  - How does it play a role in purchase choice
  - To what extent and how strong is it as a trigger among millennial consumer vis a vis other factors

Review of literature

Setting context: Exploring the relevance of Sustainability Goals

In the year 2015, the UNDP has issued a set of sustainability development goals (SDGs) for nations across the world to achieve by the year 2030. While these goals encompass the inclusion of sustainability across plethora of human activities. SDG 12 specifically lays focus on sustainable economic activity in lieu of 'Responsible Consumption and Production'. Focusing entirely on separating economic growth from environmental claims it gives importance to –

- Efficient management and use of natural resources
- Cutting down on wastage
- Adoption of sustainable practices in companies and public procurement (Stockholm institute of environment, 2018)
-

With UNDP laying significant emphasis on Sustainable economic activities, it becomes important for all industries to align their production and resource management with a more ethical and responsible outlook.

Understanding Sustainability Consciousness

In simple words, Sustainability consciousness is defined as 'an individual's experience and awareness of sustainable development. It is believed to be an outcome of education around sustainable development. A natural outcome of education in sustainability, it is a merger of cognitive and affective learning. It goes beyond normal education experiences and requires transformative learning and teaching experiences (Kalsoom et al, 2017) . Most previous researches have focused on the inclusion of sustainability education at a school level, to raise sustainability consciousness; as an approach towards conditioning sustainable living from a nascent stage

Backlash faced by the cosmetic industry

The cosmetic industry has been scrutinized heavily for its non-eco-friendly practices that cause harm to the consumers and the environment. Being a highly consumption based economy, we consume massive amounts of personal care products like Shampoos, Toothpastes, Hair gels, Deodorants etc. and the same is put back into the environment as waste (Luiela Magdalena et al, 2017). Harmful chemicals are a concern

to human health with possibility of skin irritation and pollution to the environment (Yifeng Lin et al, 2018). Many cosmetic companies around the world have been boycotted by animal rights actitivits, as a protest against lab animal testing Luiela Magdalena et al, 2017)

Exploring the role of sustainability in cosmetic industry

Previous researches that explored sustainability in cosmetics, have used a plethora of words to describe them viz – ethical cosmetics, sustainable cosmetics, organic cosmetics and the most popular ones being 'Green cosmetics' and 'Organic cosmetics'. While researchers have used the term 'Green cosmetics' extensively, the term Organic cosmetics' is widely understood among the respondents. Hence both these terms would be used interchangeably in this paper

Defining Green and Organic cosmetics

According to (Luiela Magdalena et al, 2017) ; Green cosmetics may be defined on basis of

- Being cruelty free
- Use of natural and / or organic materials
- Certified as natural, organic and / or vegetarian by world's more reliable third party organisations
- Green cosmetics give back to ' Mother Earth' i.e. They plant trees, they invest in green research and donate to green causes
- Sustainable packaging that is the use of recycled paper, boxes etc.
-

Organic v/s Natural

There seems to be a clear distinction between organic and natural at not just their formulation level but also at an ideological level. Previous researches have also emphasized on the same.

Organic means that the ingredients are grown without chemical pesticides, toxins and herbicides using sustainable farming practices. Natural however implies the usage of 'Natural Ingredients' (Vanina et al, 2017). This distinction has led to the emergence of a new category, built on the philosophy of sustainability called as the 'Organic products'

Consumer's perception and preference towards 'Green / Organic cosmetics'

Some of the most common reasons for preferring these products are dominated by four ideologies

- *Responsible consumerism and sustainability:* The notion that people should consume less in order to reduce wastage of resource (Handelman et al, 2004). Breaking down of waste is easier with natural and sustainable alternatives (Aural et al, 2017).
- *Minimalistic behaviours :* Focuses on radical criticism to mainstream consumption and foster a progressive detachment that alienates consumers from markets (Nelson, 2009)
- *Skin care consciousness:* Products based of natural ingredients are less likely to cause skin irritation or allergic irritations. Complete absence of synthetic and toxic chemicals make these products similar to traditional products that have been popular in India (Article from Acme Hardesty)
- *Collaboration of brands and consumer :* Sudden rise of consumer consciousness has made knowledge exchange possible, which further made brands to either innovate or introduce a line of green cosmetics (Nor et al, 2015)

Challenges around adoption of green cosmetics

According to (Shahohan et al, 2018) who conducted a study on 'Attitude and Perceptions towards Green cosmetics' identified that **performance, lack of knowledge and affordability** were challenges quoted by consumers with regards to adoption.

Why Indian Millennial consumers

Indian Millennial consumers are one the most sought after and coveted consumer groups by brands and marketers. Being quite different from their previous generations, Indian millennial consumers are seekers of authenticity. Their loyalty to a brand or a product is heavily driven by how honest and true the brand is with them. Age old advertising tricks do not work with them. According to an article on the mint the millennial is "extremely opinionated and desire authentic conversations". That's why companies are realizing that reaching Millennials through advertisements and brand marketing is not enough. Being authenticity seekers, Indian millennials have also started turning their attention towards brands that are authentic, marked by commitment towards ethical practices. The same drive for authenticity has led them towards the adoption of brands that 'Sustainable'. According to the CII-AT Kearney report on sustainable retail published in 2019,millennial consumers in India opn to pay more for environmentally friendly or socially minded brands across categories such as automobiles, apparel, personal care, fresh and packaged foods. In addition to this Indian millennial consumers consider themselves to be wanting to move towards more traditionalism, away from harmful effects of western synthesized products (Neel, et al, 2020). All these studies have led to the understanding that the millennial consumer being endorsers of traditionalism and authenticity, are the ideal consumer groups for this study

Research methodology

Being Exploratory in nature, the study has used 'Qualitative Individual Depth Interviews to collect primary data.

What makes it an exploratory study: The study focuses on exploring 'Sustainability Consciousness' and its role as a choice driver in purchase of Green / Organic cosmetics among Indian Millennials. While researchers in the west have done significant exploration of attitudes towards Green cosmetics, Sustainability consciousness which is a novel concept has very less literature available. Researchers use exploratory as a methodology when they have very little or no knowledge about the group, situation, phenomenon, event, but believe that it contains elements worth discovering (Robert, 2011)

Why Depth Interviews: Depth interviews are highly useful in getting detailed and thorough understanding of the subject matter. They allow the respondent to give their responses freely without being overtly conscious. With a prior understanding that every person's sustainability consciousness could vary by context and attitude, depth interviews seemed like an ideal methodology that was more inclusive and gave every respondent's opinions their own due importance. In the same context, previous researches have revealed that; In-depth interviews are most appropriate for situations in which you want to ask open-ended questions that elicit depth of information (Lisa, 2001)

Target group of the research: Indian Millennial women between the age group of 18-30 years, who have purchased and are currently using popular Green / Organic cosmetics of brands like – Forest Essentials, Pahadi Local, Ruby organics, Neemli Naturals, Khadi, Kama Ayurveda, Soul tree, Plum, Mama Earth and Earth rhythms

Sampling Method and Technique: From 30 responses received on a sample survey done on social media, 10 were purposively chosen using purposive sampling technique for the final discussion

Tool for Analysis : The data was collected by recording the interactions which were later transcribed using online platforms. The transcripts were further analysed using the method of 'Content Analysis'.

Results and discussion

Sustainability is no longer a utopian ideology but something beyond. Millennial consumers' across the globe are getting strongly influenced by an array of sustainability activism. Disasters like Australian Bush fires, Activists like Greta Thunberg, Films like Our planet and Political leaders like the 45th President of the United States, have only sparked their sustainability consciousness The research has led to the understanding that Sustainability is rapidly evolving into a 'Belief System'. A belief system is an ideology or a set of principles that help us in shaping our interpretation of the world around us. It could be a religion, political affiliation, philosophy, concept among many other things.

Akin to any other belief system, it also has its own set of Prerequisites, the satisfaction of which qualifies it to be a belief system. Sustainability consciousness is one such perquisite, which is required to be satisfied for the establishment of Sustainability into a fully-fledged belief system. With regard to Indian Millennials, the research has revealed that 'Sustainability consciousness' at an overall level varied widely due to reasons like:

- **Conditioning:** Importance given to sustainability and environmental consciousness as a part of child rearing and nurturing
- **Know - How:** Encompasses both technical knowledge of Sustainable living concepts and knowledge around global current affairs like Climate change, Toxic waste disposal, Carbon emission etc.
- **Moral compass:** Their own values, beliefs and sense of right or wrong
- **Community:** Influence of peers and their social circle and the extent to which the social circle subscribed to the concept of sustainability.

These factors further impact a person's levels of commitment / buy in into the overarching 'Sustainability belief system' (Fig:1)

Source: Authors depiction

Sustainability Consciousness in the context of Green Cosmetics: Outcomes of detailed discussions:

Exploring their nomenclature of Green Cosmetics: Natural v/s Organic perception

Most consumers had a clear distinction between organic and natural products. Natural was understood in the context of product formulation made of natural ingredients. Organic was understood as beyond natural. While most had complete or partial knowledge of what organic was, a few understood it as something beyond natural but could not articulate what the difference was.

Organic associated more with the Skin care category

Another important finding of this study was the association of the word 'Organic' with the category of skin care products and not cosmetics. This has to do with a) The positioning of organic cosmetics as products that are 'good for the health' and b) Low availability of cosmetic or beauty products from popular organic brands

Therefore, skin care products with the below features were considered as organic:

- *Indigenous brands:* Support the enhancement and growth of local community
- *Certified as Organic:* Certified as products made of ingredients that were sourced organically by approved third parties and boards
- *Vegan and cruelty free:* Made without use of animal testing or ingredients driven from animals
- *Biodegradable / Recyclable packaging:* Moving away from plastic and trying to reduce waste

The study was able to identify 4 different cohorts of consumers with varied levels of sustainability consciousness. Their levels of sustainability consciousness further determined how stringently or leniently they evaluated the products across the above-mentioned features

Cohort 1: Sustainability Crusaders - Highly Sustainability Consciousness

Description: These people are active advocates of Sustainability and Environment conservation. Being highly knowledgeable about sustainability norms and practices, they also tend to be extremely cautious of their lifestyle choices and their impact on the environment.

Purchase behaviour: Prior to purchase of the product they run a check and evaluate both the product (Ingridients, process of manufacturing etc) and the brand (Values and communication) to understand the brand's commitment to sustainability norms. They are also willing to pay a higher price for the product if they are convinced of the brand's sustainability commitment levels

Here is quote from a sustainability crusader

"From the time I was able to buy things with my own money, I shifted to pure organic products. I check everything before purchase. Read what is written at the back of the pack and cross verify against my own research, Go through their website and reviews. After all this I decided to buy the brand Earth rythms. It's a bit pricey. But I am willing to make that choice for the greater good" – Anandita, 28, Sustainability Crusader

Cohort 2: Amateur Sustainability Crusaders – Moderate Sustainability Consciousness

Description: These women are in the process of becoming active advocates of sustainability. Their sustainability consciousness hasn't completely evolved and they are still learning about sustainability and how to make more sustainable life choices

Purchase behaviour: They may have entered into the organic category driven by a) Peer influence b) Need for something safe and natural on their skin. During their journey with the product, the brand educates them of its sustainability commitment, which in turn piques their interest in the same. As they grow more knowledgeable, they start making sustainability consciousness a priority for their next purchase. Their willingness to pay is incremental and relies on their increasing affinity to sustainability

Here is quote from an Amateur Sustainability Crusader

"When I first purchased plum, I did it because I was using a skin care product for the first time and I didn't want to risk .Then Plum started sending regular emails on sustainability practices. They have a program where you can give used containers of their product to them for recycling. I got interested and from then I have tried to make it a mandate to read about how sustainable the product is" – Manisha, 25, Amateur Sustainability Crusader

Cohort 3: Pragmatic Sustainability Crusader – Moderate sustainability consciousness

Description: These women rely on practicality of implementation. They find it difficult to completely switch towards sustainability and hence try to pick and abide by a principle of sustainability that they find as convenient. Hence these are neither completely committed to sustainability nor do they envision or make efforts to commit to it in the future

Purchase behaviour: Their purchase behaviour reflects their attitude towards sustainability. The choose products which subscribe to the value of sustainability that they have chosen as convenient to them. For ex. Purchase of vegan and cruelty free products.

An interesting behaviour noticed here was that these people purchased non-organic products as well as long as they claimed to subscribe to the value that they themselves subscribe too. Ex. Choosing non-organic/synthetic cosmetics and products because they are cruelty free

Here is quote from an Pragmatic Sustainability Crusader

"I am conscious of harm done to animals. So I choose products that are cruelty free. I purchased colour bar even if it is non-organic because it is cruelty free. I don't think leading a fully sustainable life is possible, it requires that you become a minimalist. I am happy being this way, something is better than nothing na" Namratha, 30, Pragmatic Sustainability crusader

Cohort 4: Zilched Users – Low or no sustainability consciousness

Description: Zilched users typically have zero sustainability consciousness. They may have read about sustainability in the past, but have no opinions or have no lifestyle choices driven by it

Purchase behaviour: They would have chosen a sustainable or organic product due to referral, preference for natural or in a few cases, the need to construct a certain social image of themselves. Sustainability consciousness hardly plays a role in their choices

Here is quote from a Zilched user

"I just purchased it because my friends said so. I don't consider sustainability as an important factor because I don't know much about it" – Anita, 24, Zilched user

Barriers to Enhance Sustainability Consciousness

There were two scenarios that were noticed in terms of barriers

Scenario 1: Moderate - High sustainability consciousness, but inability to act

Affordability: Most organic products are priced higher than synthetic products. Most millennial women find it challenging to be able to buy pure organic products because it is beyond their budget. This makes sustainability consciousness a virtue which only the rich can afford

Absence of cosmetic line of products: Being associated with skin care and not beautification, women who regularly use cosmetics find it challenged to act on their sustainability consciousness, simply due to the lack of enough affordable cosmetic options

Distrust: Though most organic brands claim to be 100% organic, actual sustainability crusader, do not end up buying into them, because they lack certifications and approvals, which makes consumers weary of purchasing these brands

Low appeal: Being positioned as skin care products, organic products lack the appeal that cosmetic brands have

Scenario 2: Low sustainability consciousness

In cases where sustainability consciousness in itself was low, the challenge lies in 'Low awareness'. Lack of knowledge, adequate social influence, brand communication, media influence around sustainability hinder the growth of sustainability consciousness

Conclusions

The research has led us to the understanding that the 4 different profiles identified, had varied levels of sustainability consciousness, depending on their context, interests, behaviours and purchase journeys. While a pure sustainability crusader is marked with high sustainability consciousness, she is also faced with potential barriers that may derail her from living her ultimate vision of sustainability. Amateur and Pragmatic sustainability crusaders, have a great potential to become pure sustainability crusader, provided they are supported by varied sustainability stakeholder. Zilched users need to be schooled on Sustainability to raise their consciousness. In conclusion, in order to bring about an increase in sustainability consciousness among consumers, there has to be a strong ecosystem of stakeholders in other words an active community of consisting of sustainability education, sustainable brands that communicate effectively and produce more green products, Sustainability law enforcement forces , Activists and influencers. SDG 12 calls for responsible consumption and production. Hence the onus is also on the Indian millennial consumers who have the opportunity to become active advocates of sustainability consciousness by endorsing products that are sustainable and ethical. Soon to be parents, they also have a significant potential role in inculcating sustainability values in their children and parenting approaches Consumers and Producers need to collaborate and work hand in hand towards the attainment of the goal.

Limitations and scope of further research

Combining Qualitative and Quantitative methodologies: The study has scope for using quantitative methodologies as well to get an exact indication of sustainability consciousness

Exploring the product side of the story: This study focuses entirely on consumer consciousness, it can further be used to reach out to brands who produce these products, to understand their side of the story and their challenges

Larger sample and a different approach: The current sample is adequate to get these findings, however meeting more consumers and using other methodologies like focus groups will give us the opportunity to explore varied set of opinions and give more layers of depth to the insights

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7. ADOPTION OF SUSTAINABLE REVERSE LOGISTICS BY RETAILERS

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Abstract

Logistics is concerned with moving the goods from one location to another, either from the producer to the supplier, from the supplier to the consumer, or from the distributor to the consumer directly. The most important aspect of logistics for many years is to minimize transportation costs, but another important point of sustainability has also become more important now.Reverse logistics is the set of activities carried out after a product is sold to recover value and end the lifecycle of the product. It typically involves returning or forwarding a product to the manufacturer or distributor for servicing, refurbishment, recycling, disposition to reduce waste. Sustainable Reverse logistics is a green supply chain management practice that allows businesses to manage waste and improve their competitiveness as their environmental efficiency. Increased consciousness of environmental issues, sustainable development, corporate citizenship, and the benefit of recycling also put more pressure on firms to make sustainable business initiatives such as a better reverse logistics strategy.While retailers have often focused on forwarding logistics, they tend to overlook the importance of reverse logistics activities and their potential to improve the performance of retailing operations. This study aims to examine the level of Sustainable reverse logistics adoption among Hyderabad retailers, and to identify the influence of customers/ stakeholder's pressure, regulatory/Govt pressure, financial and competitive pressure, and also the pressure of corporate citizenship on reverse logistics adoption.
The Primary Data for the study is anticipated to collect from small retailers located in Hyderabad through the survey questionnaire method. The collected responses are planned to apply Regression analysis to understand the Influence of various pressures on retailers in the Adoption of Sustainable Reverse Logistics.
Keywords: Reverse logistics, Sustianability, Retailers Adoption, Regulatory pressure, competitive pressure, Regression Analysis.

Introduction

Today, with rising global warming, air pollution, and deterioration of the environment, environmental problems have become a prevalent concern for governments, communities, and business organizations. Many environmental concerns are known to emanate from corporate organizations. The greening of the supply chain became important as managers became increasingly conscious of the need to be environmentally and socially responsible for their activities.

Reverse Logistics

Reverse logistics is defined as "a process by which a manufacturing company governs the return of its products, parts and materials from the consumption sites, in order to reuse them, recover their residual value, or to dispose of them (Gandolfo and Sbrana, p. 31-32)".

Reverse logistics expands its use by restoring, upgrading, or recycling. This will serve as a kind of asset recovery for suppliers so that they can gain as much value as possible from the commodity, offering a second return on investment. Reverse logistics refers to tracking the product's life-cycle until they hit the end customer. It could include how your product could be reused, how it could be disposed of properly after use, and any other way your expired product might generate value.

Retailers earn the most returns during the months of January and February, when returns are around eight to twelve percent of overall sales, and the cost of returning these units is two to three times that of forward logistics operations.

Customer Returns

The physical shipping of the returned product.
Quality testing the returned product to replicate the error or identify the flaw.
Documenting any problems with the returned item.
The disassembling, repairing, recycling, or restocking of the returned item.
Managing the reverse travel of product back into the supply chain can help you avoid making the same mistake twice and allow you to reutilize as many components of your product as possible.

Reasons for products returned? Returns occur for a number of reasons:

When consumer is unsatisfied with the product
Faulty or faulty component.
The item is out of date and has exceeded its serviceability.
Overstock that needs to be returned to the factory.
This stock is vital to the operation of a company, even if it is only used on particular occasions.
Seasonal stock, that is, goods which are available only during certain periods of time (such as seasonal) and which must be stored for the rest of the year.

Sustainable Reverse logistcis

According to Alzawawi (2014), "Environmental and environmental developments around the world have contributed to the introduction of many environmental laws and legislation, as well as growing market demand requiring the activation and implementation of environmentally friendly practices in industry. Green regulation has pushed companies to take responsibility for their waste management. The rate of disposal of waste is also rising rapidly. It is a difficult topic as producers must comply with government policy and regulations on how to recycle and dispose of used product while reducing the effects on the economy and the environment. Nevertheless, the idea of reverse logistics helps businesses to efficiently take care of waste in a responsible and sustainable way. Reverse logistics applies specifically to the reverse movement from customer to supplier (Hansen, Larsen, Nielsen, Groth, Gregersen and Ghosh, 2018).

There are also ways to reduce waste and by reverse logistics to mitigate the environmental impacts of business operations. The reverse logistics recovery solutions include repair, remanufacture, and recycling. The repair choice is to bring used goods back to working order. When appropriate, the remanufacturing alternative is to upgrade the used goods to quality requirements comparable to those for new products
The recycling choice is to reuse the materials of the used goods or parts. Recycling requires a process by which used items are collected, divided into groups of related materials and then converted into recycled materials. To achieve competitive advantage and the effect on the environment, businesses will need to learn more about controlling return flows as part of their strategic and integrated business operations (Hansen, et. al., 2018).

Kadlubek (2015) describes “sustainable transport and logistics are the effect of the process of sustainability in the sector of transport and logistics, which possess the properties of environmental awareness, economic optimality, social justification and political responsibility (p. 496).” There is a

greater public awareness of the impact on human activities and the environment especially as a result of social, economic and environmental costs (Grabara, 2013).

In order to make reverse logistics as effective as possible, customer participation is also important. For example, companies are responsible for being part of this cycle by developing programs that support and facilitate the people's active involvement in recycling in a community.
Repair: get broken products back into working order.
Refurbish: bring used products up to a specified quality (generally less than the original).
Remanufacture: bring used products up to quality standards that are as rigorous as those of new products, although at a lower cost.
Cannibalise: recover a small number of reusable parts and allocate them to repair, refurbish or remanufacture other items.
Recycle: reuse materials or components from discarded products to make new items, which might not necessarily be like the original article.

Sustainability is more than pure cost savings in logistics. This also involves looking at the products usage during the entire process of manufacturing, selling and distribution. Recycled cardboard is a much healthier choice than using new materials for packaging boxes, which has less effects on the environment. Alongside this, the logistics of a supply chain can be seriously damaging to the environment. After all, if you order materials from several thousands of miles away and then ship the finished products to destinations even further away then you're increasing the greenhouse gases being released.

Sustainable Reverse logistics' practices not only reduce waste and its effect on the environment; recovery options can lead to reduced costs, improved operational efficiency, improved customer service level and profitability, and the public image of these companies (Hansen, et. al., 2018)

Reverse Logistics The growing concern for the environment, in particular the use of resource use by a business, has resulted in massive quantities of waste, as well as the depletion of natural resources. While these activities lead to a healthier world, thanks to savings from salvaged goods they also reflect a significant business opportunity.

Review of Literature

Marketing aspects of reuse and maximizing the product life of produced goods were based in the late nineties, and comprehensive structure was introduced for setting up and implementing reverse logistics programs.

Eltayeb et al. discussed that, in addition to economic benefits and cost savings for the companies, taking back goods and packaging, business organizations can produce environmental benefits in the form of decreased waste and efficient use of resources.

Carter and Ellram investigated drivers and constraints which decide the reverse logistics activities of a business. We describe regulatory and consumer desires as significant stimulating influences, based on a literature review. Around the same time, it is found that poor quality of input services and a lack of engagement by stakeholders are major obstacles to effective reverse logistics programs. In addition, they

suggested essential factors in the reverse logistics process, and they established a model that suggests how these factors interact.

Subramanian et al. addressed RL approaches review and assessment with the following emphasis on decision-making: reverse logistics network structure, partnerships, inventory management, and planning and monitoring. Many papers have appeared devoted to studying reverse logistics activity. Pokharel and Mutha investigated the current development of research and practice in RL through content analysis of published literature and showed that research publication on RL is that particularly after 2005, thus showing the growing awareness of RL as a supply chain driver and logistics driver.

Janse et al. have summarized Barriers and facilitators in managing reverse logistics in the consumer electronics sector and provided a diagnostic tool for assessing a Consumer Electronics company's RL practices and identifying potential for RL improvement, from a business perspective. In a complex system to structure the variables and get the interrelation between them is always a matter of concern.

Raj et al. identified enablers which help in the implementation of FMS and analyzed the mutual interactions between them using ISM approach. They explored that ISM methodology strengthens the practical views of manufacturing managers and depicts a clear picture about the significance of different enablers.

Research Gap

After pertinent Literature Review, it has been observed Reverse logistics has become a field of importance for all organizations due to growing environmental concerns, legislation, corporate social responsibility and sustainable competitiveness. Perusal of the literature shows that there is research gap in the field adoption and implementation, forecasting product returns and outsourcing have not been reviewed extensively. This study attempts to fill the existing gap through this examination, and outline the future directions for research based on research gap analysis on why and how to adopt sustainable reverse logistics.

Objectives of the study

- To understand the influence of various pressures on retailers in adopting sustainability
- To examine the retailers level operations in reverse logistics practices
- To identify the influencing factors on retailer’s sustainable logistics.

Hypothesis of the study:

Ho: There is no significant influence of government, competitiveness, stakeholders, and citizens pressure on retailer’s sustainable reverse logistics.

Ha: There is a significant influence of government, competitiveness, stakeholders, and citizens pressure on retailer’s sustainable reverse logistics.

Conceptual Model of Variables

Accordingly, if a company has several branches, clients, and vendors, and there is general public knowledge, implementing Sustainable Reverse Logistics practices is likely to be under greater pressure. The conceptual framework has been developed based on comprehensive literature analysis and reverse

logistics practices. The variables found are Government Pressure, Stakeholders Pressure, Competitiveness Pressure and Citizens Pressure as Independent Variables and Adoption of Sustainable Reverse logistics as Dependent Variable.

Figure 1: Variables description

Research Methodology

The study has concentrated on Primary data collection to get valuable information for the research. Also, secondary data has also been added to assist in the prime analysis of the report. Because of pandemic circumstances, information was collected through an online survey in Google form, the survey method was Questionnaire from various Retail Sellers.

The sample was distributed to 30 small retailers from different areas of Hyderabad, to make the research more precise, only 25 respondents retained for the study were filtered out due to unanswered, unfilled responses. The data collection period was during August 2020.

Sample description in order to appeal to all classes of the society, retail stores would have to identify with different products in different categories. Sample respondents has been identified into 6 groups and labelled as Departmental-1, Fast Food centers-2, food sellers-3, Furniture-4, Pharmcy-5, Supermarket-6.

Cronbach's Alpha:

The reliability of all variables was checked applying Cronbach's Alpha value. Table shows the result of data analysis where all variables of the study have a Cronbach's Alpha value of more than 0.7, which is an acceptable and significant reliability level.

Table i): Scale Reliability

Scale Reliability Statistics			
Estimate		**Cronbach's <u+03b1>**	
Point estimate		**0.754**	

Data Analysis and Results Discussion

Retailers are classified by form of ownership and type of product. Also, types of retailers distinguished according to product assortment, price and customer service levels. Retailers such as department stores, Pharmacy stores, Fast food centres and super markets face strong challenges from competitors, particularly in reverse Logistics.Departmental-1, Fast Food centers-2, food sellers-3, Furniture-4,

Pharmcy-5, Supermarket-6. Therefore, the sample consists of majority of pharmacy store 24%, 20% of food sellers and supermarkets and followed by fast-food centres, Furniture and departmental stores.

Table 1: Respondents (Retail) Classification

Frequencies for Sector				
Sector	Frequency	Percent	Valid Percent	Cumulative Percent
1	2	8	8	8
2	4	16	16	24
3	5	20	20	44
4	3	12	12	56
5	6	24	24	80
6	5	20	20	100
Missing	0	0		
Total	25	100		

Chart 1: Sample Classification in Pie chart

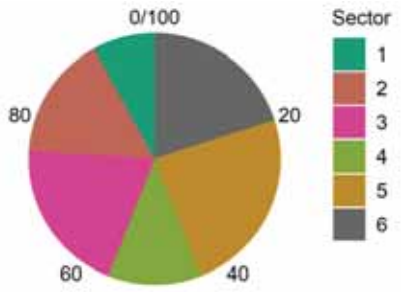

Table 2: Descriptive

	N	Mean	SD	SE	N
ADOPTION	25	19.76	3.951	0.79	25
COMPT	25	12.28	2.072	0.414	25
GOVT	25	24.36	2.343	0.469	25
CITZN	25	11.88	3.113	0.623	25
STAKE	25	13.28	2.337	0.467	25

The level of reverse logistics adoption, was measured with four constructs, namely the Government/Regulatory forces, Competitiveness pressure, Stake holder's involvement, and Citizens pressure towards reverse logistics activities, Overall mean for reverse logistics level is 15.8.

Table 3: ANOVA Table

ANOVA						
Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	9705.569	4	2426.392	118.379	< .001
	Residual	430.431	21	20.497		
	Total	10136	25			

As **p-value** (typically ≤ 0.05) indicates strong evidence against the null hypothesis, so reject the null hypothesis. if none of independent variables are statistically significant, the overall F-test is also not statistically significant. Occasionally, the tests can produce conflicting results. As F (118.379) ratiois large it means that there is a variation among group means is more than expected.

Table 4: Model Summary

Model Summary - ADOPTION												
										Durbin-Watson		
Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df1	df2	p	Autocorrelation	Statistic	p
H_1	0.979	0.958	0.949	4.527	0.958	112.742	4	20	< .001	0.197	1.559	0.235

Table 5: Correlation Co-efficient

Coefficients										
							95% CI		Collinearity Statistics	
Model		Unstandardized	Standard Error	Standardized	t	p	Lower	Upper	Tolerance	VIF
H_1	COMPT	0.722	0.481	0.379	1.501	0.148	-0.278	1.722	0.85	1.176
	GOVT	0.131	0.273	0.077	0.478	0.638	-0.438	0.699	0.91	1.099
	CITZN	0.118	0.295	0.093	0.4	0.693	-0.496	0.733	0.949	1.054
	STAKE	0.462	0.359	0.273	1.288	0.212	-0.284	1.209	0.95	1.053

The above model summary table reports the strength of the relationship between the model and the dependent variable. R, the multiple correlation coefficient, is the linear correlation between the observed and model-predicted values of the dependent variable. Its large value indicates a strong relationship.

In regression, the size of the co-efficient for each independent variable tells the size of the effect that variable is having on your dependent variable, and the sign on the coefficient (positive or negative) gives you the direction of the effect.

The unstandardized coefficients describe the mathematical relationship between each independent variable Government(0.131), Comptetiveness (0.722), Citizen(0.118, Stakeholders (0.462) on dependent variable.

The p-values for the coefficients indicate whether these relationships are statistically significant. The regression output in the above table shows that all variables are not statistically significant because its p-values are greater than the usual significance level of 0.05. As the study indicates there is no influence of mentioned variables on Retailers sustainable Reverse logistics adoption. Therefore, we accept Null Hypothesis.

Recommendations

Reverse logistics despite all the practical uses by Retailers, Mmanufacturers in developed countries are still not a popular practice among retailers. Therefore, the results of this study fulfil this gap in the literature by answering the research questions of which factors increase the level of adoption and which barriers contributes to total level of adoption of Reverse Logistics:

- In the past, industry has not concentrated on reverse process management and growth, returns have been seen as burdensome.
- Retailers need to pay close attention to public and government initiatives which may serve to increase the cost of green transportation.
- To minimize the negative impact on the ecosystems of logistics flow, retailers should utilize their resources in the most efficient and environmentally friendly way to support the need to take care of the global environment.

Pressure for Adoption and The Impact on Firm's Performance reverse logistics activities only. Regulatory pressure, together with customer and stakeholder pressure are found to have a significant relationship with the level of reverse logistics adoption.

Conclusion

Climate change, social pressure, resource scarcity, economic conditions and consumer recognition have helped to increase the importance of reverse logistics worldwide. Contending retailers should adopt sustainable reverse logistics strategies to protect the environment and to win market shares, participate in recycling, and reuse their goods to meet their target customers ' expectations.

The study revealed Issues such as lack of awareness and knowledge of reverse logistics among retailers, high implementation cost, lack of resources and no Pressures from Government, stakeholders, competitiveness, and citizens commitment is among one of the top barriers that inhibit an effective reverse logistics activities implementation among the retailers.

At the same time, this study also contributes some insights on the impact of reverse logistics adoption on retailer's performance. Even though the finding is not as hypothesized, it shed lights on retailers view on the factors that determine their business performance.

Creating sustainable strategies to promote sustainable reverse logistics in developing countries can be a potential work. The negative relationship between Influence of Various pressures on retailer's Sustainable reverse logistics and its adoption can also be examined as further research.

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8. SUSTAINABILITY BRANDING APPROACH

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Abstract

Sustainability branding refers to imparting and maintaining a specific identity to the product or service which inculcates special added values in terms of environment and social benefits. Sustainability branding, apart from green branding, acknowledges the social factor of products and services which includes health and safety issues in terms of direct or indirect consumption as well as the effects in terms of production level. A sustainable brand stands on three pillars i.e. environments, social and economic parameters. When these three pillars are successfully integrated as foundation for the operations of a product or service, one achieves sustainability branding. We as millennials are the future of sustainability. When you see a group of millennials discussing/communicating with each other, 60 per cent of their conversations revolve around environmental and social issues. But according to a 2013 study by Ecolab, millennials are 17 per cent less likely to recycle than the general population. Considering this contradiction, how do you pitch the problem and the effective solution of sustainable branding to millennials? How do you as a company gain attention of the future customers (Millennials) while imparting sustainability? How have we failed till now to gain their attention? These are some of the questions that this paper seeks to address.

Keywords: Sustainability branding, Sustainable brand, Sustainability, Millennials.

Introduction

Sustainability is the ability to exist constantly. Sustainability refers to how we live in harmony with the natural world without damaging it or causing destruction to it. As human beings, our responsibilities towards nature should diversify as we walk along the path of development and technology. It is our duty to protect nature and its surroundings from the damage and destruction caused by developments. While we converse about development and technology, we realize that the major role is played by businesses around the world that contribute to this development. How do businesses contribute to sustainability and how do they stop the adverse effect of development? Sustainability branding is referred to as imparting and maintaining a specific identity to the product or service which inculcates special added values in terms of environmental and social benefits. Sustainability branding not only benefits the environmental factors, but also aids the social and economic aspects. Sustainability branding is successful only when it can convey the sustainability benefits to its consumers and potential customers. Sustainability brand acknowledges the socio-economic factors along with the environmental factors which are entailed due to the direct or indirect use of the product or service. There has been a shift in how people perceive a product. There are various parameters a consumer considers, before buying a product. These parameters play a crucial role in converting the target customers into consumers and loyal consumers. The main focus of the present paper is to identify the parameters considered by millennials and how they perceive sustainability.

Objectives

The objective of this paper is to highlight the importance of sustainability, sustainability branding and how to attract millennials through sustainability branding. Through this paper the buying trends of millennials are considered and are compared to the influence of sustainability factor among these trends. This paper guides the reader through various approaches designed to attract millennials while including sustainability factor. This paper examines the factors affecting the purchasing behavior amongst

millennials and discusses how the brand should implement their marketing strategies keeping these factors in mind in order to target millennials and convert them into loyal consumers.

Methodology

The methodologies mentioned below were used for analysis and arriving at the conclusion:

- Observation
- Secondary data analysis/ Archival study
- Survey

A significant part of the analysis was based on observation for the qualitative part of the research and secondary data analysis and survey were used to analyze quantitative part of the research. A questionnaire was administered on a sample group of 30 individuals. Respondents were in the age group of 24-35 (millennials). The sample was decided based on their age group and the objective was to study their purchasing behavior. The questionnaire administered on the sample group sought to elicit respondent's views on multiple factors including price, ease of use, packaging and brand value.

Questionnaires and Measures

The questionnaire was prepared keeping in mind the mindset of millennials and the various factors that might influence them. The behavioral aspects of millennials were considered while structuring the questionnaire and the responses were recorded to analyze the influence of these factors on their buying trends. The following were the factors that were included in the questionnaire which were compared with the sustainability element:

- Time: How much time does the usage of the product save in their daily routine
- Design and Packaging: How well is the product packed and designed
- Brand value: Importance of brand in customer's eyes along with its financial significance
- Ease of use/ Convenience: The amount of efforts saved in getting used to the product and its customer friendliness
- Pricing: The amount requested by the seller for the product/service and the degree of justification in the customer's eye.

Analysis

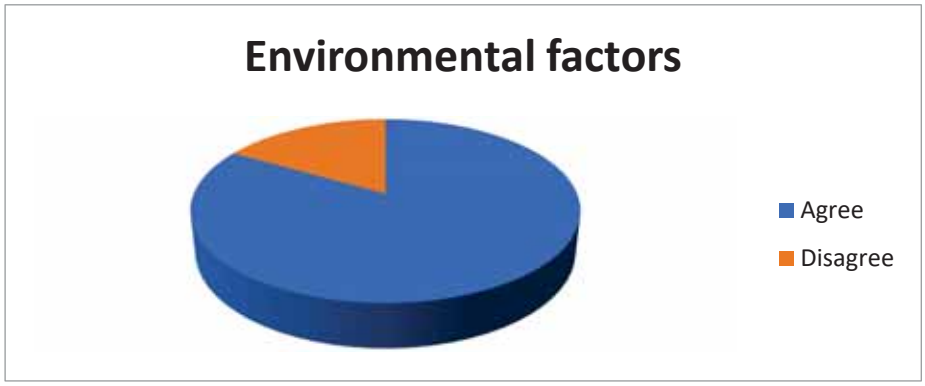
A brand is more than just a logo, it delivers the message that a business wants to deliver to its consumers. A great brand strategy helps in engaging the consumers. A strong brand strategy conveys the emotion and helps in converting the target audience into consumers. Then the question is how do you as company deliver the message of sustainability to the millennials effectively?

A marketing strategy is required which is specially knit for the millennials. According to a study conducted on millennial behavior, it is shown that millennials are more dependent on mobile phones and social media for their day to day activities. Millennials have a "want it all and want it now" attitude which make them restless and impatient. Millennials, being from a generation of multitaskers, need a product that is efficient and effective. Their span of attention is short as they have multiple tasks to achieve and in order to gain their attention, you as a company should focus on how their time can be saved. According to a survey conducted for this paper, we conclude that millennials are more consumed by the factors such as pricing or ease of use than the sustainability.

Findings

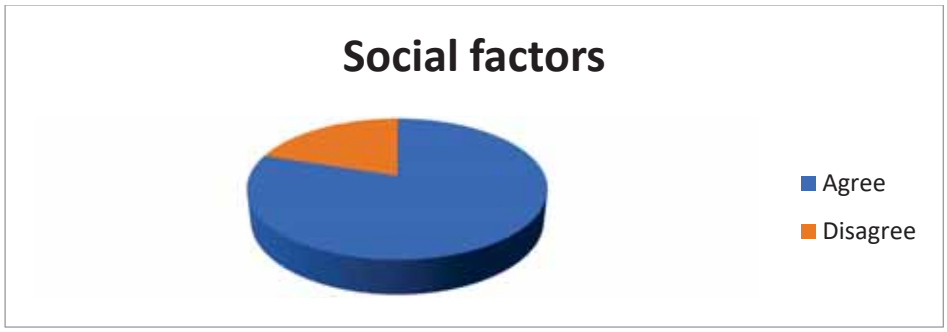
The demographic distributions of 30 respondents have been collected in the survey along with the secondary data analysis. As mentioned hitherto, the survey was conducted on individuals between the age group of 24-35 years. This specific age group was considered as they fall under the category of millennials who are financially independent to have their own buying preferences.

Chart 1: Brand contribution towards the betterment of environment influences their buying decision



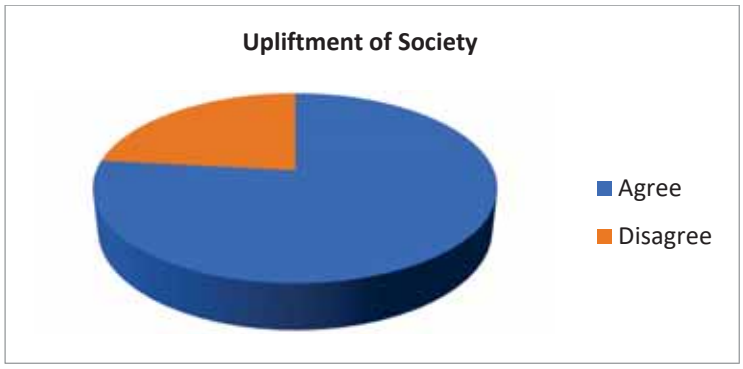
According to the survey, millennials are aware of the environmental issues and are conscious about their influence on the environment. About 83.30% of millennials agreed that if the brand promotes an environmental cause, they would definitely consider it and would be keen on purchasing products from their brand. To the query "If the brand is committed to do good to our environment, it influences your decision to buy their product" around 24 individuals agreed that environmental contribution by a brand influences their decision.

Chart 2: Brand contribution towards well being of the society influences their buying decision



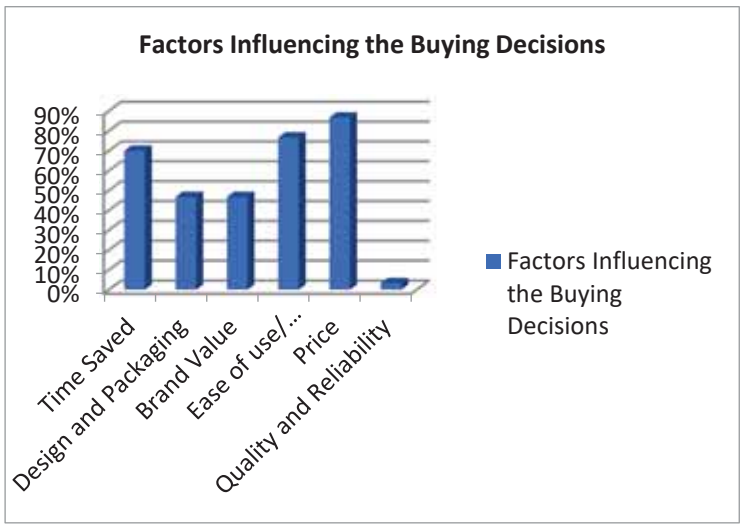
According to the survey, to the query "If the brand contributes to the well being of the society, it influences your decision to buy their product" 80% (24 respondents) of millennials agreed on choosing a brand which contributed to the social factor while 20% disagreed on the influence of the contribution of brand in the betterment of society.

Chart 3: Brand contribution towards upliftment of the society (socially as well as economically) influences their buying decision



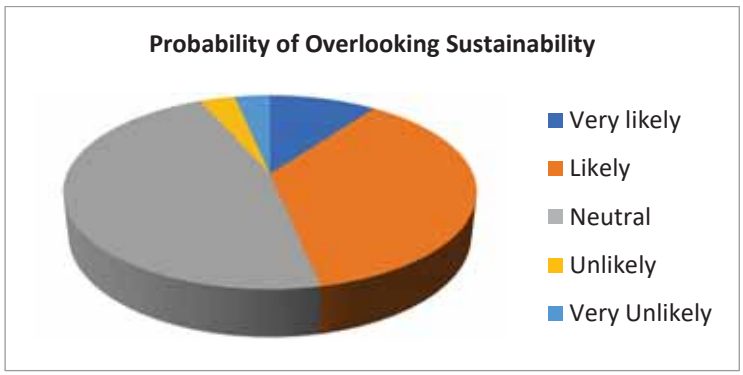
The survey portrays a trend where 76.70% of millennials agree that their decision towards brand loyalty depends on the brand's contribution towards the upliftment of socio-economic backward societies whereas 23.3% of the sample size disagrees with this being an influential factor for their purchase.

Chart 4: Factors affecting the buying decisions



According to the survey conducted, the major influential factors that are considered by the millennials are price, time it saves in their daily routine, ease of use/ convenience. These three factors play a major role while millennials consider before making a decision to purchase a product. The other factors that influence are design and packaging, brand value and quality and reliability.

Chart 5: Brand contribution towards the satisfaction of the above factors while not satisfying sustainability



According to the survey conducted, the millennials give higher priority towards factors such as price, time saved, ease of use and brand value than sustainability. The sample size was asked if they would still consider buying the product or choosing the brand if the factors such as price, time saved in their daily routine, design and packaging, ease of use/ convenience and brand value but doesn't contribute towards sustainability, would they still prefer buying the product. Around 47% were neutral about it while 37% of them said they were likely to purchase the product anyway. This shows the shift in buying trends as more weightage is given to individual factors than sustainability.

Conclusion

The way consumers perceive a brand is also changing. Brands hold an added responsibility of sustainability in the present situation. Sustainability is a long-term process and the contribution of a brand towards sustainability might take longer period of time to be noticed. Sustainability can be traversed and superintended in numerous context of time within different context of environmental, social and economic order. Growing concern has been voiced towards the over usage of non-renewable resources and over exploitation of the backward societies. As businesses across the globe contribute to the economy and the nature in general, they are also held responsible in contributing towards overcoming these issues.

Main attributes mentioned in the study are time saved, price, design and packaging, ease of use/ convenience, brand value and quality and reliability, sustainability (environmental, economical and social factors). Millennials are the future of sustainability. When you see a group of millennials discussing/communicating with each other, 60 per cent of their conversations revolve around environmental and social issues. But according to a 2013 study by Ecolab, millennials are 17 per cent less likely to recycle than the general population. Millennials are aware of the problems surrounding them but aren't conscious about these problems while making a decision to buy products. They tend to over look sustainability factor as the other attributes play a significant role in buying decisions. Because of the emerging revolutions, consumers have started perceiving nature as a resource than nature as a habitat. This has led to the access of unlimited variety of resources and their over exploitation without any outlook for the future. This has led to the change in the nature where we are on the verge of collapsing just like the ancient civilizations have collapsed. This can be stopped when sustainability is also considered to be one of the influential factors while businesses produce and buyers consume.

Discussion/ Recommendation

While the consumers make a buying decision, the theory of self image congruence plays an important role. Self image congruence refers to the decision made by the consumer based on who they are or who they want to be and if they could relate to this perceived image of themselves and the existing brand image. Seeing the trend in the market, it is really important for a brand to change their marketing strategies based on the factors the consumers want to focus on, while holding a grip on sustainability. Considering this, how do you pitch this problem and the effective solution of sustainable branding to millennials? How do brands gain attention of the future customers (Millennials) while imparting sustainability? Why did the brands fail till now to gain their attention?

The above questions can be answered by changing the marketing strategies. Marketing strategies should be designed considering millennials and their behavior in mind. Instead of portraying the brand as sustainable in the front end, the focus should be on the factors that are actually important to the millennials while highlighting the sustainability in the back end. In order to gain attention of the millennials, one has to change their traditional marketing strategies accordingly. Millennials are glued to their smart phones or

tablets most of the time and if a brand wants to advertise their products, online presence is important. Brand should focus on their online presence and how their brand image is being perceived. The key to grab attention is to gain positive image on social media. Not only online presence, brand should also focus on imparting online payments in these changing times to witness the conversion of target audience to loyal consumers. Millennials also depend on online reviews by the existing users and reviews provided by the social media influencers. Brands should consider investing in a strong social media marketing strategy in order to deliver its message to the target audience. Millennials are price sensitive i.e. they are aware of the price difference and tend to buy the same product of different brand for a lower price. Brands should be well aware of the price competition and should design their pricing strategy accordingly.

While sustainability is important, the other factors mentioned in the study are equally important. According to Simon Sinek, people tend to buy a product when the brand focuses on "why they make it" instead of "What they make it". Millennials perceive attributes such as pricing, designing and packaging and ease of use as their primary concerns while buying a product or a service. They tend to overlook sustainability if the primary factors are satisfied. Hence, a brand while choosing sustainability branding should educate millennials about their contribution towards the society while taking care of these primary factors.

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9. GREEN IT- ROLE OF CHATBOTS

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Abstract

Green IT, the study and use of computer resources in an efficient way, is under the scanner of environmental organizations, IT companies, and businesses from other industries. In recent years, many companies in the service industry, online retailers and other sectors, have recognized the need of chatbots, both for public relations and reduced costs. This paper gives us a view of how chatbots gained prominence and how they help companies going green and help reduce the carbon footprint and as well as on the issues raised about the complexities involved in deployment of chatbots . This paper also touches how chatbots became relevant during the current pandemic scenario.

Keywords: Chatbots, Green IT, Eco-friendly, Cloud Computing.

Introduction

The world of Green IT is huge. Sustainability, cost cutting and recycling are the moot topics. Herein comes chatbots-a whole new world product of AI technology algorithms and modern gimmicks. Chatbots or "Virtual Assistants" are some of the industry's tools designed to streamline the synergy between humans and computers. Whatever be the industry, whatever be the department, chatbots are playing an important role in automating mundane tasks while also providing deep insights. Chatbots have become friendly "software robots" in our daily lives. Helping us in diversified range of tasks, chatbots are the new success mantra for ultra-new startups to established industries. Ecommerce and chatbots go hand in hand and as part of customer service chatbots are playing a major role in making companies increase their customer base and also contribute largely towards "Green environment". In an era of cutthroat competition, chatbots provide an edge to all and thanks to Artificial Intelligence, also are becoming multi-faceted and intelligent just like humans.

Objectives of the Study

- To know the evolution of chatbots
- To study different types of chatbots and their benefits in different industries.
- To understand the role of chatbots in Covid19 pandemic
- To analyse how chatbots help companies achieve green IT

Research Methodology

Research methodology is descriptive in nature and is based on secondary data. The data is taken from articles, research papers, newspapers content, E- Journals, and Web sites.

History of Chatbots

Humans had a desire to communicate with computers and AI made it happen. Tech mobility and functionality of highest quality along with scientific intellect of humans resulted in creation of chatbots. BOTS are nothing but computer programs which simulate human conversations through voice commands,

text chats or both. In 1994, the term "ChatterBot" was coined. Very first Chatbot was ELIZA, developed at MIT in 1960s. Second was ALICE, a more refined version than the first. ALICE was able to use natural language processing, which in turn helped in more complicated conversation. Third Chatbot ever developed was JABBERWACKY. A much more sophisticated chatbot. It was a project designed to pass Turing Test and mimic human interaction and converse with users. MITSUKU was another chatbot developed in England using AIML, Artificial Intelligence Markup Language. Mitsuku won the Loebner Prize 5 times, a record because no other chatbot won more than once. The Loebner prize is awarded to the artificial intelligence computer program that is deemed the most humanlike by a judging panel.
In 1995, the chatbot ALICE was developed which won the Loebner Prize, an annual Turing Test, in years 2000, 2001, and 2004. It was the first computer to gain the rank of the "most human computer". ALICE relies on a simple pattern-matching algorithm with the underlying intelligence based on the Artificial Intelligence Markup Language (AIML), which makes it possible for developers to define the building blocks of the chatbot knowledge. Chatbots, like SmarterChild in 2001, were developed and became available through messenger applications. The next step was the creation of virtual personal assistants like Apple Siri. Microsoft Cortana, Amazon Alexa, Google Assistant and IBM Watson.
There was a rapid growth of interest in chatbots especially after the year 2016.Chatbots through new wave of AI were introduced in early 2016. Social media giant Facebook allowed developers to use chatbots and consumers found it easy for their daily actions. Communication with the brands expanded due to overwhelming presence of AI and this excited people across the world. The era of "conversational interface" began with the introduction of chatbots into the society. A new era of technology began courtesy chatbots.

It's no denying the fact that Smartphones acted as catalyst in the development of chatbots. A scientific study deduced that humans used mobile apps more for communicating more and more. Graphical User interfaces, AI chatbot technology and IoT (Internet of things) made things easier for chatbots to coexist with humans in the form of various Wi-Fi devices.

Fundamentals of Chatbots

Pattern Matching is significant with stimulus-response process. Chatbots developed using pattern recognition algorithms engage in routine repetitive responses and so are entirely predictable.
AIML (Artificial Intelligence Markup Language) is another tool using the pattern matching technique. It's a XML based tool through which user input responses and chatbot responses are fed.
LSA (Latent Semantic Analysis) together with AIML is used for development of chatbots. It is used to discover similarities between words as vector model. LSA is used for other unanswered questions while AIML for regular questions.

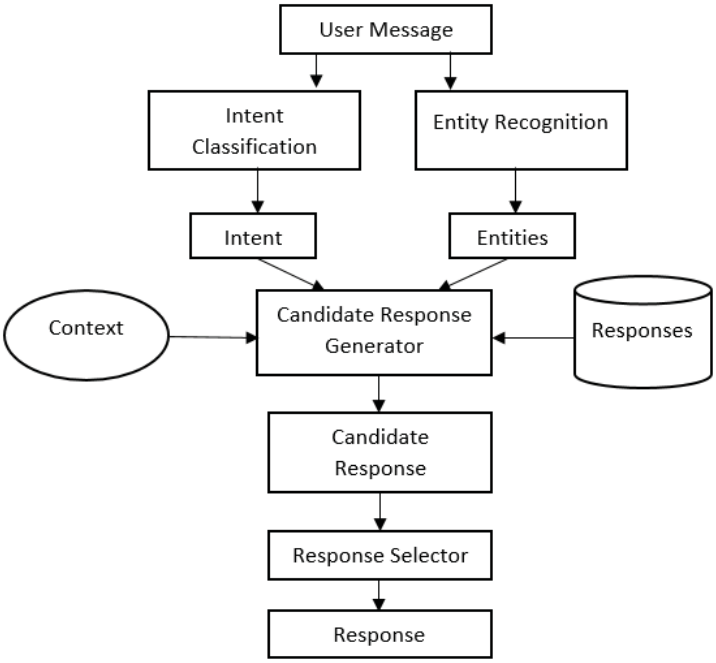
ChatScript is another expert system with open source scripting language. Chatscript consists of rules associated with topics. It is also made up of variables to indicate memory. Chatscript matches the user query string and executes a rule in that particular topic. It's case-sensitive and so used in certain cases. RiveScript is another open-source plain text, line-based scripting language based on available interfaces like Go, Java, JavaScript, Perl and Python.

Natural Language Processing (NLP) is a machine learning technique and an area of artificial intelligence that explores the manipulation of natural language text or speech through computers. Techniques are developed through the knowledge and use of human language so that computers will understand and

manipulate natural expressions to execute desired tasks. NLP tasks are undertaken by NLU (Natural Language Understanding). NLU identifies user intent and extracts domain specific entities. NLU extracts contexts and meanings from user inputs. Entities and Contexts make the job of NLU easy in all NLP tasks.

Basic Chatbot Architecture

Figure below describes the flow in a chatbot. User inputs are sent to intent and entities.



Types of ChatBots

Chatbots can be classified under various heads: the knowledge domain, the service provided, the goals, the input processing and response generation method, the human-aid, and the build method.

Chatbots as Market Potential

Industry leaders say that market potential in India is huge and chatbots only penetrated 10%. The chatbot market is categorized based on component, deployment mode, organization size, application, verticals, and regions.

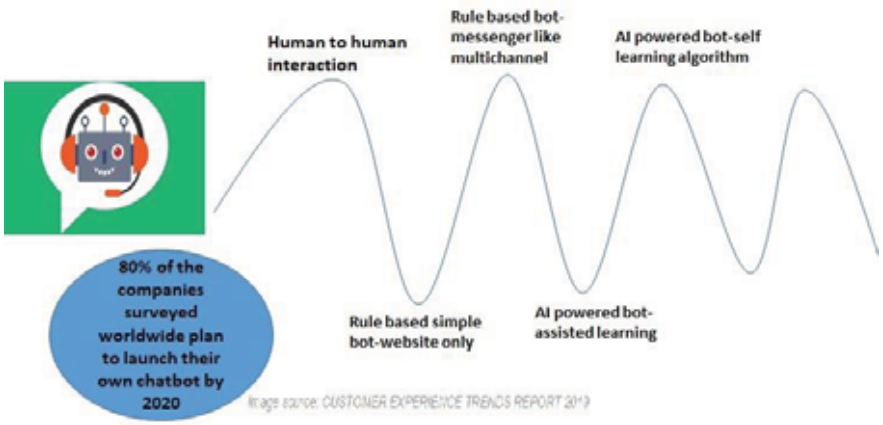


Image source: CUSTOMER EXPERIENCE TRENDS REPORT 2019

Chatbots are changing the landscape of India Inc

Chatbots are making it easier for many Indian Companies with variety of task implementations. Higher management in Blue Star India realized a lot of daily routine tasks was eating up the productive time of their sales force. To expand their sales network, representatives needed to show sales figures and other info to make the dealers buy more. Sandra, a ChatBot, helped them a lot in their sales, stocks at warehouses, and other information gathering activities which normally would take days to perform.
Another example is CloudNine Group of hospitals. The group have “BUMP”, a chatbot at their disposal to help in their maternity, childcare and fertility wards. BUMP’s work includes from booking appointment slots to automated patient onboarding.

The digital arm of Times of India, Times Internet Limited, are using chatbots in their IT support activities. TILs chatbot Toby does nearly 80% of the workflow from visitor approval to requesting an IT asset, cabs and other services. Toby also helps them in their Security Operations Centre about antivirus breach alarms and notifying users.

The increase in sales of voice-activated bots like Google Home and Amazon Alexa tells us that people are getting accustomed to talking to bots to solve their queries. The use of chatbots is exploding rapidly while developing them is going at slow pace. With more vendors coming in forward with chatbots with various capabilities, and enterprises inviting them with open arms, the market for chatbots is only going to rise exponentially.

Chatbots and covid19 pandemic

It’s a fact that chatbots have to come to our rescue during this pandemic in many ways. Chatbots are generating real-time figures of Corona cases and passing on valuable information to public. Almost every business is thinking out of the box to face this gigantic COVID challenge. Chatbots are proving to be a vital cog in the healthcare system. Hospitals are using chatbots to assess patients and also as screening tools. Chatbots have their presence felt in Education industry too. Universities are using AI powered Chatbots to handle the growing number of queries about courses and admissions and in libraries too. Bots are handling basic questions in online classes. Another industry which has been forced to take urgent measures is the Retail sector. Spencers, Big Bazaar, BigBasket, Flipkart, Amazon and Grofers have increased their presence online and chatbots are doing their bit in the supply chain system. Companies are using chatbots to maintain their customer base and investing on chatbot technologies during these testing times. Chatbots are effective tools to improve the experience of online shoppers. Coming to entertainment industry, gaming and e-sports have recorded an unprecedented boom during the lockdowns and virus outbreak. There is a proven use of chatbots to personalize music, video, streaming and news in the plethora of mobile apps worldwide.

Chatbots as technological advancements are most effective during this time-whether for online learning, video conferencing, or telehealth and becoming a “must” across multiple industries. The Corona pandemic has taught us a big lesson. Businesses cannot be shut down due to it. Lot of households are now depending on e-retailers for their household needs. Sales have shot up multifold as soon as lockdown lifted. But the number of complaints from people have skyrocketed too. The role of "chatbots" for the customer care

department is priceless. "Less people and more chatbots" is a roaring success for a lot of companies worldwide.

Green IT with Chatbots

We all know that Chatbots are nothing but a bunch of algorithms embedded in various types of softwares. The question remains-how do chatbots help in Green IT initiative? A group of at least 20 customer care executives need computers, various instruments, printers, paper, desks, and other logistic necessities. A precious natural resource "water" is also needed for their regular needs. They take up space and create garbage. Indirectly, they are polluting our environment. All these can be avoided if chatbots replace them. This is how chatbots help our so called "Green IT initiatives". Imagine very big companies hiring thousands of people, creating work atmosphere in concrete jungles, destroying trees in this elaborate process. We need to think about future generations. The IT city of "Gurugram" is a present day example. Lot of damage done sabotaging natural environment. Chatbots are a "viable" option. So the mantra is "Go Green" with virtual agents.

Conclusion

The era of better interface is here is with the advent of natural language processing chatbots and this augurs well for technology as well. It is time to embrace the change. Investing in a chatbot may not be a profitable venture or an adventurous step – the idea of handing over your customer interactions to a BOT can seem like a huge jump into unknown. But this is the reality of modern business operations. Customers now demand instant services, interactive solutions and hassle-free processes. If they don't get what they want, they will find someone else who can. Market is not short of players.

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10.A STUDY ON- AWARENESS OF CONSUMERS TO CONTRIBUTE TOWARDS GREEN CONSUMERISM

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Abstract

Green consumerism is "consumption of products which are been produced through eco-friendly production process". Green consumerism includes mainly 3 'R' like Reduce, Re-use and Recycle. Green consumerism is a must to be studied because it advocates for the efficient use of energy, which ultimately helps in saving money, reducing utility bills, lowering emissions of Greenhouse gas, and enabling economies to meet the growing energy demands. As it is said that "what's good for the planet Is good for business." There are around 17 companies across the world who have promised to go Green in 2020 for instance Google, Dell, McDonalds, Clothing retailer, Apple, Honda and many more. A survey commissioned by the Mahindra Group in 2019 revealed that every four out of five Indians are aware of the worse impact of careless nature of human being on nature and climate change, while 83% of the respondents expressed the willingness for a change in their lifestyle such as carpooling, using public transport or electric vehicles to save the nature. Hence the primary Objective of the paper is to know the awareness level for Green products / Green Consumerism by the Indian consumers and to offer suitable suggestions to the producers' consumers to make Green consumerism a way of life.

Keywords: Green Consumerism, Green Products, 3 "R"

Introduction

Green consumerism is "consumption of products which are been produced through eco-friendly production process".

Who is a Green consumer?

There are three main Green consumer groups:

i) **Super Greens:** Feel Super responsible to the environment and invest only in the companies making eco-friendly goods.

ii) **Medium Greens:** Decision of Purchase of Green products depends on personal wellbeing and affordability.

iii) **Light Greens:** Don't actively seek Green solutions, but still express positive sentiment toward them.

Some of the Core elements influence Green Consumption:

Lifestyle, Identity, Ideology, Choice, Moral Ethic, Quality of life, Health issues

Review of Literature

The need for adopting environmentally friendly way was realized back in 1960s and '70s mainly by the western countries after facing the oil crisis in the year 1973.The worsening conditions of the environment problems gave a kick to demand of the products which are environmentally friendly which are also knows as "Green Products". Basically, Green products are energy efficient, recyclable, eco-friendly packaging, non- harmful material, biodegradability, etc. (Mangun and Thurston, 2002; Bearse et al., 2009) Consumers who are willing to change their lifestyle considering

the environment condition are considered as Green Consumers (Ritter et al., 2015). The purchase decision can be traced from the consumer's enthusiasm to support environmentally friendly companies performing the purchasing activities (Mishra & Sharma, 2010), putting into practice a sustainable consumption pattern (Young et al., 2010), and interest to spend more money to consume Green Products. (Hasan & Ali, 2015).

Green Consumerism in India

India and Indians always believe in resource preservation and need base consumption. (Divesh, Praveen, Rehman & Ishwar, 2011). According to a survey by Euromonitor, a global market research firm, 67 percent of people ranked 'Environment-Consciousness' as the highest parameter influencing their shopping trends in India. Observing the trend among Indian consumers the Companies are also reciprocating the same and have started practicing Green marketing in India. (Laheri, Dangi, Vohra, 2014). According to a spokesperson Sustainable living brands of Hindustan Unilever grew by 23% in the year 2018 as compared to the previous year. (Economic times, 2019).

Need and importance of the study

The bitter truth is that the people the world are not aware of environmental hazardous like non-recyclable plastic, pollution etc. and that even if they are, but not willing to adopt an eco-friendly lifestyle hence it becomes a necessity to reboot the world and do things differently by using Eco friendly goods.

Objectives of the Study

- First objective of the paper is to know the level of awareness for Green products / Green Consumerism by the Indian consumers
- Second objective is to offer suitable suggestions to the producers and consumers to make Green consumerism a way of life.

Research Methodology

The research design is exploratory cum descriptive. Primary and secondary data have been collected.

Primary data has been collected through a structured questionnaire and telephonic interviews. Random sampling method is adopted for the study. The sample size is 250 respondent consumers. The questionnaires were processed through statistical tools like weighted mean and standard deviation.

Secondary data has been collected through various Research articles, E- journals, E- papers and various websites.

Limitations

The focus of the study is confined to Hyderabad city with a sample size of 250 random consumers through designed questionnaires. Due to COVID-19 no personal interview could be done to follow the social distancing.

Data Analysis and Interpretation

This Section of the study consists of Primary data collected through questionnaires. There are 17 parameters designed and divided in to two categories. First category is to know the opinion of the

respondents regarding the awareness and preference of Green products and the Second category is to design a roadmap through suitable suggestions to the manufactures and consumers to make Green Consumerism a grand Success in India.

Table 1: Social Profile of the Respondents (N=250)

	Category	Number	Percentages (%)
Gender	Female	187	75
	Male	63	25
Age	18-25	102	41
	26-40	92	37
	41-55	47	19
	56 & above	9	4
Educational Qualification	Inter	23	9
	Graduate	111	44
	Postgraduate	88	35
	Ph.D.	28	11
Employment Status:	Business	18	7
	Homemaker	24	10
	In service	81	32
	Retired	8	3
	Student	119	48

Source: Primary data, calculated through MS-Excel

Table 2: Level of Awareness about the Following dimensions of Green Products

(SA=Strongly Agree, A=Agree, N-Neutral, DA=Disagree, SDA=Strongly Disagree)

S.NO	PARAMETERS	SA	A	N	DA	SDA	MEAN	ST.DEV
1	Preference of Green products over Non-Green products	106	101	40	1	2	4.232	51.33712
2	Level of Awareness of the benefits of the Green Products for health	136	94	14	4	2	4.432	61.33514
3	Level of Awareness of the benefits of Green products to the environment.	141	85	19	4	1	4.444	61.20457
4	Awareness of point of purchase for Green products.	93	111	35	8	3	4.132	49.4166
5	Level of awareness of at least few brands offering Green Products	61	109	60	17	3	3.832	41.833
6	Level of awareness of various symbols/Certifications/ other identifiers of Green products	49	103	68	25	5	3.664	38.02631
7	Green Products are true to their environmental claims	78	109	52	9	2	4.008	45.42576

8	Performance of Green Products justifies its price.	55	98	76	15	6	3.724	39.26194
9	While purchasing Green products see if Contents are environmentally safe.	77	92	57	92	4	3.872	37.276
10	Prefer to buy products made and packaged in recycled material.	79	107	51	10	3	3.996	44.44097
11	Agree to pay extra price for Green products to save my planet	75	108	50	11	56	4.14	35.5176

Source: Primary data calculated using Mean and Standard Deviation

Inference

From the above data following are the awareness levels of Consumers about Green Consumerism based on various parameters:

Preference of Green products over Non-Green products (Mean: 4.232, S.D: 51.33712)

Out of 250 respondents 106 of them strongly agree that they prefer Green products over non- Green products, 101 agreed, 40 were neutral, 1 disagreed and 2 strongly disagreed.

Level of Awareness of the benefits of the Green Products for health (Mean: 4.432, S.D: 61.33514). 136 respondents strongly agreed with awareness of benefits of Green products to health, 94 agreed, 14 remained neutral 4 disagreed and 2 were strongly disagreeing.

Level of Awareness of the benefits of Green products to the environment (Mean: 4.444, S.D: 61.20457) 141 respondents strongly agreed with awareness of benefits of Green products to environment, 85 agreed, 19 remained neutral 4 disagreed and 1 was strongly against it.

Awareness of point of purchase for Green products (Mean: 4.132, S.D: 49.4166) 93 respondents strongly agreed that they are aware of purchase point of Green products, 111 agreed, 35 remained neutral 8 disagreed and 3 respondents have no idea to make purchase of Green products.

Level of awareness of at least few brands offering Green Products (Mean: 3.832, S.D: 41.833) 61 respondents strongly agreed that they know few brands offering Green Products, 109 agreed, 60 stood neutral, 17 disagreed and 3 were strongly disagreeing.

Level of awareness of various symbols/Certifications/ other identifiers of Green products (Mean: 3.664, S.D: 38.02631) 49 respondents strongly agreed about the awareness of identity of Green products, 103 agreed, 68 were neutral, 25 disagreed and 5 had no idea about the symbol of identification of Green products.

Green Products are true to their environmental claims (Mean: 4.008, S.D: 45.42576) 78 respondents strongly agreed that the claims made by the companies about their Green products are true, 109 people agreed, 52 were neutral, 9 disagreed and 2 strongly disagreed.

Performance of Green Products justifies its price (Mean: 3.724, S.D: 39.26194) 55 respondents strongly agreed to the statement, 98 agreed, 76 were neutral, 15 disagreed and 6 strongly believed that Green products don't justify its prices.

While purchasing Green products see if Contents are environmentally safe (Mean: 3.872, S.D: 37.276) 77 respondents strongly agreed that they are very particular in buying the Green products whose content is ecofriendly, 92 agreed, 57 were neutral, 92 disagreed and 4 strongly disagreed. Prefer to buy products made and packaged in recycled material (Mean: 3.996, S.D:44.44097) 79 respondents strongly agreed, 107 agreed, 51 were neutral, 10 disagreed and 3 strongly disagreed. Agree to pay extra price for Green products to save my planet (Mean: 4.14, S.D:35.5176) 75 respondents strongly agreed, 108 agreed, 50 were neutral, 11 disagreed and 56 said that they are not ready to pay extra money or Green products.

Table 3: Suitable suggestions to make Green Consumerism a part of life

S.NO	PARAMETERS	SA	A	N	DA	SDA	MEAN	ST.DEV
1	Manufacturers should give more clear information to the customer about the Greenness of their Product.	151	83	14	1	1	4.528	65.93178
2	Green Products should be marketed in environmentally friendly manner.	116	87	36	10	1	4.228	49.80462
3	Manufacturing of Green products to be highly subsidized	133	92	22	2	1	4.416	59.46007
4	Would purchase Green products if they are easily available.	155	79	14	1	1	4.544	67.01492
5	Green product manufacturing companies also involved in environmentally friendly practices are more reliable.	111	91	35	10	3	4.188	48.56954
6	Unadvertised Green products are more reliable than advertised ones.	64	86	78	14	8	3.736	36.52396

Source: Primary data calculated using Mean and Standard Deviation

Inference

Above questions were asked to the respondents in order to give suitable suggestions to the producers and consumers.

- Manufacturers should give more clear information to the customer about the Greenness of their Product (Mean:4.528, SD: 65.93178) 151 respondents strongly agreed, 83 agreed,14 remained neutral, 1 disagreed and 1 strongly disagreed)
- Green Products should be marketed in environmentally friendly manner (Mean: 4.228, SD: 49.80462) 116 respondents strongly agreed, 87 agreed, 36 were neutral, 10 disagreed and 1 strongly disagreed.
- Manufacturing of Green products to be highly subsidized (Mean: 4.416, SD: 59.46007) 133 respondents strongly agreed, 92 agreed, 22 were neutral, 2 disagreed, and 1 strongly disagreed.
- Would purchase Green products if they are easily available (Mean: 4.544, SD: 67.01492) 155 respondents strongly agreed, 79 agreed, 14 remained neutral, 1 disagreed and 1 strongly disagreed.

- Green product manufacturing companies also involved in environmentally friendly practices are more reliable (Mean: 4.188, SD: 48.56954) 111 respondents strongly agreed, 91 agreed, 35 were neutral, 10 disagreed and 3 strongly disagreed.
- Unadvertised Green products are more reliable than advertised ones (Mean: 3.736, SD: 36.52396) 64 respondents strongly agreed, 86 agreed, 78 remained neutral, 14 disagreed, and 8 strongly disagreed.

Suggestions

"What would you suggest to the manufacturer to encourage people to come forward to buy maximum Green products" was an open-ended question asked to the respondents. Following are the suggestions made by the respondents to the producers considering the open-ended question and above parameters.

Suggestions to the Producers

- It is very important for the marketer or producer to design well their Green marketing plans and know their Strengths and threats.
- Constantly refine the product and processes and keep quality first.
- Make "Green" normal by promoting the consumer value of Green products.
- The manufacturer should be very clear about the Green content of the product on its label because many times consumer cannot even make out if they are buying Green product just by looking at the product.
- There should be one common symbol used for all the Green products across the nation which makes Green products identity easier just like the veg and Non-Veg Symbol on edible items.
- Respondents believe that during this unprecedented time where everyone is looking for healthy products this is the best time for Green product companies to tap maximum market by spreading more awareness about goodness, importance and benefits of Green products.
- Few respondents also suggested that Green products should be made available at every nook and corner like Non- Green products. People don't have plenty of time to go in search of Green products.
- Companies participating in CSR activities to reinforce eco-friendly business practices.

Suggestions to the Consumers

- Avoid Green "Myopia"
- General awareness regarding impact on health and environment by using Non- Green Products.
- Buy buying locally grown fruit and vegetables & by buying locally made goods.
- Avoid buying food that is not in season.
- Choosing unpacked fruits and vegetables.
- Buy recycled toilet papers, energy efficient light bulbs, recycled stationery, sustainable clothing etc.
- Reduction of usage of private vehicles and promote public transport.
- Purchase refurbished products and dispose unused product in a recycled manner.

Suggestions to the Government

- Technology and pollution standards.
- Strict Waste regulations.
- Imposing heavy Green tax
- Giving heavy subsidies to all companies involved in making of Green products.
- Investing in Sustainable transport.

Conclusion

Due to COVID-19 the world is confined to their houses. People have realized the value of health. This is the right time for the world to "Go – Green". This situation is creating a future opportunity for the businesses. Chennai based firm Akshaya is looking at redesigning apartments keeping in mind the hygiene, the official like feel and may be even quarantine.

In the 14th episode of "Mann ki baat" (June 2020) Mr. Narendra Modi emphasized on bamboo resources of Assam and the artisans of Tripura, Manipur and Assam have started crafting high-quality water bottles and Tiffin-boxes. It is high time that Green marketing becomes the norm rather than an exception. Green Consumerism assumes more relevance and scope in large and developing nations like India.

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11.SUSTAINABILITY BRANDING: IMPERATIVE TOOL FOR MEASURING GREEN BUYING BEHAVIOR

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Abstract

Sustainability, awareness on environmental issues and green brands are becoming a focal point in developed and developing nations, with added consciousness from the government and population in general. The reason for the shift towards green purchases could be a result of consumers' realization of the behavior impact on the environment. Companies are compelled to differentiate themselves by going green and consequently making a new market segment adding to the economies of different nations globally. Organizations must align their marketing strategy to engage and leverage consumers' "green" concerns by applying sustainable manufacturing practices and exercising ethical business standards. This paper examines the impact of green brand knowledge and "sustainability" inclined attitudes, influencing green buyer behavior. The research implicates that the sustainable aspect should be considered in the marketing and branding of manufactured products. The key focus of this study is to investigate the impact of sustainable branding on consumer purchasing intention and measure their buying patterns in Hyderabad, India.

Keywords: sustainability branding, Green branding, environmental issues, green purchases, Green buyer behavior.

Introduction

Sustainability has become the word of the moment and increasingly its presence is evident in different firms. Earth's ecosystems maintenance is not an option; but a major issue today. Companies are realizing that sustainability goes beyond caring for the environment, thus the urge to "go green" has been felt across industries. According to Martin and Schouten (2012, p. 2) Sustainability is the system's ability to maintain or rebuild itself as a perpetual force influencing cultural change. Marketing is a tool for the Sustainability and a means to spread the significance of perseverance of the earth's ecosystems.

Insch (2011) defines a *green brand*, as a brand that constitutes environmental values as brand essence. Consumers associate Green brands as those brands that conserve the environmental concerns by implementing sustainable business practices.

A brand is perceived to be sustainable only if it can credibly convey sustainability benefits relevant to the consumer. A sustainability brand must showcase an integrated code for success. A sustainable brand truly generates a Unique Selling Proposition that reaps the benefits trustworthy relationship between the consumer and the brand.

Green consumer's purchases and their purchase experience are different every time and knowledge gained from each purchase enhances the creation of the green values resulting in repeat purchase. Firms must adopt the branding strategies of green marketing efforts in their relation to green products. Among the sustainable green brands, three drivers green brand trust, green brand image and green satisfaction create green brand equity.

Eco label identifies eco-friendly product/service. Eco label guarantees that a given product/service is fit to use and that reduces its environmental impact throughout its lifecycle. Eco Labeling enhances brand

and corporate image, improves sales and profits in the long run and provides accountability of manufacturers towards the environmental impacts.

What is Green washing all about?

Advertising claims made by companies are deceptive and ambiguous. Disinformation disseminated by a firm that may lead to an eco friendly public image is called commonly as `Green washing`. Fernando, Sivakumaran and Suganthi, defined Green Washing as "potentially misleading, vague and unsubstantiated environmental claims". It results in consumer and regulator complacency.

Review of literature

Gordon (2011) states "sustainability as a concept that satisfies the requirements of the present customers without compromising the ability of future generations satisfying their own needs" (p.41). Throughout this research, the researcher shall refer to the "green consumer" as anyone who is aware of products being manufactured and marketed as "caring for the environment and explore green purchasing intent and perceptions of green consumers. The purchasing of green products does not necessarily reflect their concern for the environment (J. Ottmann, 2010).

Emery (2012) suggested that sustainability branding, seems to be a latterly issue, is being discussed for several years. "Sustainability issues are renewing the association between the business enterprises and their business environment". In order to be successful, the sustainable marketer needs to understand the need to address the situations as it is observed that the impact business organization offering products to the consumer is changing continuously.

Evidently, in today's risk society (Beck, 2009), consumers and concerned citizens have become aware of the need for sustainability and significantly vary in terms of environmental concerns (Inglehart, 1997; Miles & Frewer, 2003; Roper, 2012), calls for precautionary measures to be taken "against evident and potential social and environmental consequences of latest technology" (Roper, 2012, p. 15).

Green branding, a powerful differentiator goes beyond the potential of being sustainable (Morgan, Pritchard, & Pride, 2011) it encourages and also facilitates human life in a place to show commitment to sustainability (Ritchie & Crouch, 2003). Equilibrating the business practices and the brands taking into account the environment and satisfying the needs of the consumers is a big challenge for the Organizations as stated by Ginsberg and Bloom (2004). The emotional connection between consumers and brands can be elevated if green marketing strategies are properly implemented. Being branded as a green firm may result in creating a positive public image, enhancing increased stock prices and sales", as claimed by Ginsberg and Bloom (2004, p. 84).

Objectives

- To measure the level of awareness among consumers with respect to green branding.
- To explore various factors influencing consumer's green buying behaviors.
- To measure consumers attitude towards purchase of green products.

Methodology

Probability sampling particularly Simple Random Sampling method was used.
Sampling Unit: Consumers between age group 17-55years.

Sample Size: 57.

Measuring Instrument: A structured questionnaire survey using Google Forms was deployed to collect data from consumers. JAMOVI(open source software) was used to analyze the data.

The study was conducted in Hyderabad city, Telangana State in India. The survey included basic socio-demographic questions followed by questions on consumers' attitude towards green branding their impact on green buying behavior. In questionnaire five items using a 5-Point Likert Scale (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree) has been used for measuring effectiveness of eco labeling and intensity of green packaging and green branding on green buying behavior.

Analysis: Descriptives

Parameters	Mean	S.D
13.1 Ecolabel catchy	3.47	0.1966
13.2 Sufficient Information	3.27	0.830
13.3 Easy to read	3.35	0.855
13.4 Accurate information	3.00	0.845
13.5 Easy identification	3.56	1.018

Scale	Mean	S.D	Cronbach's α
	3.33	0.683	0.810

Reliability analysis is checked for 5 items related to ecolabeling and green products identification. Cronbach's α is found to be 0.810 which is greater than 0.5 depicting that the scale us is reliable

Item Reliability statistics

Parameters	Mean	S.D	Item rest correlation
14.1Important information	3.91	0.851	0.527
14.2 Reuse, Recycle	4.30	0.963	0.827
14.3 Bio-degradable	4.39	0.840	0.885
14.4 Less harmful	4.30	1.034	0.836
14.5 Green brand is reliable	3.60	0.923	0.617

.Scale	Mean	S.D	Cronbach's α
	4.10	0.771	0.890

Reliability analysis is checked for 5 items related to intensity of green packing and branding for green consumers. Cronbach's α is found to be 0.890 which is greater than 0.5 depicting that the scale used is reliable.

H0: There exists association between company's image and its focus on environmental aspects

Company Image	Company Focus			
	Yes	No	Sometimes	Total
Yes	24	1	12	37
No	0	0	1	1
Sometimes	8	1	10	19
Total	32	2	23	57

Interpretation: p value for d.f 4 is 0.384 which is greater than0.05, thus the null hypothesis is accepted hence there exists association between company's image and its focus on environmental aspects. Cramer's v value is considered as contingency table is of 3x3 matrix.

H0: There exists association between company's focus on environmental aspects and its impact on consumers buying green brands.

Company focus	Environmental aspects before buying			
	Yes	No	Sometimes	Total
Yes	24	1	7	32
No	1	0	1	2
Sometimes	15	0	8	23
Total	40	1	16	57

Interpretation: p value for d.f.4 is 0.693 which is greater than0.05, thus the null hypothesis is accepted hence there exists association between company's image and its focus on environmental aspects. Cramer's v value is considered as contingency table is of 3x3 matrix.

Correlation Matrix		14.1Important information	14.2 Reuse, Recycle	14.3 Bio-degradable	14.4 Less harmful	14.5 Green brand is reliable
14.1Important information	Kendall's Tau B	___				
	P value	___				
14.2 Reuse, Recycle	Kendall's Tau B	0.253	__			
	P value	0.036	___			

14.3 Bio-degradable	Kendall's Tau B	0.308	0.798	___		
	P value	0.011	<0.001	___		
14.4 Less harmful	Kendall's Tau B	0.278	0.783	0.879	___	
	P value	0.020	<0.001	<0.001	___	
14.5 Green brand is reliable	Kendall's Tau B	0.344	0.313	0.282	0.319	___
	P value	0.003	0.009	0.018	0.007	___

Interpretation: Kendall tau b value (0.879)is highest for biodegradable and less harm caused to environment showing high correlation between these two variables.

H0: Independent variables positively influence the dependent variable (effectiveness of eco-labeling)

Model Coefficients – Q. 13.Effectiveness of eco labeling

Model Fit Measures	R	R^2
Model	0.254	0.0645

Predictor	Estimate	S.E	t	p	VIF	Tolerance
Intrercept	4.2171	0.2384	17.686	< .001		
13.1E.Label catchy	0.0233	0.0603	0.387	0.701	1.49	0.670
13.2 Sufficient info	0.0912	0.0875	1.043	0.302	2.31	0.432
13.3 Easy to read	-0.0363	0.0854	-0.425	0.673	2.35	0.426
13.4 Accurate info	-0.0624	0.0695	-0.897	0.374	1.52	0.659
13.5 Easy identification	-0.0407	0.0592	-0.688	0.494	1.60	0.626

Interpretation: R^2 Value is 0.0645, p value is 0.701 for eco-label being catchy. Intercept is 4.2171. Since p value is greater than 0.05, null hypothesis is accepted.

H0: Independent variables are positively influencing the intensity of green packaging and branding for green consumers.

Model Coefficients – Q .14 Intensity of green packaging and branding for green consumers

Predictor	Estimate	S.E	t	p	VIF	Tolerance
Intrercept	4.73798	0.2875	16.4817	< .001		
13.1E.Label catchy	-0.04570	0.0700	-0.6527	-0.6527	1.56	0.640
13.2 Sufficient info	0.14991	0.1024	1.4638	0.149	4.28	0.234
13.3 Easy to read	-0.20728	0.1768	-1.1723	0.247	9.71	0.103
13.4 Accurate info	0.00447	0.1243	0.0360	0.971	7.28	0.137
13.5 Easy identification	0.14693	0.0686	2.1419	0.037	1.77	0.567

Model Fit Measures	R	R^2
Model	0.379	0.144

Interpretation: R^2 Value is 0.144, p value is 0.971 for being less harmful. Intercept is 4.73798. Since p value is greater than 0.05, null hypothesis is accepted

Findings

Given the significance of sustainability, the research on Sustainability Branding related to green brands brought a tremendous contribution to the comprehension of green buyer behavior for this study. Consumers expressed strong concerns for green products. The productivity of an Organization can be drastically improved. Consumers are familiar with the benefits of buying green products enhancing their purchase behavior. Consumers are ready to spend premium price for green products as they believe that green products are rich in quality, thereby generate a sense of responsibility among marketers and consumers towards the environment. The study brought out the fact that the consumers are well aware of benefits of using eco-friendly products. They have an opinion that there is significantly any difference between green product and non green product in terms of quality and performance.

Suggestions

- To compete with the changing behavior of customers Marketers of green products need to be more innovative and dynamic
- The marketer must create promotion that are realistic and have moral values to attract customers more towards Green Product.
- Awareness about green products and their effectiveness must be improved.

Conclusions

Encouraged by rapidly augmenting global demand for eco-friendly products, Organizations continuously seek to make links between their positive, attractive lifestyle and green credentials. Organizations need to align their marketing strategy to engage and leverage consumers' "green" and "sustainability" inclined attitudes, influencing consumer purchasing behavior. Business organizations should start implementing green marketing strategies as they offer growth opportunities and incentives in the long run, though it may

involve huge start up cost initially. The consumer will increasingly reward the companies that work honestly and seek to provide sustainable outcomes.

Implications for managers, organizations and Government

- Marketers should design strong brand awareness and brand development strategies in a view to create and build the image of "being green" among target consumers.
- Government should devise plans and campaigns in regard to environmental conservation and sustainability for public in order to protect the country from global warming.
- In current scenario of load shedding and energy breakdown there is a need for the government to take immediate action. Environmental conscious organizations and policy makers must manufacture energy efficient appliances and products that can contribute in controlling environmental pollution.

Further research

Regardless of prior studies conducted on sustainability related to branding and consumer behavior, there is a considerable effect on the choice of the consumer with regard to buying a sustainable brand. It a deeper study is recommended in future to cover this gap in the survey. For better findings it can be studied on specific products and industries in future.

Limitations

Sample size selected is not large enough and thus may not be generalized. Study is limited to Hyderabad and Secunderabad city only. Study is not product specific. It was conducted for all in general green products and industries. It is conducted only to understand the perception of consumers about the green product as a whole.

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12.GREEN MARKETING: AN EMERGING BUSINESS PERSPECTIVE TOWARDS SUSTAINABILITY

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Abstract

Green Marketing refers to the concept of holistic marketing being adopted by business sectors wherein the production, marketing, consumption and disposal of products and services are less harmful for the environment. The concept assumes significance with the growing awareness about the implications of global warming, non-biodegradable solid waste, and harmful impact of pollutants. Both the marketers and consumers alike are becoming increasingly sensitive to the need for switch in to green products and services. Green marketing has enabled the re-marketing and packaging of existing products which already adhere to such guidelines. This has led the companies to reconsider their business activities and the concept of green marketing has evolved over a period of time. Green marketing refers to an organization's efforts at designing, promoting, pricing and distributing products that will not harm the environment. According to American Marketing Association green marketing is the marketing of products that are recognized to be safe for environment. So, green marketing concept includes a broad range of activities that are environment friendly. However, in the emerging countries such as India, the concept is at nascent stage. In this regard, the paper discusses the need, importance and advantages of Green Marketing for bringing sustainability in businesses with special reference to Indian industry scenario. The paper also throws light on the green product marketing mix, green marketing trends and different initiatives taken in promoting the Green Marketing concept in India. Also, the paper discusses the challenges faced in the implementation and working of Green marketing concept in India.

Keywords: Green marketing, sustainability, trends, initiatives, challenges

Introduction

At present, the overwhelming majority of the organizations realize obligations towards an environment. The concept of green marketing has received growing recognition the planet over, but it's a replacement idea for several in business world. If sustainable growth is to realize its potential, it must be integrated into the design and measurement systems of business enterprises. This idea has enabled for the re-marketing and packaging of existing products. Additionally, the event of green technology has opened the door of opportunity for companies to co-brand their products into separate line, lauding the green-friendliness of some while ignoring that of others. Such marketing techniques are going to be explained as an immediate result of movement within the minds of the buyer market. As results of this businesses have increased their rate of targeting consumers who are concerned about the environment (Amir and Atul, 2018).

Green marketing has become a crucial method for companies to stay profitable and competitive because the public and governments are more concerned about environmental issues. However, most online shopping environments don't consider product greenness in their recommender systems or other shopping

tools. In recent decades, industry has not remained isolated from social and institutional pressures regarding environmental problems that have required managers to enhance their firms' environmental performance (Banerjee, 2002). Thereby, green marketing or sustainable marketing are often defined because the effort by a corporation to style, promote, price and distribute products during a manner which promotes environmental protection. Green marketing has be defined as 'all activities designed to get and facilitate any exchanges intended to satisfy human needs or wants such the satisfaction of those needs and needs occurs, with minimal detrimental impact on the natural environment (Polonsky, 2011).

Why green marketing?

As resources are limited and human wants are unlimited, it's important for the marketers to utilize the resources efficiently without waste also on achieve the organization's objective. So green marketing is inevitable. There is growing interest among the consumers everywhere regarding protection of planet environment. Worldwide evidence indicates people are concerned about the environment and are changing their behavior. As a result of this, green marketing has emerged, which speaks for growing marketplace for sustainable and socially responsible products and services.

Importance of green marketing for business sector

Green marketing offers business bottom line incentives and top line growth possibilities. While modification of business or production processes may involve start-up costs, it'll economize within the future. For example the value of putting in solar power is an investment in future energy cost savings. Companies that develop new and improved products and services with environmental impacts in mind give themselves access to new markets, substantially increase profits and luxuriate in competitive advantages over those marketing non- environmentally responsible alternatives.

Benefits of green marketing

Today's consumers are becoming more and more conscious about the environment and are also becoming socially responsible. Therefore, more companies are responsible to consumers' aspirations for environmentally less damaging or neutral products. Many companies want to possess an early-mover advantage as they have to eventually move towards becoming green. A number of the advantages of green marketing are, it ensures sustained long-term growth alongside profitability. It saves money within the top of the day, though initially the value is more. It helps companies market their products and services keeping the environment aspects in mind. It helps in accessing the new markets and enjoying competitive advantage. Most of the workers also feel proud and responsible to be working for an environmentally responsible company.

Green products and its characteristics

The products those are manufactured through green technology which caused no environmental hazards are called green products. Promotion of green technology and green products is important for conservation of natural resources and sustainable development. We will define green products by following measures:

- Products those are originally grown
- Products those are recyclable, reusable and biodegradable
- Products with natural ingredients
- Products containing recycled contents, non-toxic chemical
- Products contents under approved chemical
- Products that don't harm or pollute the environment

- Products which will not be tested on animals
- Products that have eco-friendly packaging i.e. reusable, refillable containers etc.

Green marketing mix

Every company has its own favorite marketing mix. The 4 P's of green marketing are that of a standard marketing but the challenge before marketers is to use 4 P's in an innovative manner. Like conventional marketers, green marketers must address the '4 Ps' in innovative ways such as:

Product: Entrepreneurs eager to exploit emerging green market either: Identify customers' environmental needs and develop products to deal with these needs; or develop environmentally responsible products to possess less impact than competitors. The increasingly wide sorts of products on the market that support sustainable development and are good for the triple bottom line include: Products made up of recycled goods. Products can be recycled or reused. Efficient products, which save water, energy or gasoline, economize and reduce environmental impact. Products are with environmentally responsible packaging. McDonalds, for instance, changed their packaging from polystyrene clamshells to paper. Products are with green labels, as long as they offer substantiation.

Price: Pricing may be a critical element of the marketing mix. Most customers are prepared to pay a premium if there's a perception of additional product value. This value could also be improved performance, function, design, visual appeal or taste. Environmental benefits are usually another bonus but will often be the deciding factor between products of equal value and quality. Environmentally responsible products, however, are often less costly when product life cycle costs are taken into consideration like fuel-efficient vehicles, water-efficient printing and non-hazardous products etc.

Place: the selection of where and when to form a product available will have significant impact on the purchasers you attract. Very few customers will go out of their way to buy green products merely for the sake of it. Marketers looking to successfully introduce new green products should, in most cases, position them broadly within the market place in order that they aren't just appealing to a little green niche market. The location must also be consistent with the image you want to project and allow you to project your own image rather than being dominated or compromised by the image of the venue. The location must differentiate you from your competitors. This can be achieved by in-store promotions and visually appealing displays or using recycled materials to stress the environmental and other benefits.

Promotion: Promoting products and services to focus on markets includes paid advertising, PR, advertisements, marketing and on-site promotions. Smart green marketers are going to be ready to reinforce environmental credibility by using sustainable marketing and communications tools and practices. For example, many companies within the financial industry are providing electronic statements by email, e-marketing is rapidly replacing more traditional marketing methods, and printed materials are often produced using recycled materials and efficient processes, like waterless printing. Retailers, for instance, are recognizing the worth of alliances with other companies, environmental groups and research organizations when promoting their environmental commitment. To reduce the utilization of plastic bags and promote their green commitment, some retailers sell shopping bags, for instance those produced by Land care Australia; pack up Australia and Planet Ark, under the banner of the Go Green Environment Fund. The key to successful green marketing is credibility. Never overstate environmental claims or establish unrealistic expectations, and communicate simply and thru sources that folks trust. Promote your green credentials and achievements. Publicize stories of the company's and employees' green initiatives. Enter environmental awards programs to profile environmental credentials to customers and stakeholders (Sharma *et al*., 2019).

Challenges of green marketing

For implementing Green marketing, business firms need to face many problems while treading the way of Green marketing. Challenges, which need to be faced, are listed as under:

- Green marketing encourages green products/services, green technology, green power/energy; tons of cash has got to be spent on R and D programmes. Thus, practicing green marketing initially is going to be a costly affair.
- The customers might not believe the firm's strategy of Green marketing. Therefore, firms should make sure that they convince the customer about their green product. This will be done by implementing Eco-labelling schemes.
- Initially the profits are going to be very low since renewable and recyclable products and green technologies are costlier. Green marketing is going to be successful only in end of the day.
- Many customers might not be willing to pay a better price for green products which can affect the sales of the corporate.
- The firm may hand over on Green marketing concept or be forced to practice unfair means to chop cost to sustain within the competition and thus the whole idea of going green are going to be a farce.
- The firms practicing Green marketing need to strive hard in convincing the stakeholders and lots of times there could also be some who simply might not believe and co-operate (Welling and Anupamaa, 2010).

Keys to successful green marketing

Show potential customers that you simply follow green business practices and you'll reap more green on your bottom line. Green Marketing is not just a catchphrase; it is marketing strategies which will assist you get more customers and make extra money. But as long as you are doing it right. For green marketing to be effective, you've got to try to to three things; be genuine, educate your customers, and provide them the chance to participate.

1) Being genuine means you're actually doing what you claim to be doing in your green marketing campaign which the remainder of your business policies is according to whatever you're doing that's environmentally friendly. Both these conditions need to be met for your business to determine the type of environmental credentials which will allow a green marketing campaign to succeed.

2) Educating your customers is not just a matter of letting people know you're doing whatever you're doing to guard the environment, but also a matter of letting them know why it matters. Otherwise, for a big portion of your target market, it is a case of "So what?" and your green marketing campaign goes nowhere.

3) Giving your customers a chance to participate means personalizing the advantages of your environmentally friendly actions, normally through letting the customer participate in positive environmental action.

Path to greenness

Green marketing involves that specialize in promoting the consumption of green products. Therefore, it becomes the responsibility of the businesses to adopt creativity and insight, and be committed to the event of environment-friendly products. This will help the society in the long run. Companies which embark on green marketing should adopt the following

principles in their path towards greenness (Fig. 1).

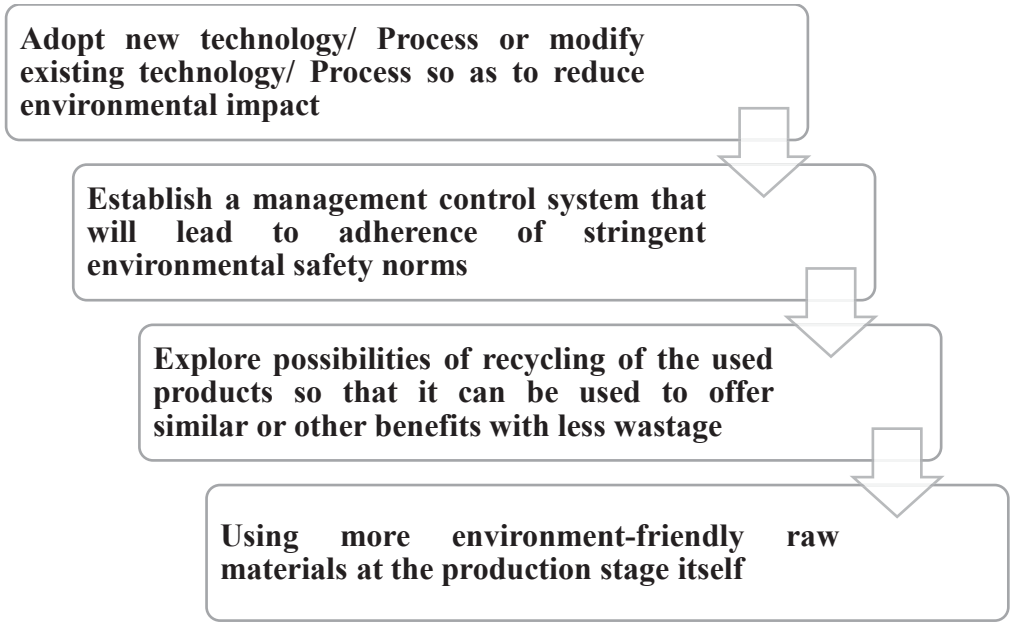

Fig. 1 Steps towards greenness

Green marketing practices in India

- Nike is the first among the shoe companies to market itself as green. It is marketing its Air Jordan shoes as environment-friendly, as it has significantly reduced the usage of harmful glue adhesives.
- Kansai Nerolac Paints has been at the forefront of paint manufacturing for more than 88 years pioneering a wide spectrum of quality paints. Kansai Nerolac has worked on removing hazardous heavy metals from their paints – among this lead being the most prominent metal. Kansai Nerolac does not add any lead or other such heavy metals in its manufacturing process.
- Dell has been one of the vendors who focus on producing green IT products. They have a strategy called "Go green with Dell" to sell these products in the market. It also comes in an eco-friendly packaging with a system recycling kit bundled along. Talking about the green commitments of the company.
- Eco Hotels (Ecotels) is a certification system promoted by Hospitality Valuation Services (HVS) International. This system is based on five main criteria: environmental commitment, solid waste management, energy efficiency, water conservation, and employee education/community involvement. In India we have Eco-hotels like Orchid, Rodas, Raintree etc. believing and practicing *green marketing*.
- IBM launched Project Big Green to help clients around the world improve the efficiency of IT and better optimize their data center resources. IBM has software and services technologies to help businesses reduce data center energy consumption and cut energy costs by more than 40 per cent.
- Tata group of companies - Tata motors ltd. is setting up an eco-friendly showroom using natural material for its flooring and energy efficient lights.
- Recently launched Samsung solar mobile guru and battery operated LG TV.
- Badarpur Thermal Power station of NTPC in Delhi is devising ways to utilize coal-ash that has been a major source of air and water pollution.
- Barauni refinery of IOC has taken steps for restricting air and water pollutants.

- Xerox introduced a "high quality" recycled photocopier paper in an attempt to satisfy the demands of firms for less environmentally harmful products.
- McDonald's restaurant's napkins, bags are made of recycled paper.

Conclusion

Green marketing is a crucial strategy for companies to extend the profit. Marketers got to understand the implications of green marketing. Companies must find a chance to reinforce the product's performance and strengthen the customer's loyalty and command a better price. Most of the businesses in India are venturing into green marketing due to opportunity, social responsibility, governmental regulations, competitive edge, cost reduction and brand image. Marketers even have the responsibility to form the consumers understand the necessity for and benefits of green marketing. Consumers are willing to pay more to take care of a cleaner and greener environment. Green marketing remains in its infancy and tons of research is to be done on green marketing to completely explore. Adoption of Green marketing might not be easy within the short run, but within the end of the day it'll definitely have a positive impact on the firm. a sensible marketer is one who not only convinces the buyer , but also involves him in marketing his product. Green marketing shouldn't be considered as only one more approach to marketing, but has got to be pursued with much greater vigor because it has societal and environmental dimensions. Increasing awareness on the varied environmental problems has led a shift within the way consumers set about their life. There has been a change in consumer attitudes towards a green lifestyle. People are actively trying to scale back their impact on the environment. However, this is often not widespread and remains evolving. Organizations and business however have seen this alteration in consumer attitudes and try to realize a foothold within the competitive market by exploiting the potential within the green market industry.

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13.CUSTOMER'S PERCEPTION ON CORPORATE SOCIAL RESPONSIBILITY

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Abstract

Corporate Social Responsibility (CSR) is a complex term. The focus of CSR activities is steadily shifting from mere contributors to charity to better ameliorating partners of a social community. Scholars describe this evolution as branching trees.An imperative approach to CSR activities involves fulfilling the needs of customers. Customers are the key potential stakeholders of an organisation. They identify those companies attractive with which they share common values and principles. Different theories and frameworks have been discussed in literature for conceptual understanding of notions of the customers and practices opted by companies for generating goodwill The paper highlights the customer's perception of the company's CSR policies by sharing the results of a primary survey analysed through factor and regression analysis. This survey was based on the application of A.B. Carroll's Pyramid model of CSR which categorises social responsibility into 4 dimensions i.e. ethical, economic, legal, and philanthropic. The result of the survey gives a better picture of which companies need to do to be labelled as "Socially Responsible". As the pandemic has altered the fate of the world, it becomes quintessential for the firm to strategize its CSR initiatives as well. In this regard, the paper also shares a result of the poll on what activities companies must focus post- COVID.

*Keywords***:** Reputation Insurance, Corporate Heritage Identity, Resource - Based View of the Firm, Pyramid Model, Cognitive dissonance

Introduction

Corporate Social Responsibility (CSR) can be observed as a conceptual framework that has undergone a paradigm shift since its inception in the 20th century. This paradigm shift can be attributed to the alteration of social expectations towards corporate behaviour. S. A. Waddock used the metaphor of a "branching tree to represent the evolution of CSR.

Review of literature

CSR is a composite term, and every organisation has diverse notions and viewpoints attached to it. As per the UNIDO, "CSR is a salient management theory whereby social and environmental concerns in the firm's operations and ongoing interactions with their stakeholders are combined by the company".

A.B.Carroll(1999)mentioned that when it comes to CSR, society has different expectations from the organisation which encompasses legal, ethical, economic etc. Carroll described that CSR is a three-dimensional integration of social issues and corporate social responsiveness and performance. Matten and Moon (2005) also, talk on the same line that CSR incorporates public responsibility, economic responsibility, and social responsiveness.3

Need for CSR

There was growing disparity among all classes and regions in terms of income; the working conditions the wages of the workers were not heeded. To make profits, companies used to acquire land leading to the displacement of the poor villages, impairing their livelihood. Dunfee and Donaldson (1999) proposed an unusual type of social contract among society and business that integrates universal rights principles that

are essential to society while conferring economic enterprises some degree of flexibility and necessary for the market operations.

Many authors such as R.S.F. Eells, in 1956 argued that large corporations are not fulfilling their responsibilities at times of inflation. Similarly, B.M, Selekman in 19595, highlighted the moral responsibility of corporations in meeting labour expectations. In 1960 Keith Davis explained the essential political and socio-economic changes that took place exerting stress to businessmen for re-evaluating their role in society and associated social responsibility5in society. Influential contributor J.W. McGuire (1963) claimed that the responsibility of firm in addition to economic, legal, political obligations must include corporation's interest in the education and happiness of its employee and the social welfare of the community5.

Customers Perception of CSR And Frameworks

The traditional benefit of CSR is generating goodwill. The eye-catchy campaigns would aid in the brand-building, building a positive public image. Ross and Creyer(1997) added that customers are ready to actively promote companies that are dedicated to ethics, environmentally-friendly methods or cause-related marketing. According to Lin-Hiand Blumberg (2018), this practise can serve up-to 40% of brand equity. Peloza (2006) gave a theory of "reputation insurance" concerning CSR which can shield a firm's image during threat or crises.

Scandelius and Blomback(2013) attested that brand's responsible image is positively affected by the way company communications its CSR heritage. Scholar such as Balmer (2011) advanced on the idea of “corporate heritage identity” as an imperative tool to intensify brand reputation and authenticity. He views that corporate heritage identity is continually developing via the incorporation of novel dimensions,by extending affinities with its stakeholders and nurturing faith in various settings.

Customers identify those companies attractive with which they share common value and principle. Value is interactive as it can be established solely when both stakeholders and business come unitedly. This connection positively influences customer behaviour. The customers are the potential stakeholders. The company gives its choices priority. Arnold and Handleman(1999) showed that firms that adhere to actions allied with institutional norms often receives positive "word of mouth from consumers.

Perception, attitude, lifestyle, training and educational background affect the individual’s choices. Accordingly, recognition of customers CSR perception is essential which leads to a blend of satisfactory CSR initiatives and the company's marketing strategies by the efficient management system. Companies need to implement CSR projects which are in sync with their core values. Pursuing projects not directly linked with the core-business strategy might result in inconsistency that seats the consumers in the state of cognitive dissonance (Festinger, 1957).

Rodríguez del Bosque and Pérez (2013), gave a conceptual framework based on a hierarchy of effects. The method reflects that customer behaviour can be broken into three stages: 1 Affective dimension, which is related to the domain of emotions 2 conative dimension, about customer's behavioural intentions and actions 3 cognitive dimension, that includes customer's beliefs and thoughts.

In 1953 ideas of H. R. Bowen got some importance in establishing the basis of CSR with his work "Social responsibilities of the businessman." Bowen described the social responsibilities of company's executives as "the obligation of businessmento make those decisions, to pursue those policies, or to follow those lines of action which are desirable in terms of the objectives and values of our society."11 Scholars such as Armandi and Tuzzolino(1981) introduced a "Need-Hierarchy framework"5via which any company's social responsibility could be measured from five criteria (competitiveness, profitability, organisational safety, market position, industry and affiliation context, self-actualisation). R. Strand (1983) presented a link among an organisation and its responsiveness and social responsibility, to identify internal and external effects of a company's behaviour known as a systems model.

The Pyramid Model of CSR was given by A.B.Carroll (1991). He described the four prime responsibilities of a firm: 1) the economic responsibilities which form the ground for the different levels of the pyramid; 2) legal duties of the company; 3) ethical obligations that mould the firm's behaviour ahead of the law-abiding responsibilities, and; 4) philanthropic responsibilities of the organisation concerning its contribution in enhancing the state of growth of a community.

Many theories attempt to explain the CSR model. One of the more comprehensive framework includes "the triple bottom line" which was first comprehended by Elkington in 19945as a sustainability model that balances the company's environmental, social and economic impact to accomplish an exceptional triple bottom line performance (economic,ecological and social) via efficient and long-term partnerships among the public, private sectors, and stakeholders.

TBL has evaluated how business affects the social and environmental values to generate financial results. It has three pillars in the form of 3P: People, Profit and planet - It refers to the sustainable environmental practices which a corporation.

Environment and Sustainability

Brundtland Commission as "development that meets the needs of the present generation without compromising the needs of future generations.11The idea of CSR and Sustainability have intimately entwined.

Corporate sustainability essentially defines the role that companies play in linking-up the agenda of sustainable development and necessitate a balanced approach in case of economic and social progress and environmental stewardship. At times, companies provide misleading information, deceiving masses while actually "greenwashing"which negatively impacts the communities.

S.L. Hart (1995) evolved a conceptual framework known as "Resource-Based View of the Firm" which included 3 principal interconnected strategic capabilities: sustainable development, product stewardship and pollution prevention. He rates it as crucial supplies to stakeholder integration and continuous improvement.

Social Aspect incorporates Corporate Governance for the employee as well as customers. This also includes the CSR activities of the company. Environmentally sensitive industries adopt no pollution processing, non-toxic packaging. Economic Dimensions includes Sustainable Reporting by companies. Companies spend in R&D to improve their supply chain and redefining their product this also includes

relations with suppliers who also focus on sustainability3. Some organisations attune their CSR activities to minimise activities which are detrimental to the environment.

The review covered various CSR frameworks. CSR affects various stakeholders in the organisation which are either directly or indirectly associated with it. The focus of the review was on customer perception of CSR and the value that an individual generates in this regard. The company's core business strategy, media and education allow a company to communicate the real picture of CSR. However, all these have changed over time and have a scope of contingency. According to Mohan (2002), Substantive signalling actions concerning CSR are operations which are calculable or mirror each noticeable outgo of resources.8 As beneficial CSR is for the community as significant it is for a company.

Research Gaps

Few articles cover the concept of sustainability and its consequences on the environment. However, in changing times companies need to change their approach to CSR. Pandemic has somehow proved to be challenging for companies and thus financial crunch have affected the welfare function of the company and Post-COVID period requiressome scope of inquiry.

Most of the articles did cover CSR practices of the companies, however, there is a paucity of study on customer perception on CSR in India. Customers are key stakeholders and their choices are given priority by the company in order to sustain financially. The applicability of A.B Carroll model which evaluates CSR on legal, ethical, philanthropic and economic parameters should be viewed from a customer's view. The next part tries to fill in this research gap as well.

Research questions and aim of study

There are two objects of studies:

- To evaluate the impact of CSR Activitiesof the company on Customer Satisfaction by applying of A.B. Carroll's Pyramid Model of CSR
- To suggest a CSR activity that companies can use Post-COVID

Hypotheses of the study

To check whether there is any significant association among the elements of the Pyramid Model, and Customer Satisfaction. The hypothesises were developed for all the 4 cases as follows:

Ho1: Legal Responsibilities of CSR and Customer Satisfaction are independent of each other Ha1: Legal Responsibilities of CSR and Customer Satisfaction are dependent on each other

Ho2: Economic Responsibilities of CSR and Customer Satisfaction are independent of each other Ha2: Economic Responsibilities of CSR and Customer Satisfaction are dependent on each other

Ho3: Philanthropic Responsibilities of CSR and Customer Satisfaction are independent of each other Ha3: Philanthropic Responsibilities of CSR and Customer Satisfaction are dependent on each other

Ho4: Ethical Responsibilities of CSR and Customer Satisfaction are independent of each other Ha4: Ethical Responsibilities of CSR and Customer Satisfaction are dependent on each other.

Research design and methodology

Cross-sectional research was used to understand the perspective of customers on CSR for the region of Delhi-NCR in this exploratory style of research. The study addresses Customer perception of CSR activities. The Data was collected from consumers in the form of a questionnaire circulated via online

medium consisting of 14 questions each question highlighted 1 variable. Following table shows the specificity.

Table 1 Variables used for analysis

Legal1	Compliance with Govt. Laws
Legal2	Products meet legal Standards
Philanthropy1	Company's support for sports and cultural activities
Philanthropy2	Charity
Philanthropy3	Partnership with local businesses and schools
Economic1	Quality Improvement
Economic2	Low operating cost
Economic3	Maximising Profits
Ethical1	Image and Reputation
Ethical2	Customer Awareness
Ethical3	Cause-related marketing
CustPers1	Positive word of mouth
CustPers2	Favoured by customers
CustPers3	Trustworthy

Instrument used:

To accomplish the above-stated objectives primary data was gathered through questionnaire. The circulated questionnaire had different parts which address the opinion of the customer on 4 elements:legal, economic, philanthropic, and ethical. The last part of the questionnaire had specific questions which addressed the customer's perception level concerning CSR. Multiple articles were used to frame the questionnaire and the responses were collected on 5-point Likert Scale from 5 Strongly agreeing on the way to 1 Strongly disagreeing.A pole was also conducted separately in order to suggest a CSR activity that companies can use Post-COVID

Tools for Study

To analyse the results obtained a sample was taken from the population and the Microsoft Excel and SPSS were used Statistical tools were used for the study which included:

- Simple average, Std. Deviation, Skewness and Kurtosis was be used to evaluate the CSR elements
- Reliability and Validity were checked by Pearson's Correlation and Cronbach's Alpha
- Regression Analysis was done between Responsibilities of CSR according to the Pyramid Model & Customer Satisfaction
- T-test for hypothesis analysis.
- Sampling Adequacy was checked by Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity
- Factor Analysis to get the latent information was done on the elements of the Pyramid Model and Customer Satisfaction

Sample Design and Selection Criteria

A sample size of 382 respondents (n = 382) was picked extending from 20 years to above 51 years of age of men and women with different education qualification using a convenience sampling method. Following were the demographic profile of respondents.

Gender: Men (48.7%), Women (51.3%)

Education: Doctorate (8%), Post-Graduate (39%) Graduate (52%)

Age: 21-30years (56%), 31-40years (20%), 41-50years(15%), 51years and above (9%)

Almost equal no. of male (186) and female (196) respondents participated in filling the questionnaire belonging to different age groups. Most of the respondents were young adults of the age group of 21-30 years (214) and were graduates (200).

Research Findings Analysis

This section presents the results of analysis. The average value of 5 dimensions, ranged from 7.87 to 11.623. Mostly due to same no. of items asked the mean comes out to be similar. The only contradiction was present in the Legal aspect as it accommodated only 2 questions. Since the Likert scale was used (Ranging from 1 to 5) Most of the data points are close to 2 Standard deviations of the mean were as indicating. The negative value of Kurtosis and Skewness indicates that respondents have mostly agreed with the statements and there is high peakedness in a normal curve towards the left (towards strongly agree). Therefore, the respondents do believe that these parameters impact CSR activities of a firm.

Reliability and Validity of results

In the analysis, reliability was measure by using Pearson correlation and Cronbach's Alpha.Cronbach's Alpha computes internal consistency i.e.measuring the wayitems are related as a group.**(here Cronbach's Alpha= 0.867).** The acceptable range of Cronbach's Alpha should be greater than 0.70. The overall value comes out to be 0.867 which is in the acceptable range.

Pearson Correlation:

	Legal	Economic	Philanthropy	Ethical	CustomerSatisfaction
Legal	1.000				
Economic	**.372**	1.000			
Philanthropy	**.338**	**.533**	1.000		
Ethical	**.484**	**.462**	**.575**	1.000	
CustomerSatisfaction	**.397**	**.479**	**.526**	**.530**	1.000

Table 2 Correlation Matrix

Pearson correlation outlines the correlation between individual items at $p<0.01$. There exists strong positive correlation among the elements used in the Pyramid model with customer satisfaction. The value of correlation greater than 0.3 affirms this especially Ethical parameter. Company should make sure that their activities are not unethical in nature as it may result in a negative image among potential consumers.

Regression Analysis:

Regression analysis was later used to evaluate the relationship between elements of CSR's pyramid model and Customer Satisfaction. Legal, Economic, Philanthropy and Ethical were the independent variables while Customer Satisfaction was the dependent variable:

Table 3 Coefficients for Regression Analysis

Model	Unstandardized Coeff.		Standardized Coeff.	t	Sig.p-value
	B	Std. Error	Beta		
(Constant)	3.333	.547		6.095	.000
Legal	.169	.062	.127	2.722	.007
Economic	.163	.042	.190	3.868	.000
Philanthropy	.231	.050	.242	4.611	.000
Ethical	.215	.047	.242	4.530	.000

Regression Equation: $y = b1x1 + b2x2 + \ldots + bnxn + C$

Where bi's (i=1,2…n) are the regression coefficients

C represent constant

Customer Satisfaction = (0.169*Legal) + (0.163*Economic) + (0.231*Philanthropy) + (0.215*Ethical) + 3.333

All the elements held a direct relationship with Customer Satisfaction. The regression coefficients show that C (value of customer satisfaction when all other variables are 0) is equal to 3.333. The model further reveals that, via its coefficient value that for every one-unit increase in Legal aspect the customer satisfaction increases by 0.169 units (a1=0.169). Similarly, in case a unit increase in Economic, Philanthropic and Ethical parameters the Customer satisfaction increases by and Ethical 0.163, 0.231, 0.215 respectively (a2=0.163, a3=0.231, a4=0.215) parameters. Philanthropic activities have the maximum impact. In all cases p-value is significant explaining that company should consider these parameters while formulating their CSR policies as customers' satisfaction level is affected by it.

Test for Goodness of Fit

Table 4 Regression Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.630[a]	.397	.391	1.52989	.397	62.092	4	377	.000
a. Predictors: (Constant), Ethical, Economic, Legal, Philanthropy b. Dependent Variable: CustomerSatisfaction									

The correlation coefficient (r) wasadopted to determine the direction and the magnitude of the relation among the dependent and the independent variable.The correlation coefficient shows a significantly positive correlation (r=+0.630) among the dependent and independent variables taken together.
Coefficient of determination that evaluates percentage variation in the dependent variable which could be explained by the varying the independent variables) and the p-value was used to evaluate the overall significance of the model. Value of coefficient of determination (r2=0.397) depicts that 39.7% of the variation in Customer Satisfaction is interpreted by the changes in, legal, philanthropy, economy and ethical parameters neglecting 60.3% unexplained. The regression model obtained for the study can, thus, cannot be completely utilised to forecast the Customer Satisfaction level fairly. The adjusted R square of 39.1% also signifies that the model may not comprehensively show relationship among the variables. This analysis shows that although the parameters correlate with customer satisfaction but these parameters are not sufficient enough to conclude on customer satisfaction level and more assessment models may be considered.

Hypothesis Testing

Table 5 Hypothesis Testing Summary

	t-value	Sig.
Ha1: Legal Responsibilities of CSR and Customer Satisfaction are dependent on each other	2.722	.007
Ha2: Economic Responsibilities of CSR and Customer Satisfaction are dependent on each other	3.868	.000
Ha3: Philanthropic Responsibilities of CSR and Customer Satisfaction are dependent on each other	4.611	.000
Ho4: Ethical Responsibilities of CSR and Customer Satisfaction are independent of each other	4.530	.000

The above table shows the result of the hypothesis. In all the above cases the t-value comes out to be greater than 1.96 at $p<0.05$. Therefore, there is a significant relationship between the legal, economic,

philanthropic, ethical parameters and customer satisfaction which implies that Ho cannot be accepted in any case.

Sampling Adequacy

Kaiser-Meyer-Olkin (KMO) was utilised to quantify the sampling adequacy and checking the appropriateness of data for factor analysis. The KMO statistics varies between 0 and 1.

In this study, the value of KMO for CSR dimensions overall was 0.825, signifying that the sample taken to process the factor analysis is statistically significant, and value ofBartlett's Test of Sphericity is 604.993(approx.Chi-Square) for degree of freedom 10 at Sig value of .000

Factor Analysis

To analyse the customer satisfaction concerning CSR 14 variables were used which Each question in the questionnaire specifiedin order to identify-Customer Satisfaction.

An exploratory factor analysis was used to check the validity of the data by analysing Eigen-value. The first 4 components have Eigen-value above 1 which 61.516% of the variance as shown in the following table. This implies that these 4 components can sufficiently explain the Customer satisfaction.

Table 6 Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.196	37.111	37.111	5.196	37.111	37.111
2	1.256	8.974	46.085	1.256	8.974	46.085
3	1.155	8.248	54.333	1.155	8.248	54.333
4	1.006	7.183	61.516	1.006	7.183	61.516
5	.814	5.815	67.331			
6	.783	5.590	72.920			
7	.627	4.480	77.401			
8	.589	4.206	81.607			
9	.546	3.902	85.509			
10	.516	3.687	89.196			
11	.437	3.119	92.315			
12	.428	3.059	95.374			
13	.378	2.696	98.070			
14	.270	1.930	100.000			
Extraction Method: Principal Component Analysis.						

Following table shows the matrix of factor loading with Direct Oblimin rotation with values below 0.3 suppressed. Although there is a cross-loading in case of few factors. However, there is a significant difference between the loaded values. All the variables which constituted the same parameter in the Pyramid model are loaded significantly high to explain the same factor.

Table 7 Rotated Component Matrix

Pattern Matrix				
	Component			
	1	2	3	4
CustPers3	.786			
CustPers2	.739			
CustPers1	.447			
Legal1		.830		
Legal2	.332	.625		
Economic3	.432		.681	
Economic1			.792	
Economic2			.727	
Philanthropy1			.670	
Philanthropy2			.507	.408

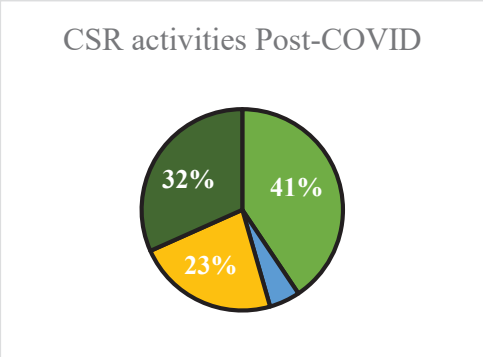
Philanthropy3			.835	
Ethical1		.332		.692
Ethical2				.608
Ethical3	.351			.527
Rotation Method: Oblimin with Kaiser Normalization.				

Component 1 explains the customer's perception with 3 high loading of 3 variables which signifies customer satisfaction. Component 2 explains the legal parameter. Component 3 explains both economic and philanthropic parameters. Component 4 explains ethical factors through Ethical variables.

Poll Results

Total Respondents- 44 Post-COVID companies should focus more on which activity:

Figure 1 Poll Results



Sustainable Supply Chain	41%
Country's Relief Funds	5%
Infrastructural Development	23%
Better Livelihood of People	32%

Conclusion

Since the implementation of Companies Act 2013, every company has taken CSR Investment as its right and duty towards community development. After it has been made compulsory to spend at least 2% of the average profit of the previous three years many companies have begun disclosing their contribution in the Business Responsibility Report. In addition to this if the company's products meet legal Standards then customers find them highly reliable increasing customers repurchase.

Customer Satisfaction level is based on customer perception, if any company meets all these parameters, it can prove to be beneficial for the company.

Recommendations

- Company must engage in Cause-related marketing and the customers should be made aware of the CSR engagements of the company to maintain reputation and brand image.
- Company should focus more on activities related to philanthropy like Adult education in villages, specific projects like Women Health, mental health.
- Since, only Pyramid model's parameters might not be wholly sufficient, combination of models could be used such as environmental aspects.
- Company can Invest in local businesses for mutual benefits.
- Investing in cultural and sports activities in schools is also a step forward towards students' welfare.
- A firm can make their Supply-Chain more Sustainable by reducing operating cost at the same time focusing on quality improvement
- Post-COVID companies can invest more sustainable supply-chain

Limitations of the Study

This was a micro-nature-based study, only used for evaluating Customer perception on CSR and sustainability. The study was concentrated in the region of Delhi-NCR with sample response of only 382 via online medium.

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14. EFFECT OF CHROMO THERAPY ON GREENGRAM: AN ANALYSIS

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Abstract

India is huge country with population increasing day by day. In the present scenario it's important to fill the belly of all the people. For that many agricultural practices have been developed. But in the long run it has been seen that the majority of these practices are depleting the environment in a much more hazardous way. Some of these processes are use of inorganic fertilizers, harmful Pesticides, toxic herbicides etc. The background of this research is to develop a technique for increasing production that is sustainable and should not compromise to the existing resources. Chromo therapy is one such technique which serves the purpose of sustainability and keeps the environment clean by providing the required nutrients to the plants. In this paper, we have developed a design of using different color filters to study the effect of chromo therapy on green gram. These color filters are used to know what their effect on plants is. Do they help in increasing the production of green gram or not? Different color filters are used as different variable to know whether there is any effect of these filters. The entire theme of this particular idea to know whether chromo therapy helps in sustainable development? The major findings are these filters help in increasing the vegetative growth of the green gram and pink filter helps the most by recording the highest growth

Keywords: Chromo therapy, Color Filters, Completely Randomized Design

Introduction

Chromo therapy is a therapy where usage of different colors is done in order to cure the diseases and disorders is a much sustainable way. Chromo therapy is one of the naturopathy practices which stresses on how to use different colors of light so that whatever may be the problem in can be treated well in time. Chromo word deals with color. Colors have played most significant role on planet earth. Whether it is traffic signal or painting, colors have left their own impression on human mind. Not only this, even the color of vehicle, school uniforms, flower colors, and many more have got a long-lasting impression on human body. People prefer different colors for different kind of work like for funeral white colored clothes, red and bright color for birthday celebrations, saffron color for monks, Green colored ink for signature by Higher authorities, Blue colored ink for notes preparation, red ink for evaluation and so on. This kind of color specification deals with not only human mind set but also sets it's impact on human mind Even it has got high impact on animals as well. Colorful designs are still being used by the nomadic people like rangoli to catch their prey. Colorful traps are being used by different tribes around the world to catch their target in a much easier way. Not only animals but also insects, mites, hoppers are trapped using color traps. This brings to the conclusion that the colors have got their own way of leaving impression on each and every living entity. In that case, it should leave some sort of effect on plant kingdom as well. As plants are also important living entity on plant earth, they too show the effect of color. Plants leaf color is green. They are very much sensitive to light, which is again a combination of seven colors. Roots , fruits and vegetables have got their own color which depicts that they release that color and absorb all other colors. In plants most important part is the flower. In flowers the first and foremost thing to be noticed is the color. Colorful flowers have always attracted the sight. Even if it marriage or any other ceremony, colorful flowers have always attracted human beings. Now the question

arises is whether plants also get affected by colors? Do they respond to color? Even if they respond, then what is the way of response and how do they respond to this kind of stimuli? Whether colors help in constructive growth of plants or do they destroy the growth? Even though there are many studies which predict that the basic colors have got different effects on plants, but still it is difficult to predict which color stimulates what effect on plants? As the genetic code of different plants are different, it is difficult and injustice to judge all kinds of flora in one theory. The color effect of different colors on different plants might be different. Taking this into consideration we have taken green gram as our plant for experiment. As the plant grows faster and it is easily available in nearby store. Because of its fact growth, it can be evaluated easily. Not only that we can even know whatis actual effect of colors. To specify about colors, three basic colors Red, Yellow and Blue, one secondary color green and one combination color pink is being used for the experiment. These colored plastic filters are packed in five pots and the green gram plants are sowed. One pot is kept without any color filter to understand and compare the growth of plants in colored pots along with non-colored filtered pot.

Review of literature

Neurohormonal balance is an important aspect of human brain. This actually deals with psychology of a human being. If neurohormonal balance is good then human brain. In order to bring out the best, chromotherapy is being implemented (Radeljak, Sanja & Palijan, Tija & Kovačević, Dražen & Kovač, Mitar. (2008)). The performance of the organ can be understood by the type of color it emit. If the color of organ is not according to the accepted standards then it gives the conclusion that the organ's status is not good. If the body parts are not working properly then they are made to work properly by using the chromo therapy in a much useful way.(Zena O'connor, (2011)) Different colors have got different advantages and they can be used to eradicate specific disorders like for the movement of arterial blood red color is used, spleen and other treatment is done using orange color (Smita Sundararaman (2016, October 18)). Deadly diseases like cancer, breast cancer, alopecia, color blindness can be cured using different colors. (Somia Gul, Rabia Khalid Nadeem and Anum Aslam (2015)) Dinshah Ghadiali is well known Indian Physician, who has done lot of work in color therapy. In medicines there are of different kind. There are color medicines which are new to humanity. His work on color medicines has played a significant role in the field of Chromo therapy. (Darren starwynn (2009,march).There are many fungal infections which are very infectious in nature. Fungus is also very much prone to colors. Fungus responds to the colors. Scientists are able to use light therapy for effective elimination of fungal infections. [Light Therapy May Combat Fungal Infections (2005, March)] In the modern world there are many therapies which govern their own importance. Due to the constant findings of human mind, many therapies have been built and developed. Like this color therapy has been found to be the upcoming alternative in the modern-day studies. (Dr.Pushpanjali Singh Dr. Shakuntala Misra (2018, March)) When so many affects are there on human beings, then it is also important and interesting to know what will be the effect of the chromo therapy on plants?

Hypothesis

Under Hypothesis development, two hypotheses can be taken into consideration for the assessment. One is Null Hypothesis and another one is alternate hypothesis. Null Hypothesis is represented as H0 and alternate Hypothesis. Under null Hypothesis, the effect of all the filters and non filter is taken to be the same and under alternate hypothesis, the effect of all the filters and non filter is taken to be different. Each effects are represented as ï with numbering from 1,2, 3, 4, 5 and 6. As the effect of each filter is same in

null hypothesis. so, all of them are equated with each other. In alternate hypothesis, all the filters do not have the same effect. Due to which not equal to sign is taken for framing the alternate hypothesis.

Null Hypothesis (H0): $ï_1=ï_2=ï_3=ï_4=ï_5=ï_6$

Alternate Hypothesis (H1): $ï_1≠ï_2≠ï_3≠ï_4≠ï_5≠ï_6$

Methodology

Green gram seeds have been sowed in six pots. Five pots are have been wrapped with five different plastic color filters namely red, blue, green, yellow and pink. One pot is left as it is without any filter. This filter less pot is basically being taken as a variable for comparing the growth with the plastic filters. Here, the plastic filter means the plastic carry bags which have got those colors. Plastic colored carry bags have been taken because they are easily accessible. The time duration taken is 15th May 2020 to 13th July 2020. All the pots have been taken under the temperature range of 15* c to 30*c. The heights of green gram plants in different pots have been recorded in Cms. The data has been recorded for 60 days. Recording of data has been done to the first two decimal places. In each pot, 10 seeds are taken for sowing. In this completely randomized design (CRD), a statistical tool is used for the assessment of this experiment. Later ANOVA analysis and ANOVA Table is framed in order to assess the variability among different filters. In this, each filter is taken as a treatment variable to calculate Treatment Sum Of Squares. Then all values are used to calculate the total sum of squares. The difference will give the error sum of squares. Later by calculating degrees of freedom and mean sum of squares, F value is calculated. The calculated F value is compared with Table value of F. If the calculated F value is less then the Table F value, then the Null Hypothesis will be rejected but if F calculated value is more then F table, value then null hypothesis will not be rejected.

Data collection

Day	No Filter	Red	Blue	Yellow	Green	Pink
1	0.5	1	1.5	1	0.5	2
2	1	3	3.5	2.6	1	4
3	2	5	5.5	4.8	2	6
4	3	7.5	7.5	6.8	3	8
5	4	9.5	9.5	9.5	4	10
6	5	11.5	11.5	11.2	5	12.5
7	6	13.5	13.5	13.2	6.5	15
8	9	15.5	15.5	15.3	9	17.5
9	11.5	17	17.5	17.4	11.5	20
10	14	19	19.5	19.5	14	22.5
11	15.5	20	20	20	16.5	23
12	16.5	22	22	22	17.5	25
13	17	23.5	23	23.5	18	26.75
14	18	24.5	24.5	24.5	19	27.75
15	20	26	26.5	25	21	28.25
16	20.5	26.5	26.5	26.25	21.5	28.75
17	20.5	26.5	26.5	26.25	21.5	28.75
18	20.5	26.5	26.5	26.25	21.5	28.75

19	21	26.5	27	26.25	22	29
20	21	26.5	27	26.5	22	29
21	21	27	27.25	27.25	22	29
22	21	27.5	27.25	27.25	22	29
23	21.5	27.5	27.5	27.5	22.5	29.75
24	21.75	27.5	27.5	27.5	22.75	29.75
25	21.75	27.5	27.5	27.5	22.75	29.75
26	21.75	27.5	28	27.75	22.75	30.25
27	22	28	28	28	23	30.25
28	22	28	28.25	28	23	30.25
29	22	28	28.25	28	23	30.25
30	22	28	28.25	28	23	30.25
31	22.25	28.25	28.5	28.25	23.25	30.75
32	22.25	28.25	28.5	28.25	23.25	30.75
33	22.25	28.25	28.5	28.5	23.25	30.75
34	22.25	28.25	28.5	28.5	23.25	31.25
35	22.75	28.75	28.75	28.75	23.75	31.25
36	22.75	28.75	28.75	28.75	23.75	31.25
37	22.75	28.75	28.75	28.75	23.75	31.25
38	22.75	28.75	28.75	28.75	23.75	31.75
39	23	29	29.25	29	24	31.75
40	23	29	29.25	29	24	31.75
41	23	29	29.25	29	24	31.75
42	23	29	29.25	29	24	32.5
43	23.25	29	29.25	29	24.25	32.5
44	23.25	29.25	29.5	29.25	24.25	32.5
45	23.5	29.5	29.5	29.5	24.5	32.5
46	23.5	29.5	29.5	29.5	24.5	33
47	23.5	29.5	29.5	29.75	24.5	33
48	23.5	29.5	29.5	29.75	24.5	33
49	23.5	29.75	29.75	29.75	24.5	33.5
50	24	29.75	29.75	29.75	25	33.5
51	24	29.75	29.75	29.75	25	33.5
52	24	30	30	30	25	33.5
53	24.5	30	30	30	25.5	33.75
54	25	30	30.25	30	25.5	33.75
55	25.5	30.25	30.25	30.25	25.5	33.75
56	25.5	30.25	30.25	30.25	25.5	33.75
57	26	30.25	30.25	30.5	26	34
58	26	30.5	30.5	30.5	26	34
59	26	30.5	30.5	30.5	26	34
60	26.25	30.5	30.75	31	26.25	34.75

Source of data

The data in the above table has been recorded from the day to day observations of the Green gram from 15th May 2020 to 13th July 2020, collecting a data up to 60 days.

Data analysis

Analysis of the data has been done to test the equality of the color filters on the pots. Here as the other factors like environment, water intake and temperature were under control during the experiment, completely randomized design has been used for the analysis.

Sum of all the values for individual filter pots have been recorded

No Filter= 1176, Red=1509.25, Blue=1517, yellow=1508.25, Green=1220, Pink=1670

Mean values of all the Individual Filters have been recorded

No Filter= 19.6, Red=25.15, Blue=25.28, yellow=25.15, Green=20.33, Pink=27.83

$R_1=R_2=R_3=R_4=R_5=R_6=60$

Grand Total (G) = 8600.3, Correction Factor (C.F)=$(8600.3)^2/60$=205458.778

Total Sum of Squares (T.S.S) = $(0.5^2+1^2+2^2+\ldots..+34.75^2)$-C.F

(T .S.S)=22425.79197

Treatment Sum Of Squares (T r .S.S) =

$(1176^2/60+1509.25^2/60+1517^2/60+1508.05^2/60+1220^2/60+1670^2/60)$-C.F

T r .S.S= 3101.47806

Error Sum Of Squares= 19324.31391

Anova Table

Sources of Variation	**Degrees of freedom (d.f)**	**Sum of squares(S.S)**	**Mean Sum of squares (M.S)**	**F Value (F_{cal})**
T r. S.S	5	3101.47806	620.295612	11.3631277
Error	354	19324.31391	54.58845737	
T.S.S	359	22425.79197	62.4673871	

Source of data

These data have been recorded and analyzed using the 60 days observation made during the observation period of 60 days from from 15th May 2020 to 13th July 2020

F Table Value (F_{tab}) = 2.21

2.21< 11.3631277

$F_{tab}<F_{cal}$

So, Null Hypothesis is rejected

Findings

- The filter pot and non filter pot have affected the vegetative growth of Green Gram.
- There is a difference of effect between Non-Filter pot Green gram and Filter pot Green Gram
- The Non-Filter Pot Green Gram has the range of vegetative growth from 0.5cm to 26.25 cm
- The filters have got different range of vegetative growth for different filtered pots.
- The range of vegetative growth of filtered pots varies from pot to pot.
- The vegetative growth range of different filters are:

Filter Color	Range(cm)
No Filter	1-26.25
Red	1-30.5
Blue	1.5-30.75
Yellow	1-31
Green	0.5-26.25
Pink	2-34.75

Source of Data

Data has been recorded from the observation period of 60 days from from 15th May 2020 to 13th July 2020

- Pink Colored Filter pot has recorded highest vegetative growth and no filtered pot has recorded the least vegetative growth.
- The effect of different filters on vegetative growth of Green Gram is different because of the wavelength associated with different each filter is different. Each filter has got a color and each color has got a specific wavelength.
- The following is the measure of wavelength of different color filters:

Filter Color	Wavelength
Red	620-750nm
Blue	450-495nm
Yellow	570-590nm
Green	495-570nm

Source of Data: The Visible Spectrum: Helmenstine, Anne Marie, Ph.D. (2020, August 28). The Visible Spectrum: Wavelengths and Colors. Retrieved from https://www.thoughtco.com/understand-the-visible-spectrum-608329

- The colored filters reflect the light wavelength of that specific color and converges the other light wavelength. By this they filter the light entering the pots.
- After reflecting the wavelength by the colored filters, other wavelengths get converged into the pots. Because of this converging effect difference among the pots is created and growth of plant is affected.
- It can be seen that the effect of chromo therapy on green gram is observable, recordable and accessible.

Conclusion

As compared to all the filters, Pink filtered pot has shown the highest result for vegetative growth of green gram.

Suggestions/recommendations

- Pink Colored Filters should be used to have more growth among the crops.
- Pink colored large cloths should be used for covering large fields in order to establish rapid vegetative growth.
- There are different forage crops which are used for fodder purpose. These forage crops should be kept under Pink filters for more above ground growth.
- Green Houses and Poly houses should be renovated with pink cloths for better yield and growth.
- Pink House effect should be implemented for betterment of crops.
- Pink Biodegradable plastics should be manufactured to establish the Pink House Effect.
- More preference should be given to usage of pink colored filters in agricultural experiments for future usage.

Limitations and scope for further studies

- Green gram Crop has been taken for the experiment, due to which results may change for each and every crop.
- The experiment was carried out under the monsoon season, which may give different result for different season.
- The Experimental Items like pots and seeds where under controlled system and not in field, due to which Completely randomized design is used for analysis.
- Under Field experiments, the results will vary.
- Variability within the experimental units i.e. variability within the pots has been taken to be negligible.
- The water availability for each pot is same and there is no difference in the treatment.
- The temperature range for each pot is same and variability with respect to temperature is negligible.
- This experiment can be conducted for other plants also.
- It can also be performed for different climates and temperature

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15.A STUDY ON ROLE OF MATHEMATICS IN UNDERSTANDING GREEN ECONOMY: A PATHWAY TO SUSTAINABLE DEVELOPMENT

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Abstract

An economy which obtains and accounts for the relation between economy, society and environment contributing to reduced waste, decreased pollution, efficient usage of resources, materials and energy for consumption during production processes for invigorating and expanding economies by creating employment opportunities along with proper income distribution encouraging sustainable trade is "Green economy". Management of ecosystems or environment and services it provides cannot be ignored. An interdisciplinary approach in research by accommodating innovative ideas for generating technology by continuous enhancement of knowledge is essential for evolution of green economy. There is a huge economic crisis in almost two hundred countries in the world today due to the measures introduced for containing the Covid-19 pandemic. The green economy puts forward a powerful solution to this economic uncertainty. For making the economies stronger the energy demands will increase leading to high carbon dioxide and other green house emissions. In order to protect environment from emissions apart from meeting these high energy demands the concept of environment tax plays a vital and critical role in green economic policy. The mathematical modeling is an indispensible tool for sustainable development. Mathematical modeling plays a powerful role in understanding, predicting and controlling sustainable development process. The sustainability of earth depends on the interdisciplinary approach in which mathematics has a very firm responsibility in addressing the challenges in promoting green economy. In this paper we study and review some mathematical models which help in introduction of environmental tax as a control parameter apart from few other mathematical models involved in creating and supporting efficient green economic development for the advantage of mankind. offer

Keywords: Green economy, Sustainability and Mathematical Modelling.

Introduction

In the past twenty years the economic growth in various countries has reduced poverty and improved standard of living. The socio-economic growth is achieved by loosing and risking resources of environment. Resource depletion and pollution caused due to industrialization resulted in unsustainable economic growth. The increased environmental risk and resource constraints are key factors which contributed to the ideaa of green growth and green economy. There is a need for developing theoretical and methodological basis of green economy. Green economy has turned out to be an indispensible way for developing countries to make sure that the future is safe for mankind.

Green Economy:

The mankind has misused ecosystem more hastily and more comprehensively over the past century than in any equivalent period of time in human history. These developments have been mostly obsessed to meet swift growing demands for basic needs and the outcome is conventional one way linear economic model: " resource – product – waste" and may perhaps head towards depletion of natural resources and damaging the environment with irreversible changes in it. Today, civilization, industry and policy makers

have started to recognize the imperative need for the reassessment and revision of this style of thinking and Green economy is advancement for developing more sustainable economies and societies. Greening the economy has been promoted recently as a new approach for enhancing human well-being and dropping the risk to the environment, being defined as low-carbon and climate protective, resource – efficient and socially inclusive. A comprehensive green economy is a substitute to today's prevailing economic model, which intensifies inequalities, waste, causes resource scarcities and breeds pervasive threats to the environment and human health. In the last ten years, the perception of the green economy has surfaced as a strategic precedence to many governments. By renovating the economies into drivers of sustainability, the governments of the countries will be prepared to take on the major challenges of the 21st century – from urbanization and resource shortage to climate change and economic instability.

Sustainable development

The initiative of sustainable development came into forefront with the 1987 publication of "**our common future"** a report from Brundtland commission. It is a development which focuses on the needs of the present times without compromising the facility of future generations to meet up their requirements. It is a process based on balancing peoples economic and social needs including principles and values) with the preservation and enhancement of natural resources and ecosystem.. To attain Sustainable development is a challenge and we have to take it positively.

Taxation and its impact

A compulsory payment to be made by every citizen of a country to its government is tax. It is the revenue which is major cause of income for the government which is used for the development of the country. Apart from fiscal purpose taxation has to accommodate more functions like resource reallocation, income redistribution and economic stability to achieve sustainable growth. The sustainable development is possible if scientists and technologists are aware of economic, social and environmental dimensions of their ideas and innovations. Mainstream economic policy cannot be framed isolating the environment. It is necessary to have an integrated approach which protects environment and contributes for the economical growth for sustainable development. Environmental tax is one of the measures to reach the goal of sustainable development.

Mathematical Modelling:

A mathematical model can transform natural phenomena in reality into a mathematical equation. It is the process which utilizes the concepts in mathematics to make predictions about the issues and problems of the real world, to comprehend situations and to support in taking decisions. It is a technique which can explain how the world works and how to make it better. It is a key element in preparing policy, decision making for optimizing economic growth**.** It can also help to be aware of the universe and the conditions needed to **sustain life**.

Role of Mathematics in Economics:

Mathematics plays a very important role in creating models and conducting quantifiable tests for planning economic activity. In the present era most of the economic policy decisions are made and their impacts are assessed with the help of mathematical modeling. The Theory of general balance and Theory of marginal utility are explained based on concepts of Mathematics[1]. The advancement of economic theory in later 1930 was dominated by application of Mathematical concepts like differential calculus, differential equations, convex sets and graph theory with the same vigor in economics as it was in physics.

Von Neumann, an eminent mathematician in his model of expanding economy proved the existence and uniqueness of equilibrium by using general version of Brouwer's fixed point theorem. These are some of the instances which enlighten and elucidate the role of mathematical models in making the study of economics accurate and precise.[2]

Literature review on Environmental tax

Many countries have imposed taxes on various resources to protect environment. The country which took the initiative of imposing forest tax in 1969 was France, which is a kind of tax collected on usage of resources and on extraction of raw materials (except for oil and gas) [3]. In the next year, the United States implemented the SO2 tax [4]. The platform of tax was extended in other countries from SO2 to other emissions in air (except CO2) and water such as CO, NOx, water and solid pollutants on which tax can be levied [5, 6]. Japan imposed aviation fuel tax in 1972 [7] and it is an example of energy tax, which covers the tax on products for producing energy and for stationary use. For the purpose of shifting the burden due to tax from factors related to production to the people who use natural resources and increase pollution the EU introduced the environmental tax reform (ETR) around 1990. [8].

Research has shown that in a which is economy the green tax promotes economic growth[9].
The reduction of pollution and carbon emissions to protect environment can be brought by levying environmental tax. Liu et al show that along with pollution control loss of ecological environment could be minimized due to environmental tax[10]. Patric[11] has proved that the higher recovery rates of various resources can be achieved by imposing higher environmental tax. Piciu & Tric[12] express that the natural resource recycling is encouraged because of environmental tax. According to Amundsen & Schb[13] for countries with depleted resources environmental tax is favourable.

Some Illustrations of mathematical models in Green economy & sustainability

The Green Development Dynamical system

Green Development Dynamical System is a non-linear dynamical system with an integrated approach in analyzing green development. The integrated approach is based on interactions between resources consumed, growth in economy, emissions in pollution and environmental tax which are variables. The Resource- Economy-Pollution(REP) model is extended by adding environmental tax as a state variable. The factors which influence the above state variables are g control of government, level of technology, consumer awareness, investment in controlling pollution, Economic Tax Reforms, and environment self-cleaning. The relations between the variables and factors are shown in fig1. The variables are in square boxes and factors are unframed. The arrows labeled by k_i (i=1,2,….22) in fig 1 show relations between variables and factors. The Resource- Economy-Pollution(REP) model is extended by adding environmental tax as a state variable. If x(t),y(t), z(t) and w(t) represent the total amount of resources consumed, the GDP, the amount of pollution and the amount of environmental tax in economy during a period where 't' is continuous time variable. The differentiated function of these variables is some function of variables themselves. Now these functions are calculated one by one.

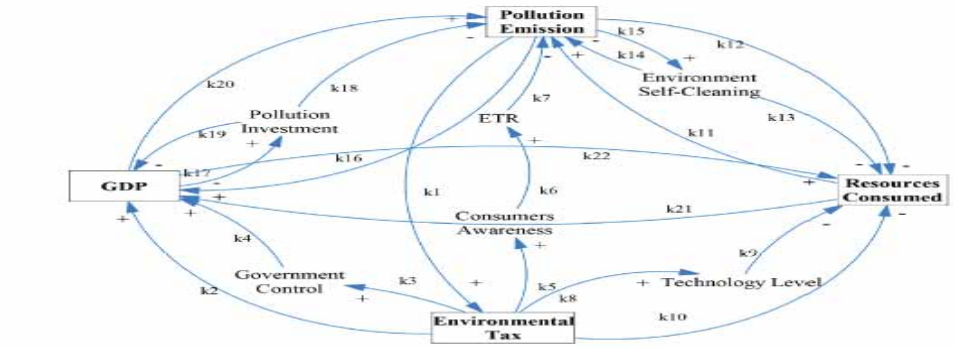

Fig 1. The interaction among the variables of GDDS.

The environmental tax is imposed to reduce pollusion emissions, therefore we need to analyze the form $\frac{dw}{dt} = F(x, y, z, w)$ where F(x, y, z, w) contains two variables pollution z and environmental tax w. When the pollution increases the environmental tax increases exponentially and when it decreases it decreases. If N is the threshold of pollution discharge to environmental tax and z is actual pollution then the Mathematical equation which describes the relation is

$\frac{dw}{dt}$ = dw(z-N) , if z>N $\frac{dw}{dt}$ is positive & if z<N $\frac{dw}{dt}$ is negative.

Here the coefficient d is positive function of k_1, k_5, k_6 and k_7.[14].

Now we consider $\frac{dx}{dt}$ = G(x, y, z, w). We need to find G which satisfies following conditions

Total resource consumed is equal to increase in resource consumption rate i.e. $\frac{\partial G}{\partial x} > 0$[15], which can be taken as first term of G as a_1x. Using the same process we have the value of $\frac{\partial G}{\partial y}$ also will be greater than zero i.e $\frac{\partial G}{\partial y} > 0$ which indicates that the second term of G is a_2y. Since we slow down under the combined effect of pollution conversion and economic growth(in fig1 k_{12}, k_{13} and k_{20}) hence the third term is given by $-a_3yz$. The environmental tax reduces the resources consumption through improvement of technological level[47]3(in fig1 k_8, k_9 and k_{10}), hence we have the fourth term as $-a_4w$.The relationship between some variable and factors is linear in GDDS[48]3 the total value of G(x, y, z, w) by combining all the four terms gives

$$\frac{dx}{dt} = a_1x + a_2y - a_3yz - a_4w.$$

Now we obtain H(x, y, z, w) so that $\frac{dy}{dt}$ = H(x, y, z, w). If x(t) is resources consumed and (1-x/M) is the prospective share of resources where M is inflection of resources to economic growth. The rate associated to resources $\frac{\partial H}{\partial x}$ is associated with both, the resources consumed and the prospective share of resources by the logistic growth model we have the first term as $b_1x(1-x/M)$ where $\frac{dy}{dt}$ is positive when the level of resource consumption is low x<M and it is negative when the level of resource consumption is high x>M. Due to Scarcity of resources and e degradation of environment the need to explore for alternate resources and managing to control environment degradation has negative impact on economic development[8]3 i.e. $\frac{\partial H}{\partial y}$<0 so the second term here is $-b_2y$(in fig1 k_{17} and k_{19}). The higher pollution slows down the economy so the pollution variable is proportional negatively to rate of GDP i.e. $\frac{\partial H}{\partial z} < 0$(in fig1 k_{16}) so the third term here is $-b_3z$. Due to policies of the government for controlling pollution the environmental tax increases and is proportional positively to rate $\frac{\partial H}{\partial w}$>0 and the fourth term is b_4w. In total we have

$$\frac{dy}{dt} = b_1 x(1-x/M) - b_2y - b_3z + b_4w$$

The last equation which is to be found is $\frac{dz}{dt}$=I(x, y, z, w). It is evident that along with economic growth pollution and resource consumption increase so the first term is c_1xy. The pollution slows down due to the self-cleaning process of the environment i.e $\frac{\partial I}{\partial z} < 0$ (in fig1 k_{13}, k_{14} and k_{15}) and we get the second term as $-c_2z$. Due to environmental tax being imposed the pollution decreases i.e. $\frac{\partial I}{\partial w}$<0 so the last term here is $-c_3w$.

Finally we get

$$\frac{dz}{dt} = c_1xy - c_2z - c_3w$$

The green development dynamical system is represented by the equations

$\frac{dx}{dt} = a_1x + a_2y - a_3yz - a_4w$ $\frac{dy}{dt} = b_1 x(1-x/M) - b_2y - b_3z + b_4w$

$\frac{dz}{dt} = c_1xy - c_2z - c_3w$ $\frac{dw}{dt} = dw(z-N)$

where a_i , b_i , c_j (i=1, 2, 3,4 & j= 1, 2, 3), M and N are positive.

For these systems of ordinary differential equations, we find the equilibrium point which is a solution which does not change with time. The equilibrium points of the system above are calculated by solving the nonlinear algebraic equations

$a_1x + a_2y - a_3yz - a_4w = 0$ $b_1 x(1-x/M) - b_2y - b_3z + b_4w = 0$

$c_1xy - c_2z - c_3w = 0$ $dw(z-N) = 0$

(0, 0, 0,0) is always an equilibrium point. This system can be solved by considering the Jacobian matrix of the above system of equations & then considering the Characteristic equation of the Jacobian matrix which is

$f(\lambda) = |J-I\lambda| = \lambda(\lambda^3 + p_1\lambda^2 + p_2\lambda + p_3)$ where I is fourth order identity matrix and

$p_1 = -a_1 + b_2 + c_2$, $p_2 = b_2c_2 - a_1c_2 - a_1b_2 - a_2b_1 + b_3c_1x + a_3b_1z + a_3c_1y^2 + 2(a_1b_1 - a_3b_1xz)/M$;

$p_3 = - a_1b_2c_2 - a_2b_1c_2 + a_3b_1c_2 - a_1b_3c_1x + a_3b_1c_1xy + a_2b_3c_1y - a_3b_3c_1yz + a_3b_2c_1y^2 + 2(a_2b_1c_2x - a_3b_1c_2xz - a_3b_1c_1x^2y)/M$

The equilibrium point is stable if p_i(i=1,2,3) satisfy Routh-Hurwitz Criterion.

Mathematical Model on effect of environmental tax on Carbondioxide Emission

Global warming is a serious threat to the planet earth and habitat on it. It is caused due to the emission of green house gases from natural sources and anthropogenic sources. Carbondioxide is the gas which is highly responsible for increase in global temperature. If carbondioxide crosses the threshold frequency then it is harmful for the nature. Threshold concentration of carbondioxide is that below due to which there are no visible harmful effects on environment. The concentration of carbondioxide in environment is reduced by leafy trees [17, 18, 19, 20, 21, 22,23,24]. It is very important to stabilize and control the concentration of Carbondioxide in atmosphere by levying environmental tax on emitters as a control parameter. Now we study a Mathematical model with environmental tax as control parameter for reducing concentration of Carbondioxide in atmosphere which minimizes global warming. Let C be the concentration of carbondioxide in atmosphere, B is the biomass density of leafy trees, E is the environmental tax. Let Q be the constant emission rate of carbondioxide which is function of time. The environmental tax is proportional to difference of carbondioxide concentration and threshold level. An equation can be obtained to find the rate of change of carbondioxide concentration. Take δ_0 as the natural depletion rate coefficient of carbondioxide so the second term is $-\delta_0 C$. Due to Photosynthesis there is a decrease in concentration of carbondioxide and it is directly proportional to biomass density B of leafy trees and to the concentration of Carbondioxide C then we have the third term as $-\delta BC$ where δ is rate of depletion due to presence of leafy trees. μ be the rate of depletion due to imposing environmental tax so the fourth term is $-\mu E$.

Total change is $\frac{dC}{dt} = Q - \delta_0 C - \delta BC - \mu E$

The growth of trees is expressed in terms of the logistic equation given by $\frac{dB}{dt} = rB(1-\frac{B}{K}) + \pi\delta BC$ where r is intrinsic growth rate and K is carrying capacity of leafy trees . π is the rate at which carbondioxide is used by trees for photosynthesis. The rate of change of Environmental tax is proportional to the difference of concentration of carbon emission and C_0 is threshold carbon concentration.ϑ is tax rate co-efficient and $\vartheta_0$is tax evasion due to natural and administrative issues, hence we get

$\frac{dE}{dt} = \vartheta(C - C_0) - \vartheta_0 E$ with C(0)> C_0, B(0)≥ 0 and E(0)≥0

The set in which the solution exists is S= {(C, B, E)ϵR_+^3/ $0 \le C \le \frac{Q}{\delta_0}$, $0 \le B \le \frac{K}{r}\left[r + \pi\delta\frac{Q}{\delta_0}\right]$, & $0 \le E \le \frac{\vartheta}{\vartheta_0}\left[\frac{Q}{\delta_0} - C_0\right]$}

The model system (1) – (3) has following two non-negative equilibria

(i) $\bar{E}(\bar{C}, 0, \bar{E})$ (ii) $E^*(C^*, B^*, E^*)$

The positive equilibrium solution is given by

Q-$\delta_0 C - \mu E = 0$ --- (4) $\vartheta(C - C_0) - \vartheta_0 E = 0$ ----- (5)

Taking value of E from (5) and substituting in (4) we get $C = \frac{Q + \frac{\mu\vartheta}{\vartheta_0}C_0}{\delta_0 + \frac{\mu\vartheta}{\vartheta_0}} = \bar{C}$ ------- (6)

Using this Value in (5) we get $E = \frac{\vartheta\delta_0}{\vartheta_0}\left\{\frac{\frac{Q}{\delta_0} - C_0}{\delta_0 + \frac{\mu\vartheta}{\vartheta_0}}\right\} = \bar{E}$ ------ (7)

The equilibrium $\bar{E}(\bar{C}, 0, \bar{E})$ exists when $\frac{Q_0}{\delta_0} > C_0$, this means that the tax would be imposed when concentration of carbondioxide is greater than threshold concentration C_0. As $\frac{Q_0}{\delta_0} > C_0$ always $\bar{E}(\bar{C}, 0, \bar{E})$ exists without condition. The positive solution $E^*(C^*, B^*, E^*)$ is given by

Q-$\delta_0 C - \delta BC - \mu E = 0$ ----- (8) $B = \frac{K}{r}(r + \pi\delta C)$ ---- (9) $E = \frac{\vartheta}{\vartheta_0}(C - C_0)$ ---- (10)

From the above equations we have F(C)= Q-$\delta_0 C - \delta\frac{K}{r}(r + \pi\delta C)C - \mu\frac{\vartheta}{\vartheta_0}(C - C_0)$--- (11)

From (11) we get F(0) = Q+ $\mu\frac{\vartheta}{\vartheta_0}C_0 > 0$ $F(\frac{Q}{\delta_0}) = -\delta\frac{K}{r}\left(r + \pi\delta\frac{Q}{\delta_0}\right)\frac{Q}{\delta_0} - \mu\frac{\vartheta}{\vartheta_0}\left(\frac{Q}{\delta_0} - C_0\right) < 0$

$F'(C) = -\delta_0 - \delta\frac{K}{r}(r + 2\pi\delta C) - \mu\frac{\vartheta}{\vartheta_0} < 0$

F(C)=0 has unique positive root in $0 \le C \le \frac{Q}{\delta_0}$ without any condition.

Substituting (9) and (10) in (8) we get $\frac{\pi K}{r}\delta^2 C^2 + \left[\delta_0 + \delta K + \mu\frac{\vartheta}{\vartheta_0}\right]C - \left[Q + \mu\frac{\vartheta}{\vartheta_0}C_0\right] = 0$ --(12)

Differentiating above equation with δ we get $\frac{dc}{d\delta} = -\frac{\frac{2\pi K}{r}\delta C + KC}{\frac{2\pi K}{r}\delta^2 C + \left[\delta_0 + \delta K + \mu\frac{\vartheta}{\vartheta_0}\right]} < 0$

which means that $\frac{dC}{d\delta} < 0$ concentration of carbondioxide decreases as δ increases.

Again differentiating (12) with respect to ϑ we get $\frac{dC}{d\vartheta} = -\frac{\frac{\mu}{\vartheta_0}(C - C_0)}{\frac{2\pi K}{r}\delta^2 C + \left[\delta_0 + \delta K + \mu\frac{\vartheta}{\vartheta_0}\right]} < 0$

As $\frac{dC}{d\vartheta} < 0$ we have concentration of carbondioxide decreases as ϑ increases. This helps in concluding that the concentration of carbondioxide decreases as the value of control parameter increases.

Modelling the removal of cement dust particles from a chimney by water sprays and greenbelt plantations

The different types of dust particles which are emitted from cement factories and other industries cause undesirable damage to atmosphere and in turn to human beings, the surroundings including greenbelt plantations. The dust particles with more than 24% concentration of calcium oxide (cao) deposited on the leaves adversely affect the Photosynthesis by blocking the light rays. This dust pollution also brings down the average yield of plants by 16.2% (Anda – 1986)

It is very crucial to remove these dust particles from the atmosphere near Earth. It is proved in many studies that plant species play an vital role in controlling the adverse effects and improving air quality. Therefore, an attempt is made to propose a mathematical model to study the removal of dust particles in the atmosphere around the source (factory) by water sprays and their effect on plant biomass in a greenbelt. In this model, let C – be the cumulative environmental concentration of various types of dust particles emitted from the cement factory. B -- be the density of plant biomass in the green belts plantations around the factory. W – be the number density of water droplets discharged from water sprays. The modelling process consists of the following assumptions:

(1) The rate of emission of cement dust particles in the atmosphere is constant (say Q)

(2) To reduce the concentration of dust particles, water sprays are used so that W is proportional to the concentration of dust particles in the region (i.e λC)

(3) The depletion of concentration of dust particles due to water sprays is directly proportional to the cumulative environmental concentration of dust particles as well as the number density of water droplets (i.e δ_2WC), δ_2 being the rate of removing coefficient of dust particles.

(4) The plant biomass in the greenbelts plantation cleans and reduces the concentration of dust particles. Therefore, the depletion of dust particles due to plant biomass is directly proportional to the environmental concentration of dust particles and density of plant biomass (i.e δ_1BC),δ_1 being rate of removing coefficient of dust particles.

(5) The depletion rate of plant biomass is directly proportional to the cumulative environmental concentration of dust particles and the density of plant biomass (r_1BC), r_1 being the depletion rate coefficient of plant biomass. Further r_2B^2C denotes the depletion of carrying capacity of biomass. These assumptions give the following system of nonlinear differential equations governing the mathematical model.

$\frac{dC}{dt} = Q - \delta_0 C - \delta_1 BC - \delta_2 WC$---(1) $\quad \frac{dB}{dt} = rB\left[1 - \frac{B}{K}\right] - r_1 BC - r_2 B^2 C$ ----(2)

$\frac{dW}{dt} = \lambda C - \lambda_0 W - \lambda_1 WC$ ---- (3) , $C(0) \geq 0, B(0) \geq 0, W(0) \geq 0$

In (1) the constant δ_0 is the natural depletion rate coefficient of dust pollutants, r and K are the intrinsic growth rate and carrying capacity of plant biomass in the greenbelts plantation respectively. The constant λ being rate at which water droplets are introduced in the atmosphere, λ_0 being the natural depletion rate coefficient of water droplets falling on the ground without removing dust particles. The constant λ_1 removal rate coefficient of water droplets due to interaction with dust particles. The constants in the model are all assumed to be positive.

Observations

(1) When δ_1 and δ_2 are very high then (dC/dt) may become negative and entire dust particles can be removed from the atmosphere near the Earth.

(2) The plant biomass density tends to zero if the depletion rate coefficient of plant biomass (r_1,r_2) due to dust particles is very high as(dB /dt) becomes negative.

The study and analysis of the nonlinear mathematical model for removal of dust particles emitted from the cement factory by using water sprays and greenbelt plantations suggest that these two methods play a very significant role. The dust particles are removed by the process of impaction on reacting with water spray. The greenbelt plantations are very helpful in reducing dust particles from the near the Earth atmosphere. Further it is very clear that as the number density of water droplets increases the concentration of dust particles decreases.

Conclusions

As it is demonstrated in our study Mathematics plays big role in sustainable development in all of its aspects: social, environmental and economic. Many developmental challenges could be solved if it is possible to get mathematical models that could describe them. The sustainability of planet Earth depends on mathematical science. Mathematical modeling has a vital role to play for a sustainable development.

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16. SUSTAINABLE UTILIZATION OF EDIBLE SEEDS BY TANGKHUL NAGA TRIBE IN UKHRUL DISTRICT, MANIPUR, NORTH EAST INDIA

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Abstract

Ukhrul district which is one of the nine districts of Manipur, is a hilly region predominantly inhabited by the Tangkhul tribe. From time immemorial, Tangkhul tribe depend much on indigenous vegetables, both cultivated in kitchen gardens and wild, for enriching the diversity of food. Plants with edible seeds constitute an essential component in the diet and food security of the Tangkhul tribe living around the forest fringe or in its vicinity. Many plants with edible seeds that are abundantly found in their locality are sold in local market, and hence it serves as main source of household income for the Tangkhul community. Some of the common edible seeds that are consumed by Tangkhul tribe are Cucurbita maxima, Euryale ferox, Hibiscus sabdariffa, Parkia timoriana etc. This article reports 22 plant species with edible seeds documented during field survey in the Ukhrul district of Manipur, along with their vernacular names and mode of uses. Plantation of these seed yielding plants in home gardens and farm areas has shown its commercial potential and steps for conserving economically significant diverse plants of this hilly region in a sustainable way. Thus, the study reveals sustainable utilization of edible seeds by Tangkhul Naga Tribe of Ukhrul district, Manipur

Keywords: Edible seeds, *Tangkhul*, Ukhrul, Manipur.

Introduction

Ukhrul district which is the main home land of *Tangkhul Naga* tribe makes its boundaries with the state of Nagaland in the North, Myanmar in the East, Chandel and Senapati district of Manipur respectively in the south and West. It is situated in the Eastern part of Manipur state covering an area of 4,544 sq km with the population of 1, 83,115 (Anonymous 2011) which lies in between 23˚13′ N and 25˚68′ N latitudes and 94˚20′ E and 95˚25′ E longitudes and covering an altitudinal range of 913 m to 3114 m above MSL. The climate of the district is temperate in nature with a minimum and maximum degree of 3^0 C to 33^0 C. The *Tangkhul* people of this region are simple, brave, reliable, generous, sincere and friendly. The majority of the people are agriculturist; Rice is the staple food of the people. People of this community depend on various wild and cultivated edible plants which obtained necessary food values of a balanced diet. Every household collects wild plants and maintain the areas where it grows. Among the plants *Cucurbita maxima, Hibiscus sabdariffa, Parkia timoriana* etc., are considered as income generating plants as the seeds are in high demand by the people of various communities for its high nutritional values. The study indicated the presence of a large number of edible seed plants in the district; however, the present paper enumerates only those species, which are used as food or spice by the *Tangkhul Naga* tribe of this district.

Table1: Edible seeds and their mode of uses.

Plant name	**Family**	**Vernacular name**	**Modes of uses**	**Market value**
Artocarpus heterophyllus Lam.,	Moraceae	*Theibo*	Eaten roasted	Rs 10-25/- per fruit.
Brassica campestris L	Brassicaceae	*Kayanghan*	Pounded seed	Rs 25-30/- per kg
Cajanus cajan (L.) Millsp.	Fabaceae	*Khaithei*	Eaten cooked	Rs 30-60/-per Kg.
Caesalpinnia crispa L.	Caesalpiniaceae	*Laikee*	Eaten cooked	Not marketable
Coriandrum sativum L.	Apiaceae	*Sachikom*	Used as condiment	Rs 5-8/- of about 100gm.
Cucurbita maxima Duch	Cucurbitaceae	*Khaimaithei*	Eaten fried	Rs 15-25/- per fruit.
Elettaria cardamomum Maton	Zingiberaceae	*Elaichi*	Used as spices	Rs 30-45 /- per Kg.
Euryale ferox salisb.	Nymphaceae	*Thangjing*	Eaten raw or cooked	Rs5-10/- per fruit
Entada pursaetha DC.	Mimosaceae	*Saotheila*	Eaten raw	Not marketable
Glycine max Merr.	Fabaceae	*Maranthei*	Eaten fried or boiled	Rs 25-40/-per Kg.
Hibiscus sabdariffa L.	Malvaceae	*Silotsougree*	Eaten cooked	Rs 15 -20 /-kg.
Parkia timoriana Merr.	Mimosaceae	*Yongchak*	Eaten raw or cooked	Rs 25-30 /-per Kg.
Ocimum americanum L.	Lamiaceae	*Sari*	Eaten soaked	Not marketable
Perilla frutescens Britton	Lamiaceae	*Hanshi*	Eaten roasted	Rs 15-25 /-per kg.
Phaseolus lunatus var. *macrocarpus* Benth.	Fabaceae	*Kalendri*	Eaten cooked	Rs 10-15/-per heap.
Phaseolus angularis (Willd.)	Fabaceae	*Theirathei*	Eaten cooked	Rs 20-25/-per Kg.
Phaseolus Vulgaris L.	Fabaceae	*Lingronthei*	Eaten cooked	Rs 15-30/-Kg.
Piper nigrum L.	Piperaceae	*Uchithi*	Used as condiment	Rs 5-8/- of about 100gm.
Pisum sativum L.	Fabaceae	*Hawai tharak*	Eaten fried or roasted	Rs 45-60/-per Kg.
Punica granatum L.	Punicaceae	*Kaphoi*	Eaten raw	Rs 5-10/-per fruit.
Trigonella foenum-graceum L.	Leguminaceae	*Methi*	Used as condiment	Rs 5-8/- of about 100gm.
Vicia faba L.	Fabaceae	*Hawai mubi*	Eaten cooked	Rs 20-25/-per Kg.

A very little work has been carried out in the past few years within the country on wild edible plants. Borthakur (1996); Chakraborty *et al*. (2003); Elangbam , (2002); Khomdram *et al*. (2009); Salam *et al*.

(2010); Salam *et al*. (2011); Singh & Arora ,(1978); Singh *et al.* (1988); Singh , P.K. (2001); However, so far, no such attempt has been made to explore the plants with edible seeds from this district. In the present paper, therefore, an attempt has been made by the authors to highlight certain unexploited wild or cultivated edible seed plants used as daily food by the *Tangkhul* tribe.

Methodology

In this study, an intensive ethnobotanical survey was conducted during (2015- 2016) among the *Tangkhul-Naga* tribe for gathering information on plant species with edible seed plants traditionally used by them. Edible seeds used as food and the method of preparation were noted down. The authenticity of the uses was repeatedly verified by asking to the different informer. In case of contradictory information, efforts were made to get the correct information. Tribal market (Litan, Lambui, Kamjong, Ukhrul,) were also visited frequently to study the plants sold there. The plants were identified with the help of published literature including (Singh & Arora (1978), Jain & Rao (1977), Kanjilal *et al* (1934 – 1940), one set of herbarium specimens have been deposited in the herbarium of the Department of Botany, Nagaland University and another set in the Life Sciences Department of Manipur University.

Results

In the present paper, botanical names are arranged alphabetically along with the family, vernacular names and mode of usage by the *Tangkhul* tribe is mentioned and shown in the Table1.

Discussion

During the current survey 22 Angiosperm plant species belonging to 20 genera and 14families were recorded from different areas and local market of Ukhrul District. Majority of the edible seeds are eaten boiled or raw and only few are taken roasted and fried by this community. The dreid seeds of the plant species like *Cucurbita maxima, Hibiscus sabdariffa, Parkia timoriana, Perilla frutescens ,Piper nigrum* etc are consumed throughout the year and usually found to be sold in every local market which are in high demand by the *Tangkhul* people of Ukhrul district and hence fetches good market price even today. But the availability of this plant species in the market is decreasing day by day due to overexploitation and people's demand for daily consumption. If proper strategies are proposed then these plants may become a part of *Tangkhul* economy. Edible seeds that are commonly consumed by the local people are non-toxic according to the gathered information. Edible seed plant species have not been systematically documented and studied in Ukhrul district, Manipur. So, there is a need to document the existing species of edible seed plant and to disseminate the knowledge among the *Tangkhul* tribe to generate interest in conservation and domestication of edible seed plant species.

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17. A REVIEW ON SUSTAINABLE LAST MILE DELIVERY (SLMD) IN ONLINE RETAIL

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Abstract

Various industries around the globe have seen a remarkable increase in online sales. With the increase in the number of products sold online, Last Mile Delivery (LMD) in the process of Supply Chain Management (SCM) has occupied a prominent role. The number and variety of products delivered to the customers and the geographical area covered to deliver the products is growing at a rapid phase. Not just the urban but tier two cities have seen an exponential development in online sales. So it becomes very important to the marketers to make the LMD a very pleasant process by catering to the needs of the customers. Understanding the needs and delivering the products to the satisfaction of the customers will yield good business. Nowadays online merchants are offering a variety of delivery options consisting of varying combinations of delivery elements like speed, time slot, delivery date, packing and delivery fee. All these options of delivery also pose sustainable environment challenges like increase in mobility of vehicles leads to traffic congestions, fuel consumption and pollution. Sustainable Supply Chain Management (SSCM) has been suggested in improving sustainability outcomes in supply chains, especially in the LMD process. A good amount of research was contributed by the researchers in the field of SSCM, whereas a very limited research is conducted in the field of Sustainable Last Mile Delivery (SLMD). Hence this gives scope to the researcher to review of literature relating to field of SLMD. Thus this paper aims to review the literature associated in the field of SSCM in LMD and provide good insights to retailers in maintaining sustainable business environment.

Keywords: Sustainable, Last Mile Delivery, Sustainable Supply Chain Management & Online Retail

Introduction

Globalization of the economics, digitalization and changing needs of customers has led to evolution of multifaceted supply chain management systems to run the businesses. The incorporation of the environmental concerns and social responsibilities has emphasized organizations to rely on sustainable supply chains. Business units and their supply chain partners are made responsible for the business activities that impact the environment, surroundings and the financial aspects of the society (Hsu, Tan et al, 2013). For the past few decades SSCM is integrating with socio-economic objectives across the supply chain processes and emerged as focal point in sustainable environmental concerns. Along with changes in the supply chain requirements with regard to environmental concerns, markets have seen an incredible increase in e-commerce. With the changing lifestyles, people started to realize new forms of needs that could fulfill their lifestyles. Most prominent need of customers is identified as the door delivery. According to Barclay (2013), in the era of online shopping, door delivery has become an important instrument in the hands of the seller to attract the consumers and reinforce the value of convenience of shopping anytime and anywhere. As the distribution and logistics play an important role in delivering the products to customers, attention went towards the Last Mile Delivery (LMD) to fulfill the changing needs of the customers and meeting the changing life lifestyles.

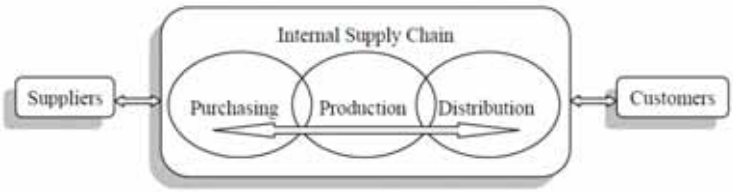

Figure no.1: An illustration of a company's supply chain
Source: Chen and Paulraj, 2004

There are three traditional phases in the supply chain: production, procurement and distribution. Each one of these phases may be combined of quite a few amenities in dissimilar locations round the globe (Thomas and Griffin, 1996). LMD falls in the third part of the supply chain that is more customer-oriented contact point.

SSCM (Sustainable Supply Chain Management)

The combination of sustainability into SCM is a widely accepted concept among the academics and business practices. There are a number of reviews available discussing the integration between conventional supply chain and sustainability. There is no one particular definition of SSCM, however Carter and Rogers (2008) hypothesized the sustainability as "the strategic, clear integration and accomplishment of an organization's social, environmental, and economic goals in the systemic synchronization of key inter-organizational commercial procedures for refining the long-term economic presentation of the individual business and its supply chains". They highlighted the reputation of the incorporation of the sustainability concept into business procedures through the supply chain to achieve long-term economic rewards. Hence, in a SSC (Sustainable-Supply Chain), sustainability-related managerial activities are tasked by achieving economic as well as non-economic (social and environmental) performance goals. However, wider supply chain sustainability can only be attained if each member in the supply chain works in accordance to accomplish overall planned sustainability goals, while simultaneously nourishing customers' and other stakeholders' necessities.

In the studies conducted by Crain and Liane (2011), describes SSCM as a field originated from the standalone research in social and environmental areas, through the CSR, and meeting of socio-economic and environmental viewpoints. While the SSCM research work has developed more into theoretically rich and methodologically demanding, there are plentiful of opportunities for further evolving theory, methodology, and the managerial relevance of future inquiries. Much of the SCM studies are considered as part of Corporate Social Responsibility (CSR). And there is a shift observed in sustainability from the one-dimensional lookout of sustainable growth toward a combined three-dimensional concept of sustainability (i.e., environmental, social, and economic) has been detected. This three-dimensional notion is also identified as the triple bottom line (TBL), which aims to lessening harmful ecological impressions and escalate optimistic social impacts while achieving economic sustainability.

All the previous works on SSCM have described from the perspective of social responsibility towards the environmental concerns as a whole SCM system. While none of the studies have specifically focused on the LMD systems. As discussed LMD has become the most significant issue to be understood and taken utmost care by the organizations. The present review article takes a look into the Sustainability in Last mile delivery aspects.

LMD (Last mile delivery)

In the online retail, final delivery of the product to the end customer plays an important role(Maruntelu, 2008). As the name recommends, last mile delivery is the last leg of the delivery method which takes place from the distribution center to customers doorsteps as shown in the below figure no.2.

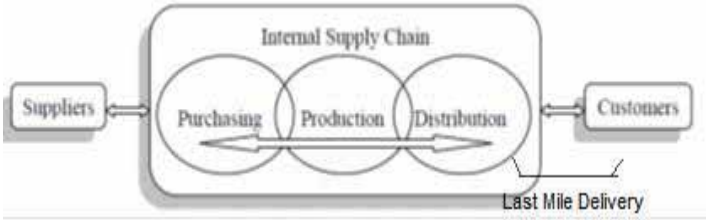

Figure no.2: Last Mile Delivery Model

The last mile delivery can range from just few streets away to 50 to 100 miles. The main goal of the last mile delivery is to deliver the package to the consumers as quickly to their prospects and the firms promise. Last mile is measured as the most significant component in the logistics and supply chain business. It's also the key to the buyer satisfaction. Last mile is the very time consuming and expensive portion of the complete shipping procedure. So, if completed in correct time, it can save an enormous amount of time and finances to the establishments that are into business and in turn can make e-commerce companies both efficient and lucrative.

A frequent and large number of packets to be delivered to the customers require more number of trips leading to environmental concerns in high fuel consumption and pollution. And inefficiency may will lead to high logistics cost to the organization. There is no specified LMD definition, however Xiao, Wang et al,(2017) conceptualize Last Mile Delivery as a metaphor of "last mile", refers to the last leg of goods movement from the last upstream distribution center, consolidation point or local warehouse to the final destination. In the study conducted by Gol, 2001 estimated LMD to 53 percent of the total logistics costs. That is more than half of the expenses in the complete process of supplying the product to the customer in online retail. At the same time, last-mile plays an important role in satisfying online purchase involvement. Accordingly, the importance of winning final delivery of e-commerce has been accepted since the occurrence of e-commerce (Bromage, 2001; Lee and Whang, 2001). Many e-retailing companies across the globe are realizing that LMD is the core asset to gain competitive advantage in the online retail companies. Over the few decades customer driven demand for door delivery is compelling the conventional retailers and transporters forcefully strive to improve final delivery. On the other hand, professional community logistics operators and several startups are evolving one after another with innovative home delivery solution proposed. These schemes at least comprise self-pickup at convenient stores (Aoyama, 2001), collection-and-delivery points (CDP) (Browne et al., 2001; Mckinnon and Tallam, 2003), and unattended reception packet (Punakivi et al, 2001; Esser and Kurte, 2006). All these different impending developments in the area of LMD must be studied in integration to sustainable supply chains for better environmental, social and economic benefits to different people in the society, individuals and organizations that are operating in Supply Chain industries.

Last mile delivery in Online Retailing

Last mile delivery is the one part of SCM which comes at the end of the process. Many research works relating to SCM by academicians was holistic and very less literature available specific to LMD. With the surge in the number of companies joining to online sales brought LMD in focus. The curiosity of the

customers to immediately own the product purchased online brings the importance of SCM. All the organizations have put thrust on SCM strategies to make the product reach to customers hand safely.
Online retail purchase experience of the customers is viewed as the core concept of e retail business (Pandey and Chawla 2018). Last mile delivery experience of the customers has direct impact on customer satisfaction in the total online retail purchase behavior. Although many e-retailers accept that last mile delivery is a crucial element of e-retail, it is not always included in their retail strategy. A proper and an in-depth understanding of LMD is necessary. This paper makes contribution to the knowledge of LMD and its association with sustainability.

While three decades of research have collectively contributed and made progress in substantially developing the awareness of the customer e-retail experience (Trevinal and Stenger 2014), knowledge regarding the delivery processes in relation to the e-retail knowledge is disjointed and rather incomplete. Initial market research regarding customer e-retail experience acknowledged the delivery procedure as a significant quality metric. Jiang and Rosenbloom (2005) have proved that the level of consumer satisfaction can have a difference in among the stages of online retail checkout and after delivery, suggesting that delivery has great impact on the overall consumer satisfaction levels. Three decades of studies on LMD have produced a limited and rather constrained knowledge regarding the relationship between delivery processes and sustainability.

Sustainable Last Mile Delivery

Customers have two options to buy the products, one is to visit personally and the other is product delivered to the doorstep by the online retailers. Both the processes to procure the products have impact on environment in emissions of carbon while commuting to the retail outlet or product delivered at doorstep. A sustainable last mile delivery system can be the solution to maintain the eco-friendly environment. As identified by Ericsson, Larsson, and Brundell-Freij (2006), CO2 produced by transport vehicles burning carbon-based fuel represents a serious threat to the environment and society we are living. Online retail businesses need to respond to the changing customer preference opting for online purchases. There is an increase in the number of products delivered to the door step, hence as part of this change the delivery industry will once relook at how it can become more environmentally sustainable and provide solutions. Delivery consolidation for different products in different routes and less polluting delivery options should be encouraged by the e-retailers.

The Cross-Border E-commerce Shopper Survey (2019) released by International Post Corporation (IPC) reveals that majority(66%)of customers are demanding sustainable delivery options and agreed to recycle the packaging the parcels and preferred cardboard rather than plastic. Additionally, 45% of cross-border online customers would like the delivery procedure to be carbon-neutral. Interestingly, participants in the survey said they likely pay higher prices for sustainable packaging and transportation facilities Last Mile Delivery(LMD) services by the e-commerce firms. This change from the online purchasers should be recognized by the online retailers and travel towards the Sustainable Last Mile Delivery(SLMD)

Adriana Giret, Et al(2018) proposed a sustainability-oriented solution for the LMD problem. The approach combines citizen's movements with delivery of parcels by using multi-agent system framework. This framework offers a set of optimized functions for the participants that are willing to collaborate in order to transport parcels to different destinations in the city. The proposed framework employs multifaceted network-based algorithms and measures which study the urban geographic areas as a graph of nodes that

capture the real-time geo-location of the members and the arcs link adjacent members' trough a possible delivery path. The executed tests show that the application is realistic and can give satisfying solutions for the LMD problem. Astrid & Kristin, (2018) explored the sustainable supplying of e-groceries which has the wide array of merchandise. They suggested potential strategies by incorporating last mile distribution of e-groceries in city planning.

Making Last Mile Delivery More Sustainable

Crowdsourcing

Location-based crowdsourcing allows consumers to open a mobile app and get the services done to his requirement like hail a ride, send flowers to a friend etc. With crowdsource technology, sellers, logistics channel partners, and consumers can connect directly with local suppliers, non-professional couriers who use their own transportation to make deliveries. Companies can get their online orders to customers faster, and consumers can get their objects when and where they want them. The autonomy to make on-demand and programmed deliveries also safeguards that customers are home at the time period of delivery excluding the need for a second (or third) attempt.

Consumer activism

Consumer awareness is rising towards the environment protection. This shift in mindset towards the environmental concerns made the consumers to boycott the brands that don't appear to share their social beliefs. Consumers are now expecting their brands to take care of their dreams as well as taking care of the world. Consumers are demanding environmental awareness from brands. If brands don't deliver, they risk more than just losing a few customers: They risk undesirable brand acquaintance on social media and in the news, which can have a shattering effect on transactions. Subsequently the demands for both speedy delivery and consumer activism are only expected to escalate, businesses should and must adopt sustainable, affordable delivery logistic solutions that create the LMD more eco-friendly.

Recycled and Reusable packaging

Plastic is wreaking havoc on our planet by intchocking every bit of our environment and showing its impact on the air we breathe and water we drink. Even the cardboard used in packaging is consuming billions of trees on earth. So to lessen the ecological damage to the environment recycling and reusability should be stimulated by the businesses. Since we're at least a few years away from time-traveling technology, the best trades can do is try to mitigate future damage to our planet and keep consumer activists happy by using recyclable or reusable materials in their packaging and supplying the product to the end customers.

Using Artificial Intelligence(AI)

Information technology has been used as a good solution in many industries. AI being a component of IT can be a good help in providing solutions in controlling the pollution in urban areas by providing solution to complex multitude of logistics problems. Furthermore, the sheer capacity of merchandises being delivered, if not accomplished intelligently, can play a substantial role in air quality problems and produce unsustainable levels of carbon emissions. However, potential solutions to this problem can be created with the aid of AI. AI can be described as computer algorithms that can make decisions far large and complex than traditional software is proficient of handling. There's no question that it has the power to automate and define exponentially superior efficiency in a range of applications, including LMD.

Data Driven Technologies

Currently, presenting recent data-driven technologies to logistics has its limitations, by and large for the fact that such data is often imperfect and incomplete. By using Machine Learning and Predictive

Analytics, logistics companies can operate in LMD services and can benefit. It enables them to achieve their business goals in a more intelligent way, therefore, reaching much higher levels of operational efficiency and improving the bottom line by integrating the multiple trips and further enabling the company to carter to sustainable practices.

Delivery route optimization

Another important issue faced by the LMD processes is route planning. In real time, data from a diverse source including the information relating to shipment, traffic patterns, Global Positioning Systems data, and weather can be used for route optimization, which can significantly impact fuel, personnel, and other overhead costs of LMD. Further, more precise delivery options can improve the level of service provided to customers and the confidence with which couriers vendors do their operations.

Product categorization

There's also the chance to optimize deliveries using the consignment data: the type of merchandise or material that's being delivered, the measurements of the bundle, and perhaps even patterns to the timing in which the goods are being ordered and demanded for delivery. Such data can be collected, cataloged, and visualized to make well-organized LMD mechanisms, helping to optimize various types and overall trips by creating sustainability in the long term.

Integration of multiple suppliers

Requirement of multiple products from different companies to a single customer may require multiple vendors' involvement to deliver the products. If these type of customer's in a locality can be pooled and made Last Mile Delivery(LMD) by single vendor would bring down multiple vehicle trips by reducing traffic, carbon emissions and bring in sustainable solution's to LMD.

Conclusion and future implication

There are important elements involved in the LMD process that customers are looking for namely the speed, timeliness, accuracy, and precision of the product deliveries after reaching their endpoint. Last mile delivery is normally considered an central decision-making criterion for online customers (Esper et al. 2003; Murfield et al. 2017; Buldeo Rai, Verlinde, and Macharis 2018). The present paper is an attempt to add some knowledge on SSCM and SLMD the existing research. This review has highlighted the concepts and importance of sustainable LMD and its relevance with online retail purchases. In the present market scenario, online retailers are offering a variety of delivery options like time slot for delivery, same day delivery, delivery fee, delivery tracking and many more options. Exploring the impact of these options in coherence to sustainability can form a good research for future. Thus a good business strategy integrated with sustainable practices will yield in good eco-system and make this world sustainable for future generations.

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18. AN EMPIRICAL STUDY ON INDUSTRIAL REVOLUTION 4.0: OPPORTUNITY AND CHALLENGES

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Abstract

The Fourth Industrial Revolution or Industry 4.0 or i4.0 encompasses the digitalization of everything in the business. The use of sustainability move towards the concept of go green or Green IT. It includes the use of technology such as data management, production processes and relationship with consumers. It results in competitiveness and efficiency providers to the consumers. This research paper discusses the managerial perspective of Industry Revolution 4.0. It supports the organization in in-depth understanding and also deals with the inferences and fields of solicitation of the Fourth Industrial Revolution as well as the interplay among all the processes working in the organization. It enabled the initial focus on flexibility and scalability for improvements in Supply Chain processes. It trusts on analytics and smart things. It is considered as human-centric paradigm. Its focuses on sustaining the existing business architectures. Startup companies are focuses on radically changing operating models, working heavily on data and data analytics. Crowdsourcing is a Platform-based processes works on-demand establishment of customized services follows the distinct approaches for digitalizing operational processes. This paper uses the notional aspects in the innovation of supply chain. This is to investigate the awareness and preference of use of green marketing using the survey. The implications and findings of i4.0 on supply chain management. And finally, Artificial intelligence/machine learning is used to develop the programs for the well-defined processes in organization.

Keywords: supply chain management, sustainability, Industrial Revolution 4.0, COVID19

Introduction

Sustainability is all about meeting the needs of present without compromising the ability of future generations in order to meet their needs. Sustainability consists of 3 pillars that are as follows: economic, environmental and social(Venkataraman, 2009). Due to the COVID-19 pandemic it is believed that COVID- 19 has a positive effect on the environment and climate. As people locked themselves in their homes which led to clean air hence pollution free environment and river water is also clean. Virtualization enables one physical server to run many independent programs. Thus technology reduces the number of physical servers and this promotes great utilization of each server. Hence visualization reduces the cost, electricity uses, and material waste. This will reduce the environmental burden of running a data center.

Industry 4.0 refers to the inclusion of technologies used where the man and machine talk to each other, this means man talks to man, machine to machine and man to machine and vice versa. This uses the conceptual analysis and it uses all the technologies(Venkataraman, 2009).The concept behind industry 4.0 is to enable machines to work independently i.e machines should be able to work (Plan, program and produce goods) without the help of any operator in the factory. This concept will increase the flexibility of production of goods which would ultimately increase the customization of products. According to this concept machines are able to communicate with each other for the execution of production plans. This term called Industry 4.0 initially came into existence from a project that is being executed under German

Government for supporting computerization in manufacturing that is taking place in 2018(Bag et al., 2018).

Therefore, Industry 4.0 is very closely linked with industry operations and Information Technology, and automation as well. The industry 4.0 impact on the supply chain is due to Disruptive innovations that are taking place by currently changing landscape of many industries and their business models. Supply chains are also impacted by the fourth industrial revolution due to increasingly digitized processes and an exponential growth of sensible data,. Although the development of steam machines has changed the production processes. The second industrial revolution was initiated by Combustion engines, Electrical drives and the innovative assembly line production systems. The third industrial revolution was marked by the automation of the production processes which is the basis of the fourth industrial revolution, which include complex systems of hardware, data centers and software components in one single product named Industry 4.0. This fourth industrial revolution has primarily helped the management for its growth and development.

Sustainability and IR 4.0

Industry 4.0 make the world more sustainable Fourth Industrial Revolution is opportunity and a challenge. It is opportunity as it enhance global manufacturing output to meet rising human needs without hurting the environment. Thus, it will going to build the world more sustainable(Bag et al., 2018). It is challenging as many people losses their jobs.Based on the most important characteristic features such as digitalization, autonomization, network-collaboration, socializing, modularization, transparency and mobility. This feature helps a device to be equipped with and carry on for the latest technologies and try to collaborate and connect with one device to another(Hoffberg& Hoffberg-Borghesani, 1999). Digitalization is the integration of digital technologies by everything that can be digitized. Autonomization is a game changer that reduces the process cost and is very helpful in repetitive tasks(Hahn, 2020). Network-collaboration consists of a variety of entities that links the organization with the people. Socializing is all about acquiring knowledge, skills. Modularization refers to the adoption of data exchange and AI in manufacturing technologies like cloud(Cabot et al., 2009). Transparency refers to the technique where it is known to all and there is no hidden information. Mobility refers to the data and the information can be accessed from anywhere anytime(Smith & Powlson, 2007).

The key technologies and concepts involved with Industrial Revolution 4.0 are used to exchange the information and facilitate the incorporation of technology in businesses. The basic key technologies and concepts that evaluate during a particular method or technology, the corporate executive basically used this awareness to apprehendwith interconnections with other technologies. The very significant technology is the reduction in use of electronics equipment, which means the manufacturing of smaller mechanical, optical and electronic products and devices will be minimized(Pearce & Atkinson, 1998). To study in detail about the industrial revolution 4.0, there are four(4) pillars of Industry 4.0 are as shown in Table 1.

The discussion of sustainability and IR 4.0 cannot be complete if we talk about the green marketing as one of the upcoming area in this field.

Table 1: Four pillars of Industry 4.0

S. No	Pillars	Description
1	Cyber-physical systems (CPS)	It is one of the key pillars behind the concept of industry 4.0. CPS is used to control the connectivity of machines as well as to manage big data that help machines to become independent from human intervention (Hornborg, 2001).
2	Internet of Things (IOT)	It is based on the use of the internet to access data from remote sensors and control physical objects in the surrounding environment.
3	Radio-frequency identification (RFID)	RFID technology is frequently used to gather data and to make decisions.
4	Cloud Computing	By enhancing data management and storage processes Cloud Computing has taken digitalization to a new level.

(Source : self-made by author)

After the introduction, the literature review was referred in this paper and followed by a case study on sustainability in section III. The section IV talks about the data and its analysis of survey data. The data analysis discusses the awareness of respondents about the green marketing and also its preference in their professional life and finally, the research paper ended with the conclusion.

Literature review

The parameters of sustainable development are economic, technological, Ecological and political. Economic take cares of maintain a sustainable population and maintain profitability and productivity of environment, technological refers to adopting environment-friendly technologies , Ecological means promoting proper management of waste and protect environment and conserving natural resources. Political means empowering people and maintaining peace. 4th industrial revolution that is intelligent & automated production and communication with corporate players. It enables customized production via flexible manufacturing & real-time data interchange (vertical & horizontal integration) (Hornborg, 2001). Technologies enables the refrigerator store to order food directly, online sale services such as services of car and medical test can done from home via artificial intelligence (AI), mobile devices and cyber security. For the group of connected technological advances there is an umbrella term that provides increased digitalization of businesses. There are radical changes in execution of operation due to significant influence on the production environment(Verma, 2019). There is dynamic self-optimization due to real-time planning of plans. Logistics processes and smart manufacturing facilitate all ingredients such as internet of services, IOT, CPS, Big data & 3D printing. 4.0(critical success factor) will deliver robustness and great flexibility; hence powerful Value-Chains can be built foradaptable&supple business models. In order to cope with changing business environments it possesses in internal evolutionary for ability in permanent developments for manufacturing solutions provides adaptable & flexible production processes which solve problems rising in production facilities. This will help and evolve it in the dynamic changing world(Pearce & Atkinson, 1998).

With rapidly and dynamic changing boundary conditions in the world of increasing complexity known as smart factories. 4.0 could enhance the welfare and think of welfare of the humanity. It also contribute in enhancing sustainability. Industrial 4.0 should have a relationship with all partners that are in the ecosystem in which the firm operates. With this advancement of technology, the management has to

support and understand the business process and also be ready for the organizational changes that may occur(Hornborg, 2001).

A management approach essentially supports the companies to understand which organizational changes are frequently expected for respective supply chains. Therefore, the management needs to evaluate how supply chain will be impacted by the emerging technologies as well as the challenges expected from the primary supply chain activities. With the help of Industry 4.0, technologies, suppliers will upgrade knowledge and skills in order to continuously provide best services to the customers. Under Industry 4.0 concept, factory workers are now able to work with smartphones and tablets for running production at all levels. A well as it enhances the communication at all levels. The industry 4.0 deeply impacted supply chains engineer-to-order industries. Industry 4.0 (fourth industrial revolution) a concept introduced by Germans (IOT). While implementing it to Small and Medium Enterprises (SME), they have to take it further and face the challenges to implement in their organization are discussed (*The Handbook of Human–Machine Interaction – a Human Centered Design Approach: Behaviour & Information Technology: Vol 30, No 6*, n.d.).

SMEs may face challenges like managerial & organizational in the path of technological development. CPS leads to connect virtual and physical worlds. Process for object to object, human to human and human to object connection. The advantages like remote control & diagnosis, real-time condition monitor, prognostics, error prediction, continuous optimizing, self- organized, recycling, value creation and consumption and reduced efforts and time. Sustainability can also be discussed as one of the important issues to be considered for the growth of any organization(Bolter, 1984).

In all dimensions of industry 4.0 attempts to achieve a triple bottom line of sustainability. Part of SCM engineer-to-order industries considered complexity due to unpredictable, non-recurring events and calibration in methods pertaining the lower degree. Industry 4.0 prospects lie in self-intelligent data analysis and supporting decisions. It encompasses solutions of energy transmission of scales with large values, the one tailor-made to consumer demand. Consequently, stakeholders redesign actions for single order. The packaging provider challenges fear of employees being replaced and increasing technology dependence. Parcel logistic providers challenge insufficient understanding exclusively. Within industry 4.0, hindrance to development of logistic projects is insufficient financial resources. Technical constraints in implementation of industry 4.0 include unpredictable values, inadequate data eminence, data security, infrastructure (IT) and breakdown susceptibility.

There is more concern for practical possibility rather than financial or structural competences. In order to address judgments of business 4.0 resources need to be assigned which includes applied capabilities in IT-associated arenas and skilled employees. For successfully integrating industrial 4.0 in worth establishment developments/practices acceptance have to be obtained for know-how, understanding and inter-organization. The “Internet Plus Initiative “ also called “ Made in China 2025 “ in China or “ Industrial Internet Consortium “ in the USA are the international equivalents of Industry 4.0.(Programs worldwide). The companies spend more and more on developing data mining software, algorithms, and Enterprise Resource Planning (ERP) interfaces to obtain right data and information,. These tools represents the problem on the investment side and on finding the right workforce. CPS uses sensors, 3D scanners, cameras, that provide mass data for the process which ultimately helps in connecting physical device to cyber space. The CPS solution is specially used in production, the Cyber-Physical Production System

(CPPS), is a production networked system equipment, this connects workers and products in the production process.

Nowadays, the current state of the production is very well prompted by Smart products. With robots and AI, less monotonous work is needed. Smart devices, such as robot arms serve as a physical supplier in production and logistics processes have appeared in corporate practice. Smart devices connect to the network and interact with the environment, and make decisions even. The robots implementation is unique production systems where an intelligent systems will be identifying problems at the failure times, and also allows the increase their operation may be delayed in some such cases.

Fourth Industrial Revolution generated a development path which require following steps for a change:

- In order to ensure the transparency of the entire business process basic tools and technologies are applied.
- Close, real-time connectivity and cooperation within the enterprise's field of activity is called Horizontal integration.
- Primarily Vertical integration involves cooperation with partners in the supply chain. Partners in the supply network, including digital connection.
- Reconsideration of the business model that focuses on customers, even by transforming the organizational structure.

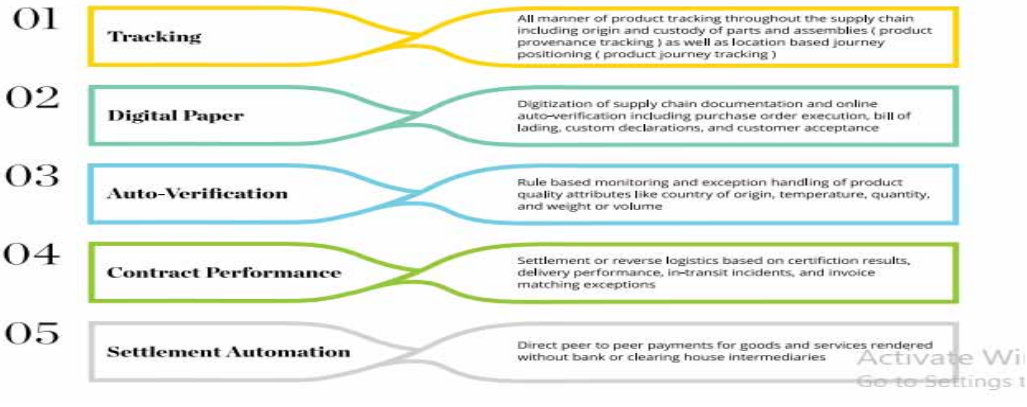
The applications consider the life cycle of the work process in any organization as shown in figure Steps for the manufacturing process are as follows:

- *Big data*: Big data utilizes machine learning and AI technologies to process data and provide information to decision makers to make decisions and make improvements across the entire manufacturing operation.
- *System integration*: With the merger of automation and computers to enhance efficiency in manufacturing industries which include IOT, cloud computing. The purpose of industry 4.0 is to improve production through connectivity to enhance flow of data that can be achieved by system integration.
- *Simulation*: simulation is used while designing a product, verification and manufacturing of product.
- *Augmented reality*: it creates a connection between customer and product in order to experience from design to manufacture to delivery
- *Additive manufacturing*: It deals the facility to yield custom-made products with littler lead time and lesser development cost. By using such technology less energy is consumed and less material is wasted.

Industry 4.0 supply chain innovation perspective for sustainability: a case study

IKEA work towards the renewable energy and sustainable production minimize cost. Swedish furniture giant installs solar power cells on its own and its Chinese sub-suppliers facilities in order to be energy self-sufficient and reduce co2 emissions. Timber suppliers are trained in sustainable forestry and water and waste management in order to secure access to crucial resources in production.

Figure 2

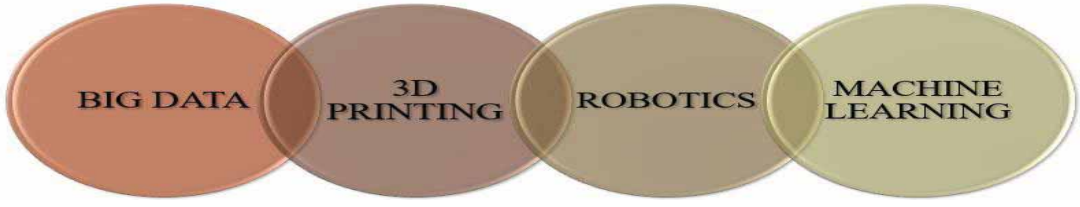


(Source:https://www.oracle.com/a/ocom/docs/blockchain/value-driven-supply-chain-blockchain-iot-deloitte.pdf)

Supply chain (SC) innovation comprises digitalization using Social Mobility Analytics and Cloud (SMAC) of the industrial sector. There are 200 digital unicorns with capitalization of 1 billion USD. Game Changers in 4.0 are advanced analytics & Big Data. Horizontal alliances are formed by integrating suppliers and customers(Pearce & Atkinson, 1998).Software-driven technologies include block chain (BCT) and crypto-currency bit-coin which provides trusted & open ledger for business partners. BCT enables tracing and tracking of material flows along SC and also automates cross-company operations according to business rules (Smart contracts implements).Platform-centric, product and service centric are different types of business architecture. Route optimization via analytics capabilities and sensor-based tracking (IOT). Process automation (on-demand-crowdsourcing) through inventory & warehouse management (monetize excess capacity). Cloud computing to industrial context via on-demand solutions. Highly flexible & scalable services via transforming SC operations capabilities. Back-end resources and front-end for process management are software-based applications. Multi-tier SC creates transparency via Predictive analytics (strategic-tactical level). Manage short-term shipment risk (due to infrastructure bottlenecks) through alternative routes. (operational level) Real-time level follows sense & response for risk detection. Supply Chain in the fourth industrial revolution where in modern economy production is organized by supply chain where processes involve from product- design to customer-delivery. The Supply Chains are implemented by the energies of all the stakeholders with multiple talented people such as logistics service providers, manufacturers and technology suppliers.

Key technologies involved in Supply Chain 4.0 are as follows as shown in figure 3

Figure 3: Key technologies in Supply Chain 4.0(Source : self-made by author)



The capability of processing extremely large data sets to identify patterns of relationships (i.e.; correlation, causality) among data to be used in detecting market trends, consumer behaviour and preferences (shown in figure 3) is referred as Big data/Analytics. Robotics entails the application of digital technology to perform repetitive manual tasks, such as those required in car assembly, agricultural harvesting and

exploration in dangerous environments. 3D printing is a technology that allows the creation of objects by means of successive printing of adhesive materials, such as polymers. The product design includes therapeutic prosthetics, architectural and textile design and also the spare parts development includes in electronics and industrial products used by consumer (Bag et al., 2018).

Supply chain enablers work in advance and update time to time to tell the congestion points etc. Latin America and the Caribbean (LAC) countries face shortfalls in supply chain enablers, such as scant road and railway infrastructure, congestion in the access to ports. Supply Chain 4.0 provide best practices such as: a) Promoting the Fourth Industrial Revolution (4IR) transformation in all key industries b) Supporting the 4IR transformation among SMEs c) Extending the SME 4IR technology adoption support programmers to the logistics sector.

Data and analysis

Survey: The survey was conducted to find out that the people are aware about the green practices or not. The survey is basically based on the practices and awareness about this. There were total 102 respondents participated in this survey. The demographic details are as under:

Out of 102 participants 56 are male and 46 are females as shown in figure 4

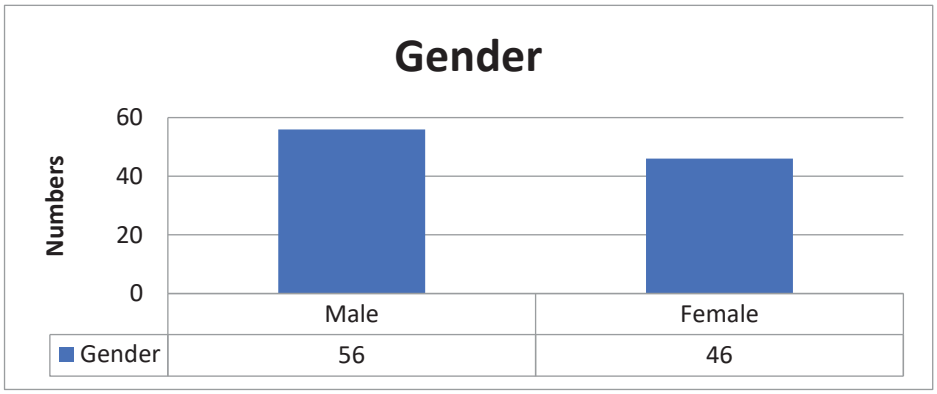


Figure 4 Demographic details

The study on awareness was studied in Green marketing was studied in terms of the following:

A1: Sponsor of green products have a sincere intension there is a little low as strongly agree but people do agree with the notion of the sponsorship for the same.

A2&A3: Marketing Green marketing preys upon consumer environmental concern and also is a good business practice.

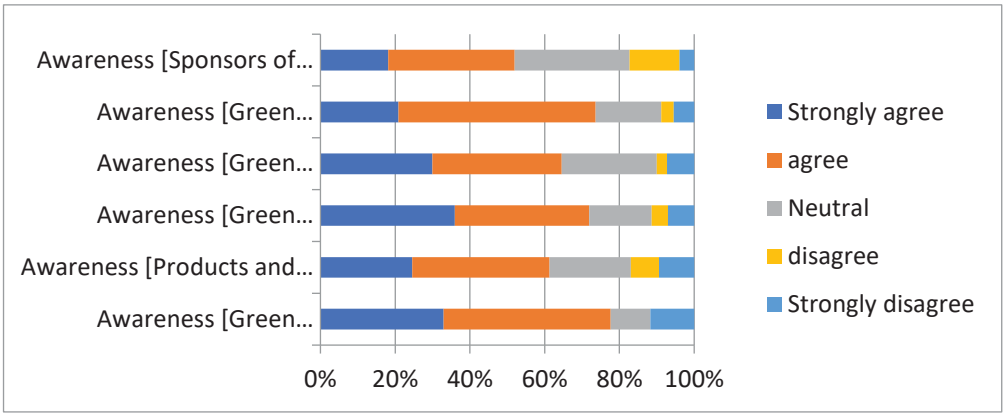
A4: Advertising: the green advertising is effective in addressing the usage of the products

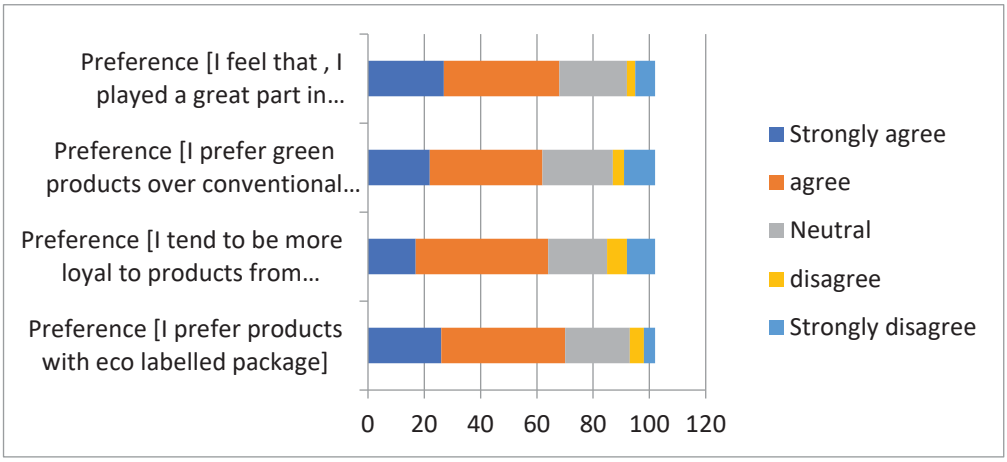
A5: Product and services which advised as safer to use.

A6: Societal: This leads to be more socially sensitiveness to the consumers.

The figure 7 represents as we look for the strongly agree, if you arrange them in based on the interest of the respondents, they will be A4, A6, A3, A5 and A1. The respondents are much aware of green technology as the sum of agree and strongly agree is more than 50% as a average. The respondents are much aware of green technology and green marketing.

Figure 7 Awareness





The preference is judged by the following criteria such as

P1: Preference as I feel that, I played a great part in helping environment when I use green products.

P2: I prefer green products over conventional products.

P3: I tend to be more loyal to products from companies that practice green marketing.

P4: I prefer products with eco labelled.

The figure 9 represents as we look for the strongly agree, if you arrange them in based on the interest of the respondents, they will be P4, P1, P3, and P2. The respondents are much preference in green technology as the sum of agree and strongly agree is more than 50% as an average in all the preferences. The respondents are much preference of green technology and green marketing.

Conclusions and future research directions

Industry 4.0 is considered to be successful in providing a variety of benefits to the business which include operational value chain optimization and optimization. Which is adopted by German firms such as Volkswagen, Daimler and BMW. Recently, Chinese Government has also adopted industry 4.0 by introducing the “Made in China 2025” strategy which mainly focuses on improving manufacturing by speeding up the digitalization in China. Similar kinds of initiatives have also been taken by the US, French, UK, Japanese and Singaporean Government as well. The ability to merge the concepts of Industry 4.0 and sustainable supply chain is to basically focus on research. Key development in the sustainable supply chain mainly focuses on enhancing the environmental, social and economic benefits, and key development in Industry 4.0 includes total system integration and automation.

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19. EMERGING STRATEGIES FOR SUSTAINABLE DEVELOPMENT IN INDIA: THE CONTEXT OF POPULATION GROWTH AND CARBON EMISSIONS

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Abstract

The sustainable development is development that fulfils the needs of present generation without compromising the future generation. There are three types of sustainability: environmental sustainability, ecological sustainability and socio-economic sustainability. There are some key challenges to sustainable development in India, these are poverty, environmental deterioration, political instability and population growth. In this paper, an attempt is made to study the emerging strategies of sustainable development in India in the context of environmental deterioration and population growth. Here we take carbon-di-oxide emission as an indicator of environmental deterioration which is a prominent Green House Gas. In this paper we consider carbon-di-oxide emission because although the per capita emission of carbon-di-oxide is low in India but as per the report of Centre for Science and Environment (CSE) air pollution is now the third highest cause of death among all health risks ranking in India. Consequently, the average temperature over India during the year 2019 was above normal and the sea temperatures rise 0.3 C higher than the global average of 0.7 C (Union Ministry of Earth Science, 2020) which may increase the intensity of cyclone, In the meantime it had experienced eight cyclone storms form over the Indian sea. In this study we use time series data and study the causal relationship between population growth and carbon-di-oxide emissions. Moreover, we also analyse the rainfall pattern of India which is an important indicator of climate change.

Keywords: sustainable development, population growth, carbon emission, causality, rainfall pattern.

Introduction

There are multiple factors of climate change. Among them population growth is only one which directly or indirectly contribute to the climate change. The world population has surpassed the 7 billion mark and is projected to grow to over 9 billion by 2043 (UNFPA, 2013). There is an increasing divergence across the countries regarding population trends. Most of the developing countries continued to be characterized by rapid population growth whereas others that are advanced in their demographic transition are experiencing rapid population ageing. In contrast India is the second largest populous country in the world having 17.7% of the total world population, while it occupies only 2.4% of the total land area of the world. Therefore, it increases the pressure on the resources and contributing to climate change and environmental sustainability. According to World watch Institute if "we cannot stabilize the climate and we cannot stabilize population, there is not an ecosystem on Earth that we can save."

With a population of 1.4 billion and one of world's fastest growing economies India's energy demand has been increasing. Population size drives a massive increase in India's primary energy consumption, which expands by 1.2 billion tons of oil equivalent or 156% by 2040 (BP Energy Outlook 2019). According to Astri Hovem, chief Executive officer, Oil & Gas, DNV GL "While we forecast the global dependence on fossil fuels will come down to 50 % from the current 80% by 2050, India's dependence will be higher at 65% by 2050." It is clear from the fig.1 that consumption of fossil fuel percentage of total has been increasing. Consequently, fossil fuels are prominent source of carbon dioxide emissions which in turn

contribute to global warming and climate change. In India power industry contributes to the highest fossil carbon dioxide emissions (fig.2). It is because about 80% of India's electricity generation is from fossil fuels. In the meantime as per the report of climate assessment 2020 India's temperatures of the warmest day and the coldest night of the year have risen by about 0.63 degree centigrade in the recent 30 year period (1986-2015) and these temperatures are projected to rise approximately by 4.7 degree centigrade and 5.5 degree centigrade, respectively, by the end of the century. On the other hand India is one of the largest coal consumers in the world and import costly fossil fuel. As per the report of world resource Institute India is responsible for nearly 7.01% of total global carbon emissions. As a prominent green house gas carbon dioxide contributes to climate change through increase in temperature which in turn affects the monsoon rainfall of the country, whereas most of the people of the country mostly depend on monsoon rainfall for agricultural purpose. However higher or lower rainfall or changes in its spatial and seasonal distribution would influence the spatial and temporal distribution of runoff, soil moisture and groundwater reserves, and would affect the frequency of drought and flood. Furthermore it will affect the cropping pattern and productivity which in turn affect the food security of the country. Therefore, it is necessary study the nexus between population growth, fossil fuels consumption, fossil carbon dioxide emissions and monsoon rainfall pattern in India. In this paper an attempt is made to study the short run and long run relationship among the variables. Moreover, an attempt is made to analyze effect of population growth and carbon dioxide emissions on monsoon rainfall of India. Here we collect the secondary data over the period of 1992-2016 and a time series analysis is made to study the causality among the variables.

Literature Review

There are various research done by various researchers in this field. A study made byDavid le Blanc and Romain Perez on the relationship between rainfall and human density in sub-Saharan Arica and they found that human density and rainfall are strongly correlated in Sub-Saharan countries.

Another study done by Mikael Hook and Xu Tang found that limits to availability of fossil fuels will set a limit for mankind's ability to affect the climate. However, various studies have found quite different results regarding future atmospheric co2 concentrations caused by fossil fuel limitations.

A study done by Leo Bryant et al found that high population growth heightened human vulnerability to extreme weather event.

Moreover, another study found that in India due to the existence of inter-annual variability there is a consistent increase in co2 concentration over Cape Rama India. It also reveals that summer monsoon rainfall precipitation and monthly values of co2 concentration during the season are well correlated (Yogesh k. Tiwari, J.V. Revadekar and k. Ravi Kumar). A study by Knapp and Mookerjee (1996) explore the nature of the relationship between global population growth and co2 emissions found a lack of long-term equilibrium relationship, but found a short term dynamic short-term relationship between them. Shi (2003) using IPAT exercise analyses co2 emissions in 93 countries found that population elasticity of co2 is higher in developing countries than in developed countries. On the other hand, O' Neill et al. (2010) found that carbon emission rate decreased significantly in case of population growth.

Objective

From the above literature review we found that no study is taken to investigate the causal relationship between population growth, carbon dioxides emissions from liquid fuel consumption and monsoon rainfall pattern of India. Therefore, the objective of this paper is to forward the investigation in this regard and to show how it can affect the sustainable development of India.

Methodology

In this paper we investigate the pair wise causal relationship and co integration relationship among the variables. Here we use a time series data over the period of 1992-2016. The data are collected from various secondary sources such as World Bank, indiastate.com and meteorological report of government of India. Our empirical analysis relies on DOLS co integration regression. The exploited model is indicated as follows

$$lm = \theta + \alpha P_t + \beta F_t + lCO2_t$$

The variables in the above equation are natural logarithms of monsoon rainfall pattern (lm), logarithm of CO2 emissions from liquid fuel consumption (lCO2), population growth (P) and Fossil fuel consumption percentage of total (F).

Unit Root Test

To investigate the causal relationship among the variables it is necessary to check whether the data series is stationary or not. In order to check the stationary of the data set we run Augmented Dickey fuller test and optimum lag length is selected by automatic leg length selection based on SIC which is 3. The result of the unit root test is given in the following table 1. Here we found that all variables are non-stationary at level except monsoon rainfall which is stationary at 1%. Therefore, we take first difference the variables and found that all variables are stationary at 1% level.

Granger Causality Test

The granger causality test is a statistical test which is used to investigate the cause and effect relationship between two variables in a time series. Here we run pair wise granger causality to test the cause and effect relationship between the mentioned variables. The results are given in the following table 2. From the table it is clear that there is a unidirectional causality running from population growth to carbon dioxide emissions from liquid fuel consumption. Similarly, the population growth also cause change in monsoon rainfall pattern in India. Consequently, there exist bidirectional causality between change in monsoon rainfall pattern and carbon dioxide emissions from liquid fuel consumption.

Co integration test

To avoid spurious regression, we run co integration test to make sure that there exists stable relationship. From the table 3 it is clear that the null hypothesis of Johannes Fisher Co integration test is clearly rejected. According to Johansen Co integration Test result we can assume that there exists a long run equilibrium relationship between co_2 emissions, population growth, fossil fuel consumption and change in monsoon rainfall.

DOLS result

Having established a co integration relationship among the variables we can apply DOLS model which is more efficient than OLS because it takes care the Endogeneity problem by adding lag and lead value. DOLS method is a parametric method which is used to obtain long run coefficients. This method is

applicable only then when there exist co integration relation among the variables. With the help of this method we can detect the magnitude and direction of the relationship between the dependent variables and independent variables. The result of DOLS (table 4) shows that all variables are statistically significant at 5% level. The effect of co_2 emissions from liquid fuel consumption on change in monsoon rainfall pattern in India is significantly negative in the long run. But fossil fuel consumption and population growth have positively significant effect on changing the monsoon rainfall pattern in India. Population growth of India leads to 0.87% change in the monsoon rainfall pattern of India. On the other hand, fossil fuel energy consumption leads to 0.06% change in monsoon rainfall pattern of India.

Discussion

The empirical results show that there exists causal relationship among the variables and they are co integrated. Therefore, it is necessary to investigate the probable reverse effect of population growth and fossil fuel consumption which in turn affect the monsoon rainfall pattern of India. From the fig. 3 it is clear that the monsoon rainfall of India shows a decreasing trend. According to the IMD, as a result of the changing climate, monsoon rainfall in 2018 was the sixth lowest since 1901. It was also the sixth warmest year since 1901. From the empirical result of causality, it is clear that population growth causes the emission of carbon dioxide from liquid fuel and we found bidirectional causal relationship between carbon dioxide emissions and monsoon rainfall. Therefore, we can say that in the short run carbon dioxide emission and population growth affect the monsoon rainfall pattern.

The rainfall pattern of a country is an important indicator of sustainable development because deficit in rainfall and excess in rainfall both are harmful for environmental sustainability and economic sustainability of a country. It disrupts the ecological system which in turn affects the environmental sustainability. Excess of rainfall during monsoon season lead to flash floods events and large scale of landslide will occur. Moreover, it will lead to loss for agricultural areas and thereby affects the food security. In the meantime it also increases the migration of people from flood affected area, which may increase the deforestation. In this way climate change become challenge for sustainable development.

There are various global policies adopted to combat the climate change all over the world. The 2019 Scientists' warning of a climate emergency, signed by more than 13,000 scientists from around world, explicitly calls for "bold and drastic transformations" regarding both economic and population policies, including making family planning services available to all and achieving full gender equity. Another major international study in 2017 identified family planning and educating girls as among top 10 workable solutions to combat climate change available today. It founds that together they would reduce CO2 emissions by 103 gigatons by 2050.

Conclusion

From the above discussion we found that there exist a short run and long run relationship among the variable population growth, carbon dioxides emissions and monsoon rainfall pattern. It is seen that change in monsoon rainfall pattern all over India leads to adverse effect on agriculture productivity because most of agricultural activity is based on nature. However, India constitutes the 17.7% of world's total population. In order to feed the world's population in 2050 agriculture production has to grow by 70% (FAO, 2009; 2010; Godfrey et al. 2010). Therefore, the impact of population growth on monsoon rainfall pattern is necessary to study which indirectly effect the sustainable development. The study reveals that

it is indeed necessary for India to reduce their population growth to achieve the sustainable development goals 2030.

Unit Root Test Results

Table 1

variables	t statistics	
	level	first difference
population growth	4.367071 (1.0000)	-8.039549 ***
lco2 emission	0.499714 (0.9830)	-3.477154 ***
fossil fuel consumption	-1.3059 (0.6097)	-4.839172
lmonsoon rainfall	-4.743288 ***	-6.428472 ***

Here *** refers 1% significance level

Table 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LMONSOON_RAIN does not Granger Cause LCO2	24	6.51747	0.0185
LCO2 does not Granger Cause LMONSOON_RAIN		6.62699	0.0177
POPULATION_GROWTH__ANNUAL_ does not Granger Cause LCO2	24	3.50330	0.0752
LCO2 does not Granger Cause POPULATION_GROWTH__ANNUAL_		1.02606	0.3226
POPULATION_GROWTH__ANNUAL_ does not Granger Cause LMONSOON_RAIN	24	3.93077	0.0606
LMONSOON_RAIN does not Granger Cause POPULATION_GROWTH__ANNUAL_		0.10630	0.7476

Table 3

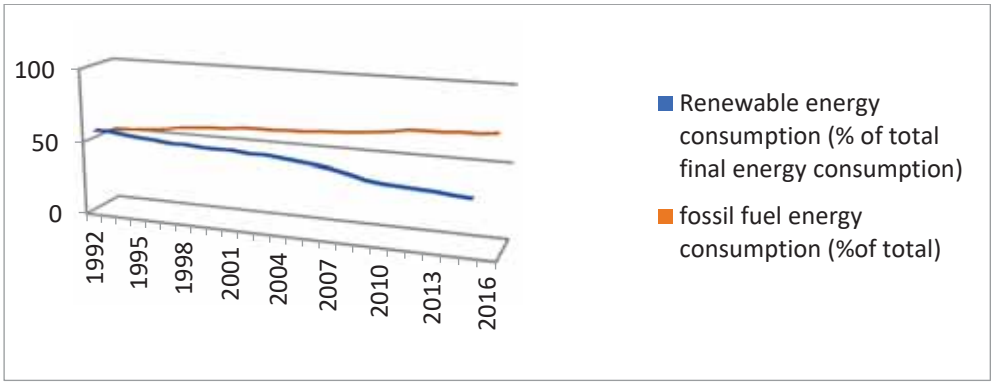
Unrestricted Co integration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.953801	148.5485	63.87610	0.0000
At most 1 *	0.883026	80.90299	42.91525	0.0000
At most 2 *	0.633955	33.69526	25.87211	0.0043
At most 3	0.409392	11.58528	12.51798	0.0712

* denotes rejection of the hypothesis at the 0.05 level

Table 4: Result of DOLS

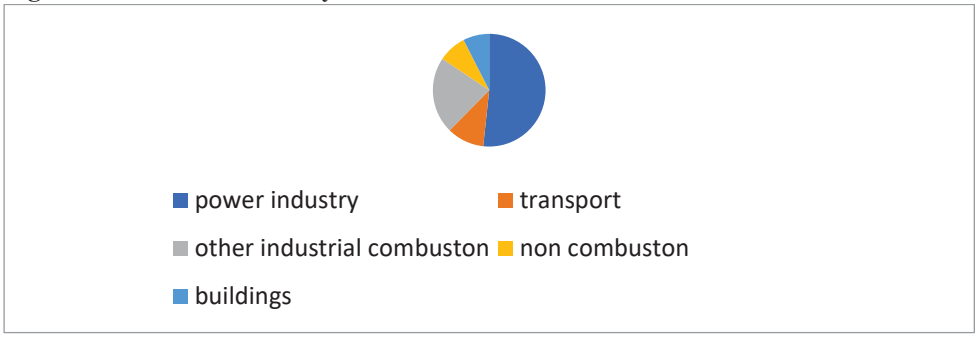
Variable	Coefficient	Std. Error	t-Statistic	Prob.
POPULATION_GROWTH__ANNUAL_	0.872897	0.403753	2.161960	0.0589
FOSSIL_FUEL_ENERGY_CONSUMPTION___OF_TOTAL_	0.065049	0.023745	2.739428	0.0229
LCO2	-0.592702	0.275428	-2.151927	0.0598

Fig.1



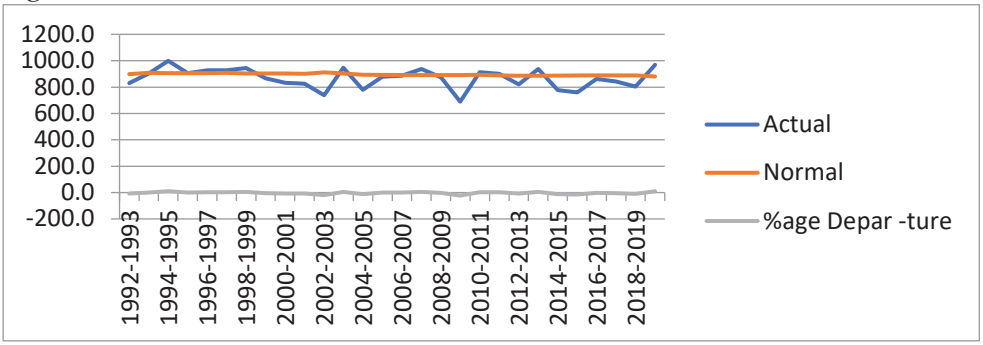
Source: World Bank Data

Fig.2: **Fossil co2 emissions by sectors in India**



Source: https: //www.worldmeters.info/co2emissions/

Fig.3: Distribution Of Rainfall in India



Source: indiastate.com

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20. SUSTAINABLE SUPPLY CHAIN MANAGEMENT

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Abstract

Supply Chain Management is an essential component of a business. With the changing times, businesses will have to be sustainable. Sustainable supply chain management implies that we should be able to upkeep the processing plant, maintain the various entities of the business and modernize it while we adhere to social and environmental standards. The firms need to understand the growing need for integrating the environment and the operations. To achieve sustainability in the supply chain practices the firms will have to understand the entire eco system. Secondly, the firms will have to create the sustainability goals. Also, the organizations will have to train their employees to better understand the importance of achieving the sustainability goals. In this paper we look at the supply chain management operations in some of the industries where is it used the most: The hospitality sector, the electronics sector and the e-commerce sector. A lot of waste is generated in the hospitality, electronics and e-commerce sector. Also, there is an extensive supply chain operation that takes place in the mentioned sectors. Further, in the paper, we examine how a few companies in these sectors are adopting sustainable practices in their supply chain management operations and improving themselves. The research methodology adopted is the descriptive approach.
Keywords*:* Supply chain management, sustainability, green companies, re-usable packaging, water conservation, sustainable shipping, reduction in energy waste.

Introduction

An organization consists of several distinct functions. The supply chain requires that every function needs to work in collaboration with each other to fulfil the need of the customer and to sustain in the market. The key requirement of the SCM operation is to be able to network and communicate with other business entities. Procurement of input, production of goods and services, and delivering to the customer are the most significant components of supply chain management. As the name indicates, the supply chain involves a chain of activities in delivering the goods or services to the customer. With a good supply chain management process, the firm shall be able to be more responsive to the customer orders and bring down the costs of the business.

Sustainable supply chain management implies that we should be able to upkeep the processing plant, maintain the various entities of the business, modernize it while we adhere to the social and environmental standards. Sustainable SCM would require the planning systems to be much more efficient. Procure and manage the raw materials with a network of superior design be able to produce and distribute the goods and services to the end-user. Sustainable supply chain systems will help us achieve efficiency, increased quality and higher levels of satisfaction among the customers.

For a firm to make its supply chain operations sustainable, they need to first understand the ecosystem as a whole, then secondly create sustainable goals, help suppliers, customers and workers understand the sustainability strategy and strategize the business, logistics and transport to meet the needs of both customers and the environment.

In this paper we look closely at supply chain management, reverse engineering and waste management strategy of the hospitality, electronics and E-commerce industry. The supply chain operation is one of the most important elements in these sectors. We have identified the sustainable supply chain management process at Starbucks, ITC Hotels, Apple, and Flipkart.

Objectives

The objective of the paper is to closely understand the sustainable supply chain practices at identified industries. Case studies have been provided to amplify sustainable SCM practices. These examples will help us understand how the firms have incorporated sustainability to achieve long term goals.

Analysis

Hospitality Sector

The hospitality industry is a tertiary service that adds value to luxury seeking guests. Sustainability is the most important issue every industry is facing today. Hotels consume energy, lighting and fuel for their daily operations. Also, waste is generated on a daily basis in the form of paper, batteries, bulbs, old furniture etc. With advancement in technology the industry is using alternative sources to improve business.

With sustainability as one of its major challenges the firms need to differentiate and position themselves in the market to meet the environmental obligation. Having sustainable business practices will help in enhancing the reputation and brand image of a company. The customers will also take pride in contributing to something that is environmentally good. Also, the government provides incentives to encourage the construction of “green buildings”.

Sustainable Supply Chain Management at Starbucks

The supply chain basically involves planning, sourcing, making and delivering. Starbucks follows the concept of vertical integration. This means that the company is involved in each and every process of the value chain. The operating costs of the company increased significantly in 2008. This happened because the company was expanding at a rapid pace. The reason this problem arose is because the supply chain operations did not grow at the same pace as the expansion of the firm. The supply chain operations could not focus on the enlargement of the business. As a result, the operating expenses widened. To strike a balance between the cost and performance, Peter D. Gibbons, the then executive vice president of global supply chain operations of Starbucks made changes in the supply chain operations. Firstly, he traced the source of the costs. After a thorough analysis he understood that the issue was inability to deliver service to the stores. The cost examination uncovered that 65 to 70 percent of Starbucks' flexibly chain working costs were attached to re-appropriating arrangements for transportation, and outsider coordination. While, outsourcing a part of the process will help the firm in concentrating on the core business competencies, it also increases the operating costs. Gibbons and his team came up with few strategies to reduce the costs and increase efficiency. They decided to reorganize the supply chain operations by simplifying the structure and improve day to day supply chain operations. The next focus was to reduce the costs and then to make the supply chain even more sustainable in the future.

To make the business sustainable Starbucks works directly with growers. The organization even has its coffee sourcing guidelines, which requires all suppliers to meet the quality and sustainability guidelines.

Additionally, these guidelines also protect the worker's rights and ensure that all employees have safe and humane working conditions. Suppliers are also supposed to adhere to minimum wage required. Also, they cannot use child or forced labor. As a part of the guidelines the suppliers are provided with special training and education programs. Due to direct interaction with the farmers, special training and social responsibility programs the suppliers feel they are the important contributor of the business.

Starbucks has a murky record of achieving its sustainability goals. In 2015, it purchased enough renewable energy to power company-operated locations in USA and Canada. By 2030, the firm is planning to reduce the carbon emissions by 50 percent. The organization is planning waste management and wants to conserve water being used for direct operations and agriculture. The firm wants to develop environmentally friendly options like use re-usable packaging, invest in better and innovative agricultural solutions, water conservation, reforestation practices. However, in 2008, the firm set out a goal to serve twenty-five percent of the drinks in reusable containers by 2015. A few years after the self-imposed goal, the company reduced the target to five percent. By 2018, it served 1.3 percent of the drinks in reusable containers. Meeting the new goals is a challenge, especially when we consider the case of reusable containers. As of now, the company has partnered with NextGen Consortium to fund compostable and recyclable cups. In 2018, the company introduced straw less lid. The company has released what it calls "Environment Baseline Report", where it observed that much of Starbuck's footprint for greenhouse gases, water and waste relate to its reliance on dairy. Kevin Johnson, CEO at the time, said that alternative milks will be a big part of the solution. The company's website claims that they are working towards bringing the entire coffee sector along to make coffee the most sustainable agricultural product.
The aim is to inculcate sustainable practices from stores to supply chain manufacturing. Young people, millennials, and Generation Z are apprehensive about climate change. Starbucks needs to work on sustainable solutions to maintain their customer base in the market.

Sustainable SCM at ITC Hotels

ITC Hotels are India's third largest hotel chain. Headquartered in Kolkata, West Bengal. ITC hotels is pushing itself to deliver its sustainability goals. Their efforts have been rewarded with ITC Maurya being named "Best Eco-friendly" Hotel in National Tourism Awards. The award recognises the firm's contribution towards the environment. The firm has set up new benchmarks in energy, water efficiency, solid waste recycling and carbon reduction. The firm's commitment to "responsible luxury" sets a benchmark for the industry.
Their initiatives include

- More than 50% percent of the electricity demand is met through renewable sources of energy.
- Hot water served at the ITC hotel is generated through solar energy.
- ITC hotels recycle water to irrigate 65000 trees.
- ITC Gardenia, ITC Windsor, ITC Maratha and ITC Grand Chola are powered by renewable energy.
- Food and beverage served at the hotel is procured locally.
- ITC Gardenia uses frontier green technologies in its systems like water recycling, energy and waste management, along with eco-friendly materials in its architecture and décor.
- The hotels also have a double insulated window to ensure temperature control.
- Natural light has been used as much as possible.
- Rain water harvesting system are also present.
- ITC hotels have also been first in introducing glass water bottles.

ITC Hotels is known for delivering luxury in a responsible and sustainable way to guests. The organization has also made a start towards greening of the supply chain by inducing the suppliers with cleaner and greener production practices. The firm is implementing water recycle practices, uses CNG vehicles to transport goods, checks if ample ventilation exists, if noise levels norms are followed, adequate lighting etc. The organization also is implementing energy efficient practices.

Electronics Industry:

Industrialization and high competition among the organizations are creating challenges for the firm to grow and sustain in the market. The growth of electronics manufacturing sector is very crucial for economic growth. The electronic sector produces electronics for industries and consumers. We now survey the sustainable SCM operations at Apple, the iconic tech company to understand the sector closely.

Sustainable SCM at Apple:

Apple plans to become carbon neutral across its entire business, manufacturing supply chain, and product life cycle by 2030. The company's aim is to bring out products that more energy efficient and environmentally friendly. In its 2020 Environmental Progress Report Apple details its plan to bring our carbon removal solutions. Apple decreased its carbon footprint by 4.3 million metric tons in 2019 through design and recycled innovations. Apple has also invested in energy efficient upgrades, lowering energy needs by 20%. The company also has commitment from suppliers to use renewable energy for Apple production. Apple is working towards developing the first ever direct carbon free smelting process. Through partnerships Apple reduced emissions from fluorinated gases.

E-commerce Industry

With an advancement in technology, many businesses have evolved. One industry which has emerged tremendously is the Ecommerce industry. With an availability of internet facilities and smart phones at low and affordable prices this sector has grown significantly. The SCM is an essential component of the e-commerce sector. The sector focuses on procurement of raw materials, manufacturing, packaging and delivering the right product to the right customer. E-commerce business leaders are facing the challenge to bring out eco-friendly and carbon neutral solutions for the fulfilment operations. Companies need to find sustainable alternatives to packaging, as it is one of the largest contributors to the waste generation. The growing trend of packaging will lead to deforestation as wood is one of the raw materials required to develop the material. E-commerce packaging and disposal of waste have huge environmental costs. The products have to be made and dispatched in such a way that it respects the needs of the customer as well as the environment, otherwise we will have to drown in packaging waste.

Sustainable Supply Chain Management at Flipkart

In August 2019, the firm announced that it has achieved 25 percent reduction in use of plastic through various initiatives in its value chain. By March 2021, the firm plans to move towards 100 percent recycled plastic consumption in its supply chain. Flipkart is also working to understand how it can better manage the plastic waste. Additionally, the firm is also working towards usage of renewable energy, waste management, and sustainability. The sustainable packaging for Flipkart's supply chain includes replacing plastic security bags with security envelopes made of paper. In addition, all fillers and wrapping films have been replaced with cushioning materials made from recycled paper.

Research findings

After looking at the case studies above we understand that the firms are moving towards sustainable operations. They are using renewable sources of energy. The organizations are maximising their usage of natural light. The supply chain management techniques are made more sustainable. In the e-commerce sector, the firms are moving towards sustainable packaging solutions to lessen the packaging waste. The electronic industry is trying to reduce their usage of Carbon. The firms are trying to strengthen their environmental activities and also grow in the business. Also, the firms are training their employees to reach their sustainability goals.

Conclusion

When it comes to sustainability initiatives, business will have to shift their focus from short term financial gains to long term effects and strategic implications. Firms will have to re-evaluate their current business model of supply chain and reinvent the fulfilment operations with eco-friendly best practices that offer sustainable distribution solutions to organizations and its customers. Also, the firms need to adopt sustainable practices with respect to their own product line to prosper in a better way.

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International Journal of Innovation, Management and Technology, Vol. 5, No. 4, August 2014 A Decision Support Framework to Assess Grocery Retail Supply Chain Collaboration: A System Dynamics Modelling Approach Ghada Elkady, Jonathan Moizer, and Shaofeng Liu

Sustainability reports from Starbucks, Apple, ITC and Flipkart.

21. CREDIT PLUS BY MFIs IN INDIA FOR SUSTAINABLE DEVELOPMENT

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Abstract

The aim of sustainable development is to satisfy the needs of the present without jeopardizing the capacity of future generations. It strives to establish a balance between economic growth, care for the environment and social well being. The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. Micro Finance or Micro Credit was envisaged as a tool for reducing poverty by financially empowering the poorest member of the society. It has merged as a promising and effective tool for alleviating poverty. India has been at the forefront of the Microfinance revolution in the world enabling financial and credit inclusion for millions of bottom-of-pyramid consumers thus supporting them with their livelihoods MFI sector in India has been constantly working towards their goal of poverty alleviation. Traditionally MFIs focused on providing micro credit to lift beneficiaries out of poverty. But soon they realized that credit alone does not suffice and the poor need a wider variety of financial products/ services to improve their lives. Based on research findings and wisdom that credit alone will not suffice many MFIS started broadening their services and apart from providing financial services rendered business training health care and social services. These services called " plus" services belong to either Business Development Services or Social Services. Micro-credit plus has the potential to solve multidimensional poverty problem. many MFIs have evolved beyond a plain vanilla credit product and have diversified into credit products for renewable energy, water and sanitation, health services, affordable housing etc. Thus, MFIs in India are evolving from realizing the first goal of sustainable development to five more goals and the day would not be far when other goals of sustainable development too would be addressed.

Keywords: Sustainable Development, Sustainable Development Goals Micro Finance, Finance Plus Services

Introduction

Sustainable Development is commitment to social progress, environmental balance and economic growth. It is a way of preparing society by taking into account what is critical for the present as well as the future in terms of environment and natural resources and social and economic equity. The aim of sustainable development is to satisfy the needs of the present without jeopardizing the capacity of future generations. It strives to establish a balance between economic growth, care for the environment and social well being. A simple definition given by the Brundtland Report, 1987, "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable Development Goals was approved by the UN as a roadmap for Sustainable Development. These goals which address poverty alleviation, inequalities and climate change have the power to create a better world. In 2015 all the United Nations Members States adopted the Sustainable Development Goals (SDGs) also known as the Global Goals. These were a universal call to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.The Goals are:

1.No Poverty, 2. Zero Hunger 3. Good Health and Well-being 4 Quality Education 5. Gender Equality 6.Clean Water and Sanitation, 7. Affordable and Clean Energy 8. Decent Work and Economic Growth 9. Industry, Innovation and Infrastructure 10. Reduced Inequality, 11. Sustainable Cities and Communities 12. Responsible Consumption and Production, 13. Climate Action, 14. Life below Water. 15. Life on Land 16. Peace and Justice Strong Institutions, 17. Partnerships to achieve the Goals.

Objective of the Study & Methodology

The study traces how micro finance in India has evolved as a tool of poverty alleviation to offering various other additional financial services which address six other goals of sustainable development.

The study is descriptive in nature and has drawn inputs from published secondary sources. It is limited to the Indian context only

Micro Finance and Poverty Alleviation

Micro Finance or Micro Credit was envisaged as a tool for reducing poverty by financially empowering the poorest member of the society. Micro Credit which was seen as a miraculous tool for poverty alleviation in the early 2000's was followed by a crisis period in the early 2010's which damaged the sectors reputation caused by over indebtedness of beneficiaries and greed for excessive profits by unscrupulous Micro Finance Institutions (MFIs) in countries of Southern India, Pakistan, Morocco and Nicaragua. It was concluded that this crisis was the result of excessive search for profit, uncontrolled growth of MFIs and lack of regulation. Then came the phase of reforms to empower and professionalize the sector to establish responsible, ethical and inclusive microfinance.

Poverty alleviation is the first of the Sustainable Development Goals (SDG) of United Nations (UN) Micro Finance has been envisages a job creating and income generating activity in many developing countries. Any sustainable development program to be effective must address poverty alleviation (Chokor 2004; Duraiappah 1998). Poverty alleviation has been the top priority for international development (Develtere and Huybrecht 2005). One fifth of the world's population lives in extreme poverty (Hermes and Lensink 2007b). and about 2.5 billion which is around half of the worlds working adults have no access to the financial services offered by formal institutions. (Fouillet et al. 2013). Therefore, majority of the working adults around the world depend on money lenders to finance their micro enterprises.

Around 3100 microfinance institutions are providing loans to 100 million clients around the world and helping them to come out of poverty. (Hartarska and Nadolnyak 2007; Cull et al. 2011; Epstein and Yuthas 2011;). Micro Finance has emerged as a promising and effective tool of poverty alleviation by financing micro-entrepreneurs with small, but collateral free loans. (Baklouti 2013). It focuses on providing credit services to the income generating ventures of the poor without collaterals. (Hermes et al. 2011; Quayes 2012).

The long-term sustainable effects of micro finance have been debated. While one group of researchers are of the opinion that access to finance reduces poverty significantly and accumulation of financial assets improves the financial situation of the beneficiaries thereby enabling access to education, health care and empowerment. (Hermes and Lensink 2011).

Another group of researchers are however of the opinion that micro finance does not address the needs of the poorest of the poor (Hermes and Lensink 2007b), and since it remains at the micro-enterprise level

does not contribute much to higher level of economic development (Ahlin and Jiang 2008; Mayoux 2001; Weber 2013).

In India the results have been encouraging though. Studies by Imai and Annim (2010), Das T. (2019), Balammal, Madhumathi, & Ganesh, (2016), found encouraging results of poverty alleviation through micro fiancé lending.

Micro Finance in India

The microfinance sector in India has made great strides during the last decade by adopting a wide variety of innovations in improving access to financial services to the poor. An estimated total outreach of more than 42 million clients, the sector has indeed shown an encouraging trend.

Enabling financial and credit inclusion for millions of bottom-of-pyramid consumers and supporting them with their live hoods, India has been at the fore front of the Microfinance global revolution. Even a crisis couple of years back could not hold the industry back and it reformed itself and emerged stronger.

There has been a phenomenal growth in the Indian Microfinance Sector over the past 18 years. There has been a quantum jump in the number of institutions providing micro finance services. . 29 States, 5 Union Territories and 570 districts are currently serviced by micro finance institutions in India A branch network of17,218 and 1.38 lakh employees with an outstanding loan portfolio of Rs.94,391 crores have reached out to over 43 million clients according to 202 MFIs that have reported. Table 1 indicates that the average loan outstanding per borrower has increased from Rs.11,425 to Rs.16,576 per borrower and 90% of loans were used for income generation purposes. Loan outstanding has grown by 37% over the previous year and outreach increased by 22% It is encouraging to note that women constitute 99% of total clients. It thus indicates that the MFI sector in India has been constantly working towards their goal of poverty alleviation.

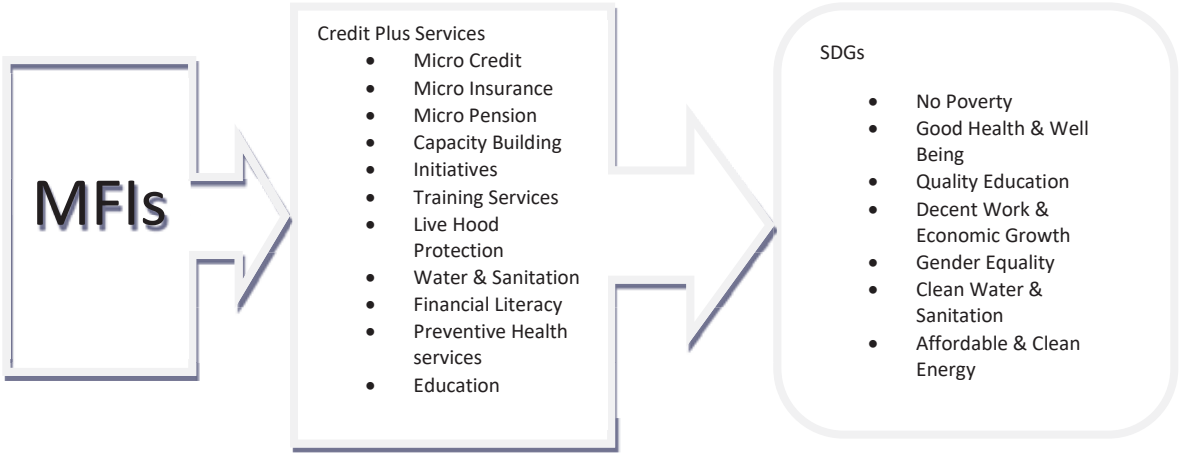
Table:1 Performance of MFIs in India

Outreach Indicators	**2019**	**2018**	**2017**	**2016**
Client Outreach (lakhs)	429	351	295	399
Women Clients	99%	96%	96%	97%
Gross Outstanding Portfolio (in crores)	94,391	68789	46842	63853
Average loan per Borrower (Rs)	16,576	14,700	12751	11425
Financial Indicators				
Operating Expense Ratio	9.7%	9.97%	10.50%	10.22%
Finance Cost Ratio	15%	13.03%	14.8%	13.83%
Yield	20.0%	18.56%	22%	21%
Net interest margin	9.72%	9.55%	8.08%	10.0%
Operational Self Sufficiency	114%	110 %	114 %	113 %
ROA	2.06%	1.63%	2.4%	2.2%
ROE	11.49%	7.48%	13.31%	19.31%
Leverage	3.3	2.8	2.9	3.2
NPA	0.68%	1.48%	0.69%	0.15%
CAR	23.09%	22.1%	21.13%	19.39%

Source: Bharat Micro Finance Report: 2019, 2018,2017.

Micro Finance Plus Services for Sustainable Development

Traditionally MFIs focused on providing micro credit to lift beneficiaries out of poverty. But soon they realized that credit alone does not suffice and the poor need a wider variety of financial products/ services to improve their lives. Thus, micro credit evolved into micro finance



Source: Authors depiction

to include a broader set of financial services like loans, savings, insurance, transfer services and remittances. Based on research findings and wisdom that credit alone will not suffice many MFIS started broadening their services and apart from providing financial services rendered business training health care and social services. These services called **"plus"** activities, emerged from acknowledging that though financial services are critical to micro finance they address only one of the many problems of the poor. For example, high disease rates, lack of knowledge in using the borrowed funds would render providing credit insufficient.

Plus services belong to either Business Development Services or Social Services. Business development services usually aim to boost competitiveness through higher productivity, better product design, improved service delivery, or enhanced market access. They comprise a broad range of nonfinancial services, including management or vocational skills training; marketing and technical assistance; technology access; productivity and product design; accounting and legal services; and access to various information about standards, regulations, or ideas in an enterprise field. In contrast, social services integrate credit with health, education, or other programs intended to raise health consciousness, health practices, and the use of formal healthcare.

Thus Credit-plus refers to the provision of developmental services to customers alongside other non-credit financial services such as savings, insurance, or money transfers.

A MFI can offer plus services in parallel or unified form. A parallel service covering a wider spectrum of services is offered by specialized personnel. Since it involve higher costs they are usually funded by donations or special customer service charges.

A unified service is offered by the staff of the micro finance institutions itself usually the credit offices. The plus services here are usually limited to training only and therefore additional costs are minimal and hence funded by the customers themselves. MFIs in India have evolved from providing just micro credit

to credit- plus services spanning financial developmental and social. Table 1 and table 2 indicate that many MFIs in India have not confined themselves to providing just micro credit. The development of the weaker sections would be sustainable only by providing the needed financial and social services along with micro credit.

Table no. 1 Credit Plus Services – Financial

Service	No of MFIs offering the service	Number of Clients
Micro Insurance Health	28	50. 33 lakhs
Micro Insurance Non-health	20	72.86 lakhs
Micro Pension	7	57 thousand

Source: The Bharat Microfinance Report 2019

Table no. 2 Credit Plus Services – Developmental and Social

Service	No of MFIs offering the service
Capacity Building Initiatives	12
Training initiatives	25
Live hood Protection	15
Water & Sanitation	12
Financial Literacy	21
Preventive Health Services	18
Education	10

Source: The Bharat Microfinance Report 2019

Conclusion

Micro-credit plus has the potential to solve multidimensional poverty problems. Researchers have argued that providing credit alone does not solve problems of the poor. They need more than just financial services to improve their lives as apart from lack of funds they find themselves vulnerable, powerless and dependent. To overcome poverty, they need a coordinated combination of micro finance and other development services. It is here that microfinance plus services have the ability to improve human capital. Enhanced knowledge promotes scaling up activities and ability to service bigger loans. Credit – plus services reduces the risk of default as borrowers use the loans for productive purposes and not consumption. Plus services enable enterprises to improve customer satisfaction and customer retention thereby making them sustainable.

MFIs are proving to be more effective in alleviation of not only economic but also social poverty. The Microfinance sector in India which is comprised of MFIs and SHPIs/SHGs has been proactively providing credit plus services such as savings, micro-insurance, micro-pensions, and other development related activities. The sector clearly understands the importance of credit plus services to low-income people. Even in the credit services many MFIs have evolved beyond a plain vanilla credit product and have diversified into credit products for renewable energy, water and sanitation, health services, affordable housing etc. Thus MFIs in India are evolving from realizing the first goal of sustainable development to five more goals and the day would not be far when other goals of sustainable development too would be addressed. MFIs have the potential to help in attaining majority of the sustainable development goals. They would help humanity face great challenges and ensure that all mankind has the same opportunities for living a better life without compromising the future.

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22. SUSTAINABLE INVESTING- PERFORMANCE OF SUSTAINABLE INDICES

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Abstract

*The need of the hour for all businesses is to embrace sustainability not just to be profitable but also to lure investors to stay invested. Sustainable Investing is a holistic approach for investing, much more than Negative Screening. Sustainable investing is an investment discipline that considers environmental, social and corporate governance (**ESG**) criteria to generate long-term competitive financial returns and positive societal impact. Sustainable investing is gaining traction in India. There are several indices offered by BSE and NSE. These ESG indices act as reference to investors in identifying companies which are suitable for sustainable investing. The current study highlights the Risk-Return performance of select sustainable indices from BSE and NSE. The indices considered are BSE Carbonex, BSE Greenex and NSE ESG 100. The period of study is 7 years YTD i.e. from 2013 to 2020 (July 31). The study uses secondary sources of data from NSE, BSE and RBI and other websites mentioned in the bibliography. Yearly returns are considered. The mean returns, volatility, normality have been studied for the indices and compared with their parent indices BSE 100 and NSE 100 using SPSS. The performance of the sustainable indices have been measured with Treynor Ratio (Reward to Volatility) and Sharpe Ratio (Reward to Variability) and compared to flagship market indices SENSEX and NIFTY. The present study adds to the existing body of knowledge. The study overall proves that sustainable investing yields higher returns in the long run. Sustainable Investing boosts the value for investors and to the society at large.*

Keywords: Sustainable Investing, Sustainable Indices, ESG, volatility

Introduction

Sustainable Investing is responsible investing which considers the factors of Environmental, Societal and Corporate Governance (ESG) criteria. The investors are opting for sustainable investing because they believe the companies which have good rating under the ESG criteria are better equipped to deal with challenges in future as they have strong risk management practices and are responsible to society. Sustainable investing is gaining momentum in India. Now the investors have realized importance of giving weightage to ethical principles in investing. The interesting feature is that the academicians have shown a strong linkage between ESG and Financial performance. The COVID 19 Pandemic has accelerated the investor interest with respect to ESG. The "S" in ESG had been brought into limelight. There are indices developed by stock exchanges selecting companies which have a satisfactory rating according to set standards and methodology on ESG factors. Companies with good ESG rating have lower risk exposures, generate higher profits and distributes dividends as they are future oriented, attract good talent with a strong culture of innovation. Hence, sustainable investing results in good yields. The two important stock markets of India BSE and NSE have floated indices comprising companies that scored higher on ESG parameters. BSE launched "BSE Greenex" and "BSE Carbonex" in 2012. NSE launched "NSE ESG 100 Index" with base date in April, 2011. Bse-greenex (25 Green Companies) is the first environmental friendly equity index to be publicly disseminated on a real-time basis, providing a new tool for use by "green" retail and institutional investors to track the performance of India's largest and most liquid, energy efficient stocks. The S&P BSE CARBONEX, the first index of its kind in India, tracks the performance of the companies within the S&P BSE 100 index based on their commitment to mitigating risks arising

from climate change. NIFTY100 ESG Index is designed to reflect the performance of companies within NIFTY 100 index, based on Environmental, Social and Governance (ESG) scores. Of late the turnover of trade in sustainable indices has significantly increased.

Review of Literature

Cr, Hariharan & Babu, M.. (2018). Price Behaviour of Indian Sustainable Investment-A Comparative Study. Research Journal of Humanities and Social Sciences. 9. 865. 10.5958/2321-5828.2018.00144.4.
The article explains the price behavior of sustainable indices of NSE i.e. NSE ESG 100 and NSE ESG Enhanced 100. The article tests the normality and unit root, price volatility of daily returns of sustainable indices and compare it with parent index from April, 2011 to March, 2018. Descriptive statistics, Augmented Dickey Fuller test and GARCH (1,1) Model was used and concluded that the returns of sustainable indices were higher than that of parent Index but at the same time the volatility of sustainable indices was less than that of parents Index NSE 100.

Srinivasan, Sudha. (2014). Risk-return and Volatility analysis of Sustainability Index in India. Environment, Development and Sustainability. 17. 10.1007/s10668-014-9608-8. The study not only compares the performance of the sustainability index of India—the S&P ESG India Index with two broad market indices, i.e., the Nifty and the S&P CNX 500 using daily index data—but also analyses the inherent conditional volatility using generalized autoregressive conditional heteroscedas-ticity models. The results indicate that though the daily compounded returns to the ESGIndia Index are not statistically different from those of the Nifty or those of the CNX 500, annualised returns of the ESG India Index have been better than the returns of the other two indices.

Objectives

The primary objective of the study is to compare the performance of sustainable indices in terms of important select parameters with parent and benchmark indices from BSE and NSE

- To compare the mean return and risk of sustainable indices with parent and benchmark indices
- To study the normality behavior of the sustainable, parent and benchmark indices with the help of skewness and kurtosis.
- To measure the performance of sustainable indices with reference to Reward to Variability (Sharpe ratio) and Reward to Volatility (Treynor ratio) and compare with parent and benchmark indices.

Methodology

Sustainable Indices were selected from BSE and NSE. The statistics comprising of mean, Standard Deviation, Skewness and Kurtosis was studied. The descriptive statistics was also run for the parent indices and benchmark indices of BSE and NSE. The performance of the indices were measured using Reward to Variability (Sharpe Ratio) and Reward to Volatility (Treynor Ratio) and compared to the parent and benchmark indices respectively.

Sample Indices Studied

Indices selected:

Sustainable Indices of BSE: BSE Greenex, BSE Carbonex ; Parent Index: BSE 100
Benchmark Index: BSE SENSEX
Sustainable Indices of NSE: NSE ESG 100 ; Parent Index: NSE 100

Benchmark Index: NSE NIFTY

The calendar year returns of the above indices had been considered. The data was collected for 8 periods from 2013 to 2020. The returns for 2020 had been calculated on YTD basis from Jan 1, 2020 to July 31, 2020 .1 year Government bond yield was taken as risk free rate. The monthly average rate was taken for the select year.

Sources of Data

The study used secondary sources of data. The data was collected from BSE and NSE websites. The risk free rate was taken from Investing.com website. Other sources of data are listed in bibliography.

Data Analysis Tools and Techniques

MS Excel 2013 was used to calculate averages, beta, Sharpe and Treynor ratios

IBM SPSS 22 was used for descriptive statistics comprising of Mean, Standard Deviation, Skewness and kurtosis

Formulae used

Sharpe Ratio: (Average Return on Portfolio – Average Risk Free rate of Return) /Risk of portfolio

Treynor Ratio:(Average Return on Portfolio – Average Risk Free rate of Return)/Beta of portfolio

Beta of Portfolio = COV (Portfolio, Market Portfolio) / (Std Dev of Market portfolio)

Data Analysis

Returns of Sustainable Indices from 2013 to 2020 (YTD July 31, 2020): BSE

Table 1 : Returns of BSE CARBONEX

Year	Open	Close	Returns (%)
2013	975.08	1027.55	5.38109694
2014	1030.61	1348.97	30.8904435
2015	1348.4	1300.19	-3.5753486
2016	1299.81	1360.16	4.64298628
2017	1364.44	1788.1	31.0501011
2018	1789.43	1816.52	1.5138899
2019	1821.36	1972.92	8.32125445
2020*	1977.31	1779.05	-10.026754

*YTD as on July 31,2020 Source: www.bseindia.com

Table 2: Returns of BSE Greenex

Year	Open	Close	Returns (%)
2013	1624.37	1705.81	5.013636056
2014	1709.91	2242.98	31.17532502
2015	2240.2	2252.48	0.548165342
2016	2251.83	2329.4	3.444753822
2017	2335.77	2868.32	22.79976196
2018	2873.03	2714.11	-5.531442414
2019	2720.93	2822.89	3.747248184
2020*	2831.14	2707.39	-4.371030751

*YTD as on July 31, 2020 Source: www.bseindia.com

Returns of Parent and benchmark Indices of BSE CARBONEX AND BSE GREENEX

Table 3: Returns of Parent Index BSE 100

Year	Open	Close	Returns (%)
2013	5998.53	6326.72	5.471173771
2014	6343.75	8369.27	31.92937931
2015	8367.15	8097.57	-3.221885588
2016	8095.57	8386.69	3.596040798
2017	8414.31	11029.78	31.0835945
2018	11037.78	11161.02	1.116528867
2019	11188.74	12236.19	9.361643938

2020*	12262.19	11433.17	-6.760782536

*YTD as on July31,2020 Source: www.bseindia.com

Table 4: Returns of Benchmark Index BSE SENSEX

Year	Open	Close	Returns (%)
2013	19513.45	21170.68	8.49275756
2014	21222.19	27499.42	29.57861559
2015	27485.77	26117.54	-4.977957685
2016	26101.5	26626.46	2.011225409
2017	26711.15	34056.83	27.50042585
2018	34059.99	36068.33	5.896478537
2019	36161.8	41253.74	14.08099154
2020*	41349.36	38407.01	-7.115829604

*YTD as on 31 July,2020 Source: www.bseindia.com

Table 5: Descriptive Statistics of indices of BSE from SPSS (Returns from 2013 to July 31, 2020)

	BSE Greenex	BSE Carbonex	BSE 100	BSE_Sensex
Mean	**7.103302**	**8.524709**	**9.071962**	**9.433338**
Median	3.596001	5.012042	4.533607	7.194618
Mode	-5.5314[a]	-10.0268[a]	-6.7608[a]	-7.1158[a]
Std. Deviation	**13.0335984**	**14.9872831**	**14.7120563**	**13.6481017**
Skewness	**1.197**	**.794**	**.961**	**.464**
Std. Error of Skewness	.752	.752	.752	.752
Kurtosis	**.345**	**-.481**	**-.520**	**-1.016**
Std. Error of Kurtosis	1.481	1.481	1.481	1.481
Minimum	-5.5314	-10.0268	-6.7608	-7.1158
Maximum	31.1753	31.0501	31.9294	29.5786

Interpretation

BSE Greenex has underperformed compared to parent and Benchmark Index. The risk associated with BSE Greenex is marginally less when compared to benchmark and less than parent index as indicated by Standard Deviation. The skewness is positive and higher than zero which indicates an asymmetrical distribution with a right tail. The index return are not normally distributed and it is highly skewed because skewness is greater than 1.The positive kurtosis with value less than 3 indicates a slightly heavy tailed and a flat curve than normal distribution.

The average returns of BSE Carbonex is marginally less than its parent index BSE 100 and benchmark Index BSE Sensex. The risk is marginally higher than the parent index and higher than the benchmark index BSE Sensex. The skewness is positive and slightly higher than zero which indicates an asymmetrical distribution with a right tail. The index returns are not normally distributed and is moderately skewed as skewness is between 0.5 and 1.The negative kurtosis with value less than 3 indicates a light tailed and flat than a normal distribution.

Table 6: Comparison of Performance Measures (Sharpe and Treynor ratios)

Index	Mean Return of the index	Risk of the index	Risk Free rate	Volatility Measure (beta)	Sharpe Ratio	Treynor Ratio
BSE_Carbonex	8.5247	14.9872	6.88	1.0695	**0.10974**	**1.537821**
BSE_Greenex	7.1033	13.0336	6.88	0.8521	**0.017133**	**0.262058**
BSE_100	9.0719	14.712	6.88	1.0513	**0.148987**	**2.084942**
BSE_Sensex	9.4333	13.6481	6.88	1	**0.187081**	**2.5533**

Source for Risk free rate: in.investing.com

Interpretation

The BSE Carbonex has rewards to variability and volatility less than the parent and the benchmark Index. BSE Greenex also has rewards to variability and volatility less than the parent index and benchmark index as indicated by Sharpe and Treynor Ratios.

Returns of Sustainable Indices from 2013 to 2020 (YTD July 31, 2020): NSE

Table 7: Returns of NSE ESG 100

Year	Open	Close	Returns(%)
2013	1032.23	1117.22	8.2336301
2014	1114.81	1474.12	32.230604
2015	1474.15	1442	-2.1809178
2016	1446.05	1487.51	2.8671208
2017	1489.06	1958.15	31.502424
2018	1941.66	2035.64	4.8401883
2019	2040.35	2259.34	10.732962
2020*	2261.62	2172.25	-3.9515922

*YTD as on July 31, 2020 Source: www.nseindia.com

Returns of Parent and Benchmark indices of NSE ESG 100

Table 8: Returns of Parent Index NSE 100

Year	Open	Close	Returns(%)
2013	5875.15	6225.45	5.96240096
2014	6244.55	8290.45	32.76296931
2015	8280.55	8090.9	-2.290306803
2016	8085.4	8382.5	3.674524451
2017	8409.6	10985.15	30.62630803
2018	10990.45	11110.15	1.089127379
2019	11130.55	12267.75	10.21692549
2020*	12299.85	11222.95	-8.755391326

*YTD as on July31,2020 Source: www.nseindia.com

Table 9: Returns of NSE Benchmark Index NSE NIFTY

Year	Open	Close	Returns(%)
2013	5937.65	6304	6.169949391
2014	6323.8	8282.7	30.97662798
2015	8272.8	7946.35	-3.94606421

2016	7938.45	8185.8	3.115847552
2017	8210.1	10530.7	28.26518556
2018	10531.7	10862.55	3.141468139
2019	10881.7	12168.45	11.82489868
2020*	12202.15	11073.45	-9.25000922

*YTD as on July 31,2020 Source: www.nseindia.com

Table 10: Descriptive Statistics of Indices of NSE from SPSS (Returns from 2013 to July 31, 2020)

	NIFTY_ESG100	NIFTY_100	NIFTY
Mean	**10.534303**	**9.160820**	**8.787238**
Median	6.536909	4.818463	4.655709
Mode	-3.9516[a]	-8.7554[a]	-9.2500[a]
Std. Deviation	**14.0328736**	**15.0073528**	**14.3395343**
Skewness	**.944**	**.849**	**.648**
Std. Error of Skewness	.752	.752	.752
Kurtosis	**-.571**	**-.519**	**-.678**
Std. Error of Kurtosis	1.481	1.481	1.481
Minimum	-3.9516	-8.7554	-9.2500
Maximum	32.2306	32.7630	30.9766

a. Multiple modes exist. The smallest value is shown

Interpretation

The average returns of NIFTY ESG 100 is higher than the parent index NIFTY_100 and benchmark Index NIFTY. The risk of the sustainable index is also marginally less than the benchmark index and considerably less than the parent index. The skewness is positive and higher than the parent and benchmark index which indicates a longer right tail when compared to the indices. Moreover, the skewness with a value between 0.5 and 1 and suggests the distribution is highly moderately skewed. The returns are not normally distributed. The negative kurtosis with value less than 3 indicates a light tailed and a flat distribution than a normal distribution.

Table 11: **Comparison of Performance Measures (Sharpe and Treynor Ratios)**

Index	Mean Return	Risk	Risk Free rate	Volatility Measure (beta)	Sharpe Ratio	Treynor Ratio
NIFTY ESG 100	10.5343	14.0328	6.88	0.9693	**0.260411**	**3.77004**
NIFTY 100	9.1608	15.0073	6.88	1.0414	**0.151979**	**2.190129**
NIFTY	8.7872	14.3395	6.88	1	**0.133003**	**1.9072**

Source for risk free rate: in.investing.com

Interpretation

The sustainable index indicates higher rewards to variability and volatility (Sharpe and Treynor Ratios) when compared to the parent index NSE 100 and benchmark Index NIFTY. The sustainable index NSE ESG 100 had superior performance when compared to NSE 100 and NIFTY.

Findings

- As shown in Table 5, the average return of BSE Greenex is less and risk is also marginally less than the parent index BSE 100 and benchmark Index BSE SENSEX. The index is positive and highly skewed distribution with a right tail. The index had positive kurtosis which indicates a heavy tailed Platykurtic distribution (Flat than normal).
- The average return of BSE Carbonex index is less and risk is higher when compared to the parent and benchmark indices as observed form Table 5. The BSE Carbonex is positive skewed and a slightly skewed distribution with right tail. The index had negative kurtosis indicating light tailed and a Platykurtic curve (flat than normal)
- As observed form Table 6, the performance of the sustainable indices of BSE in terms of Sharpe and Treynor Ratios is less than the parent (BSE 100) and benchmark (BSE SENSEX) indices.
- The average return of NIFTY ESG 100 is higher and risk is less than the parent index NSE 100 and benchmark Index NIFTY as shown in Table 10. The skewness is positive and it is a moderately skewed distribution with a right tail. The negative kurtosis indicates a light tailed and a Platykurtic curve (flat than a normal distribution).
- The performance of sustainable index of NSE in terms of Sharpe and Treynor Indices was better than parent (NSE 100) and benchmark indices (NIFTY) as observed in Table 11.

Conclusion

Sustainability is the new norm and is picking up pace. The study focusses on performance of Indian sustainable indices of BSE and NSE. The study selected BSE Carbonex and BSE Greenex from BSE and NSE ESG 100 from NSE. The descriptive statistics and performance measures of Sharpe and Treynor ratios suggested that the sustainable indices of BSE have marginally underperformed the parent Index (BSE 100) and Benchmark Index (SENSEX). The sustainable index of NSE had outperformed parent index (NSE 100) and Benchmark Index (NIFTY).The study concludes that the sustainable indices are not normally distributed and are Platykurtic distributions. The study concludes that sustainable investment can generate much the same returns as the other indices. Sustainable Investing is the way forward and is expected to be profitable in the long run. The conclusion drawn is in line with the studies conducted by Cr Hariharan, 2018 and (Srinivasan, 2014)

Suggestions & recommendations

Based on the study it is suggested that the investors shift focus on sustainable investing as the performance of sustainable indices are at par with other benchmark indices. The step towards sustainable investing by investors would force the companies to involve themselves into sustainable practices.

Limitations and scope for further study:

Limitations

- The study focused on select sustainable indices.
- The study considered only 8 periods of study.
- Few selected measures were taken into consideration for evaluating the performance of sustainable indices.

Scope for Further Study

Few mutual fund houses have started new ESG mutual funds with the above sustainable indices as benchmark. In future, the performance of ESG Mutual Funds launched can be studied.

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23. GREEN BANKING SYSTEM - AN OVERVIEW OF GREEN FINANCIAL PRODUCTS AND SERVICES IN INDIAN BANKING SECTOR

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Abstract

Today, the World's Economy is driven and determined by the Globalisation Phenomenon. Globalisation and its effects give rise to many new problems and challenges for society. Global Warming is leading to Environmental damage in the form of climatic conditions, Energy Scarcity situations and Financial Crisis. Banking sector is one the major service sector component in determining nation's economy and plays a vital role in sustainable development. To retain and sustain environmental condition, Green Financial System acts as a remedy to obtain the balance between economy and environment. Green Banking System is an Initiative of Indian Banks for sustainable Development in the country. Green Banking System refers to the concept of functioning of banks with an intention to reduce the external carbon emission and internal carbon foot print. Green Banks are also referred as Ethical Bank or Sustainable Bank. Green Banking not only helps in environmental protection, but also results in reduction of operating cost of banks. Green banking is an effective initiative adopted by many Indian Banks with an objective to carry out Eco friendly Investments. Green banking system is a Corporate Social Responsibility which leads to Sustainable Growth and Development. The present paper aims at understanding the concept of Green Banking System. The study mainly focuses on the green banking initiatives adopted by Indian banks both public and private sector. The study is concluded with the highlights explaining the benefits of Green Banking system and its effective role in achieving sustainable Development.

Key words: Environmentalism, Green Banking System, Green Banking Benefits, Green Banking initiatives, Sustainable Development.

Introduction

The term Environmentalism deals with nature related aspects, preservation of natural resources and protection of natural environment. Environmentalism can be referred as a concept which tries to balance the nature with human needs. This balance state when achieved with proper grade can be termed as Sustainability. Sustainability can be explained as the ability to achieve perpetual existence. Sustainable Development is often related and interconnected with environment, economic, and social factors. Environment and nature related aspects are generally represented with colour Green. Green colour symbolises growth, harmony, and prosperity. Today the world economy is around the Globalisation Phenomenon. Global Warming is leading to environment damage in the form of climatic conditions, energy crisis and Financial crisis. Global Warming is also called as "Green House Effect "and is considered as a call for global protection. The Banking Industry has a greater impact on the nation's economic growth and as well as on environmental sustainability. Financial institutions are indirectly related with the firms, organisations, projects that damage environment or nature. As such there is a need for banking industry to strive towards sustainable Development. To retain and sustain healthy environment conditions Green Financial system acts as a remedy to obtain the balance between economy and

environment. Generally Indian banking sector targets a certain long-term rate of return on their credit and investment. But the need has arised for the banks to perform environmental evaluation of the projects before taking any investment decisions. The banking sector has recognised the importance of Green Finance and started introducing initiatives which may lead to sustainability. Environmental factors were considered in commercial and investment decision making. Eco friendly practices are adopted by banks for sustainable banking network. Green Banking system is one such initiative and a significant step taken by Indian banking sector for sustainable development in the country. Green banking system refers to the concept of functioning of banks with an intention to reduce the external of carbon emission and carbon footprint. Indian Banks started adopting many activities with an intention of going green. Green Banking services included online banking, mobile banking, Green loans, E- statements, ATM's, Paper less banking, energy saving equipment etc.

Literature review

HeimGal (2005) The study found that environment had a sensitive effect on stock market. The importance of pollution norms to be followed by industries was mentioned to achieve sustainable development.
Nanda Sibabrata & Bihari Suresh (2012) The study was based on the significant relationship between Net Income and Profitability of the banks after implementing Green Banking Strategies. The conclusion stated that there is no significant relationship between the variables.

Sharma (2013) Global Warming and its consequences made people think more about protection of environment and gave rise to the thought of Environmentalism.

D.Khandewal (2013) Basically, dealt with concept of Green Bank and its benefits. The paper was an attempt to study Green practices followed by leading Banks like ICICI, SBI. The major suggestions were Online Banking, Waste Management, Green Banking in rural branches.

Saleema .T.A. (2014) The paper was a comparative study of Green Bank Initiatives adopted by SBI and ICICI bank and emphasised on opportunities and challenges of Green Banking system in India.

Yadwinder Singh (2015) A study on commercial banks in India which are adopting Green Banking Initiatives. The paper highlights the paperless banking, Green Street Lending and Green Marketing.

Garg (2015) The research was conducted on the importance and need for Green banking System. Dr. Loluru Nagarjuna (2015) The author in his case study of SBI and ICICI bank studied the investment avenue of Green Finance and limitation in calculation of environment benefits. The paper Concluded highlighted growing demand for Green Finance products.

Suresh Chandra & Bhavna Pandey (2015) The paper was an attempt to check the awareness of Green Banking among Bank Employees and the effect of Green banking on nation's economy. Green Banking facilitates improvement of asset quality of banks.

Kavita Vadrale & V. P. Katti(Feb 2016) The study was on Indian banks adopting Green Banking Practices and conclusion was Indian Banks are actively undertaking Multiplicity of Green Banking Practices.

Priyanka Goel (March 2016) The author studied on how Green Finance is a step towards Sustainable development and found that there is a vast scope for Green Finance in India. Recent Government Policies and initiatives released regarding Green Finance Products.

Sandeep (August 2016) The writer studied on the Green Banking Issues and Challenges and the major findings were Green Banking is a concept of Proactive and smart way with an aim to achieve Sustainability. Green Banking well implemented will definitely lead to sustainable Growth of the nation.

Objectives of the study

- To Understand the concept of Green Banking System and to gain a thorough knowledge of various Green Banking Methods and their benefits.
- To Compare Traditional Banking Practices with Green Banking Initiatives.
- To Perform SWOC Analysis of Green Banking System.
- To know the Green banking Strategies adopted by the top Public sector bank and top Private sector bank in India.

Research methodology

Research methodology is descriptive in nature and is based on secondary data. The data is collected from articles, research papers, annual reports of the selected banks, reports of RBI, newspaper content, E-Journals, and Web sites. The study is confined to the selected Public and private sector bank annual reports from 2010 to 2019.

Green banking system

The main objective of Traditional banking has been to improve the financial leverage of banks and to maximise their profits. The harmful effects of traditional banking activities on the environment and on the economy was not given any consideration. But with the emergent requirement of sustainability and its development, entire world started moving towards the direction of Eco-Friendly Projects. Banking sector has adapted many new initiatives to achieve sustainable Development.

What is Green Banking?

Green Banking System refers to functioning of banks with an intention to reduce the external emission of carbon and internal carbon foot print. Green Banking is based on the concept of increasing sustainable development in the country. It is the new system of functioning of banking sector which mainly concentrates on environmental and socially responsible investing. **Green Bank** is also referred as **Ethical bank** or **Sustainable bank**. This new system of banking encourages banks to carry out eco-friendly transactions. As the performance of banks completely depend on the activities of its clients, there is a need for banks to check the client projects whether the projects are meeting all legal and environmental compliances. Indian Banking sector has undergone a Paradigm shift due to the development of technology. The core functions of banks added many new processes. As a result, banks functioning became a major source of environmental issues and increased the level of carbon Footprint. Sustainable development was the only solution to the issues arised due to Global warming. Banking Industry had to undertake new initiatives to support sustainable development. As such Green Banking was identified as the common solution to reduce the environmental damage. The concept of Going Green was adopted by many Indian Banks for the conservation of Earth, Environment and Natural Resources. Introduction of Internet Banking, Mobile banking, Cash Less transactions paved the way for easy implementation of Green Banking System. A campaign launched by NDTV named:" **GREENATHON"** was a promotion activity

to create awareness of Green banking system. Many banks were inspired with this campaign and started financing projects which were eco-friendly. Green Banks are regulated and controlled by the same regulatory bodies as of traditional banking. An additional Agenda of taking care of earth, environment, habitats and natural resources will be included for Green Banks.

Green banking benefits

Green Banking is useful to the customers, Banks, Industries, Nation and for Environment Protection. Customers can avail the advantage of better deposit rates on Green deposits and Green savings account. Ethical banking system leads to energy saving, less paperwork, low external emission of carbon and low internal carbon Foot print. Green banking involves principles of Sustainability. Ethical loans, Conservation of Energy and Green Mortgages introduced will encourage industries to Grow Green. Green Banking is recognised as CSR activity of banking industry. Green Banks work towards restore of natural resources, environment protection, Ecology and Bio Diversity. The other benefits of Green Banking are it results in reduction of operating costs of the banks. It also ensures improvement of Quality in the bank's assets. Green Banking will have a greater impact on nation's economy as it results in declining of Credit Risk, Legal Risk, and Reputation Risk of the banking Sector.

Green banking products and methods

Green Deposits Banks encourage online transactions by offering high rate of interest on customer Deposits, Money Markets accounts and Savings Account.

Green Mortgage and Loans Green mortgages allow home buyers an additional percent of their house into loans if the house is considered as Energy Efficiency House. Such houses contain solar energy panels, eco-friendly windows.

Go Online Online Banking includes Online payments, remote deposits, Online Transfers through RTGS and NEFT. Online banking leads to less paper usage, saving of time. Due to quick and prompt payment mode customers can escape from payment of Fines or penalty.

Green Checking Accounts It is the facility given to the account holder to check their account details through ATM or special touch Screens provided in the branches of Banks. .

Green Credit Cards Card based transactions are launched by many banks through their Green Channel Counter (GCC). Different variety of cards like ATM, CREDIT, DEBIT, Green Remit card, Foreign travel card, EZ pay card, Gift Card etc are available.

Mobile Banking Mobile banking is reaching high speed rate of usage as it saves time and energy of the customers. It also helps banks in reducing use of paper and energy.

Save of Paper Green Banks use recyclable paper for the purpose of printing bank statements, ATM Receipts, Annual Reports and for other stationery purpose.

Reduction of Carbon Footprint Banks can reduce the emission of Carbon by adopting new strategies like computerised working environment, Green Infrastructure, use of Solar and wind energy.

Green loans Banks along with Ministry of Non-Renewable resources came forward to grant low interest rate home loans and concessions to customers who opt for environment friendly projects and provided Green Finance for procurement of Solar Equipment, Vehicle Finance for low carbon emission vehicles.

TABLE 1: TRADITIONAL BANKING AND GREEN BANKING

Traditional Banking	Green Banking
✓ The Functional process is time consuming and visiting banks was felt inconvenience	✓ The process is digitised and quick in functioning. No time foundation as Online Banking can be accessed at

by customers.	anytime from anywhere.
✓ Manual work was carried out and gave a scope for errors and Frauds.	✓ Due to computerised work environment Errors and Frauds are minimised.
✓ Operating Cost is high and leads to greater extent of Carbon Foot Print.Tranactions are secured.	✓ Green Banking reduces carbon emission and saves valuable resource consumption like electricity. High risk of hacking of transactions.
✓ Cash in Hand involves risk of theft or loss.	✓ Green Card based transactions reduces the risk of carrying cash.
✓ For manual working environment huge human force is required. No internet is needed.	✓ As the transactions are taking place with computerised network less human force is needed. High internet connectivity is required.
✓ Not much skilled people are required to carry the banking transactions.	✓ Technical Experts are to be hired to perform online banking transactions.

SWOC analysis of green banking system

Strengths

- Time saver for both bankers and customers.
- High speed in performance of transactions.
- Reduces operating costs of banks and increases net quality of their assets.
- Most powerful strength is green banking leads to sustainable development.

Weaknesses

- Lack of technical knowledge among bank employees and Customers.
- Difficult to implement in rural areas.
- No uniformity in the practice of green banking system implemented by different banks.
- Risk of security of data is a prevailing drawback of online banking.

Opportunities

- In today's Digital Era, there is a greater scope for green banking practices.
- People are becoming E-Literates and are preferring to use card-based transactions.
- Introduction of Mobile Banking encourages wide spread of Green Banking system.

Challenges

- Green Banking system is still in the initial stage and requires to spread much in rural areas.
- High cost is involved in Renewing and Recycling techniques adopted.
- Number of Customers of the banks may get effected as green Banking system finances only Eco-friendly Projects.
- Credit Risk may increase to the banks which finance projects which are harmful to environment.
- Banks have a threat to forgo its reputation if they support non eco-friendly ventures.

Green Banking initiatives taken by top Indian banks

public sector: State Bank of India

- Green Channel Counter was launched in 2010 as first step towards sustainability and as an initiative of Green Banking System. SBI is the first bank to install 10 Wind Mills with 15 MW.
- SBI stands as the largest installer of solar ATM's and saves large extent of Carbon.
- Tree Plantation Program is taken up by the bank and encourages for planting more number of trees annually. Bank involves in construction of Green Building, Waste Water Treatment Plants,

Rain Water Harvesting Projects, and installing of solar lamps in rural areas. Bank sanctions loans at low rate of interest for Installation of Green Infrastructure facilities.

- Bank has taken an initiative to determine its carbon Foot Print levels so that reduction of carnon footprints can be planned.
- Bank has to its credit Best IT Implementation Award and Best Green IT Project titled "Green IT @ SBI". SBI is an investor to the Carbon Disclosure Project and is a pioneer in banking sector for adapting sustainable initiatives in all its branches spread across the country.

Private sector: ICICI bank

- The Bank as a Green Product initiative introduced INSTA BANKING which provided variety of services under one umbrella convenient to the customers. This Green Banking Service reduced the carbon Footprint of the customers. All the branches of the Bank have set up electronic mode of functioning to carry out banking transactions. E- Drive -Bank sent annual reports in electronic form saving a lot of paper consumption.
- Bank encouraged Eco friendly Vehicles by providing concession on such vehicle finance. Bank provides low processing fee of Home finance for Leadership in Energy & Environmental Design (LEED) certified Building. Go Social Campaign was launched for bank employees to encourage in spreading the journey Go Green. World Environment Week will be observed from June 9th to 13th with Green Theme like No Plastic, Re Use Paper Day, Car Pool Day, Duplex Printing Day and Save Energy Day. Solar Panels were installed in many branches as a part of its green initiative.
- The Bank with the help of internal Media insisted its customers to switch over to online banking transactions. Bank is also in partnership with National and International Green Organisations and NGO's to promote sustainable Development and is involved in organising awareness programs regarding Go Green Concept.

Findings

The Major Findings of the study are:

Green Banking System is an Effective Shift in the functioning of Banking sector and is marching towards overall sustainable Growth and development. These Initiatives results in Low paper consumption and reduces internal Carbon Footprint. This in turn leads to Less deforestation and saves Trees. Green Banking Concept creates awareness of Sustainability and its emergence among Bank Employees and its customers. This initiative encourages people to become more environment friendly. The Facility of Low Rate of interest on Green Loans encourages organisations /Industries to take up Green Projects. In India both public and Private sector banks adapted Successfully many variety of Green Banking methods and services and are contributing their part of share towards sustainable Development.

Conclusion

The Present Scenario demands an urgent need of creating awareness of sustainable development and protection of Environmental Factors. Indian Banking Sector is the leading service sector and a major contributor to Nations Economy. As such banks have greater responsibility towards sustainability of nations natural resources and energy conservation. As a part of its contribution Banking Sector introduced Green banking system. Green banking system involves the principle of Sustainability, Ethical Lending and Conservation of Energy. Ethical Banking opens the way in the mindset of people to think about environmentalism. Green Loans facility encourages every business to become Environment responsible.

Most of the Indian Banks have successfully adapted Green Banking Strategies. Thus, it can be concluded that Indian Banks have much wider Scope to contribute towards Sustainable Growth and Development.

Suggestions

Few suggestions to establish more effective Green Banking system in India are:

The concept of GO GREEN and Green Banking System must reach every remote area of the country. Many more awareness campaigns can be arranged. New and Multiple Green Banking Initiatives can be developed by bank experts. Banks need to provide more concessions on online banking transactions in order to motivate customers to opt for ethical banking. To encourage Green Projects financing of eco-friendly projects must be given preference. It is the responsibility of banks to ensure its customers about safe online banking transactions.

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24.SUSTAINABLE DEVELOPMENT AND INTEGRATED REPORTING -A STUDY ON BHARTI AIRTEL LIMITED

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Abstract

Integrated Reporting (IR) could be a fairly unused shape of corporate announcing that is accepted to hold guarantees for both monetary and sustainability reporting. IR goes past a insignificant alter in data revelations and has the potential to impact inner communication forms vital contemplations and as a result of choice making. The concurrent depiction of maintainability concerns nearby monetary contemplations might lead to socially and environmentally beneficial company choices. A careful understanding of those variables that possibly intercede the relationship between coordinates announcing on one side and company execution on the other permits for conclusions on whether coordinates announcing considerably influences the way in which companies bargain with supportability issues. In this paper appears that the fast advancement of coordinates announcing arrangement and early improvements of practices show hypothetical and observational challenges since of the distinctive ways in which in integrated reporting is understood and enacted within institutions. It highlights numerous zones where advance strong academic research inquires about is required to direct improvements in arrangement and hone. This paper moreover give academics, controllers and reporting organizations with experiences into issues and angles of coordinates announcing that require assist advancement and require vigorous prove to assist illuminate advancements in approach and policy. A key restriction is that it draws upon a blend of the existing writing which is at very an early organize of advancement but gives scope for impressive advance improvement.

Keywords: Integrated Reporting, Sustainability, Social Responsibility Accounting, Corporate Disclosure

Introduction

Earnestness and maintainable development are major objectives that contemporary associations and social orders are encouraged to accomplish in the short, medium and long haul. The ongoing money related emergency and the developing inconsistencies across social orders have driven numerous experts and spectators to portray the worldwide financial framework as busted and to lump business and account among expected reasons for social, environmental and financial issues. The significant inquiries may be created by master in the field of Accounting and Finance:-

- Can organizations and social orders prevail with regards to finding some kind of harmony between the requirement for intensity and economical development?
- How can esteem be characterized, overseen and estimated after some time?
- From what and for whom do organizations make or crush esteem?

As of late, these issues have energized the macroeconomic and political discussion over the globe with a critical interest for a move past Gross Domestic Product (GDP) measures. A few people keep up that GDP overlooks social costs, natural effects and pay disparity. Subsequently, the world needs a superior comprehension of what practical prosperity implies, how to gauge it and how to accomplish it. This development is picking up energy in popular feeling and is all around lined up with the call for common society and business associations to collaborate all inclusive to accomplish the United Nations

Sustainable Development Goals: a lot of targets which are discharged in 2015 for battling neediness, advancing maintainable turn of events and improving worldwide prosperity.

The mix of Integrated Thinking and Integrated Reporting appears to offer a logical answer for the current concerns and remarkable needs. Coordinated Thinking marks an adjustment in the manner by which organizations conceive structure and maintain their business. Looking past the money related portrayal to incorporate a review of procedures, activities, dangers and openings, future standpoint, administration, and that's just the beginning.

IR International Framework

In December 2013, the IIRC discharged the principal form of its IR Framework to be utilized as direction for deliberate appropriation of IR. This Framework is at present moving countless organizations over the globe (Microsoft, PepsiCo, Unilever, Coca-Cola, Volvo,HSBC, Natura and Repsol to give some examples) as they pioneer the reception of IR across various ventures and districts The IR Framework was intended to offer a harmony among adaptability and remedy. It gives the essential ideas, core values and substance components that ought to be highlighted in a coordinated report. At last, the IR Framework speaks to an "open space" to be filled in an important and dependable manner to impart the exceptional worth creation story of the organization.

Incorporated detailing brings about better educated choices in asset allotment which thus improves the gainfulness and acquiring limit of the organization. It gives linkages and availability by ID of the components which set up linkages among money related and non budgetary execution and their impact on the organization's general execution which helps in working up center standards and techniques. Constant flexibly assessment of money related and non budgetary data helps an organization in better guideline of hazard.

A Coordinates Report ought to be an organization’s essential announcing vehicle. Coordinates Detailing combines the foremost fabric components of data right now detailed in isolated detailing strands (money related, administration commentary, administration and compensation and maintainability) in a coherent entire and critically.

- Shows the connectivity between them; and
- Explains how they affect the ability of an organization to create and sustain value in the short, medium and long term.

A Coordinates Report gives a clear reference point for other communications counting any particular compliance data such as speculator introductions point by point monetary data, operational information and maintainability information. Much of this data might move to a web environment, diminishing clutter within the essential report which is able center as it were on the things that the organization considers most fabric to long term victory.

The IIRC was set up in 2010 in acknowledgment of the got to move towards an Worldwide Coordinates Detailing System that's fit for reason for the 21st century. The IIRC looks for to construct upon upgrade and support the work that has been done to date and is continuous to realize a announcing system that:

- communicates the organization’s strategy, business model, performance and plans against the background of the context in which it operates;

- provides a coherent framework within which market and regulatory driven reporting requirements can be integrated;
- is internationally agreed so as to encourage convergence of approach and hence more ready understanding of information presented;
- reflects the use of and effect on all of the resources and relationships or "capitals" (human, natural and social as well as financial, manufactured and intellectual) on which the organization and society depend for prosperity; and
- reflects and communicates the interdependencies between the success of the organization and the value it creates for investors, employees, customers and more broadly society.

The IIRC is creating an Universal Coordinates Detailing System that will encourage the advancement of announcing over the coming decades. The center objective of the System is to direct organizations on communicating the wide set of data required by financial specialists and other partners to survey the organization's long term prospects in a clear, brief associated and comparable organize. This will empower those organizations their financial specialists and others to form superior brief and long term choices. The System will offer assistance to inspire reliable announcing by organizations give wide parameters for approach creators and controllers give a center for harmonizing announcing measures.

Integration of Reports in the context of India

Organization yearly detailing has experienced considerable changes over the most recent two decades with the blast in data and innovation. Ten years down the path, yearly announcing in Organizations used to be simply detailing about the monetary information. These reports depend on a lot of bookkeeping norms i.e., Universal Money related Announcing Guidelines or Sound accounting standards that characterize the data revealed in an organization's salary articulation, monetary record and notes to the fiscal reports. Presently, another pattern had seen the light in the patterns of detailing i.e., announcing non monetary information alongside the money related data.

Service of Condition and Woodlands Administration of India gave a notice in 1993 requiring the accommodation of natural review reports by any industry, activity or procedure expecting agree to work inside the Water (Anticipation and Control of Contamination) Act, 1974 the Air (Avoidance and Control of Contamination) Act, 1981, or Risky Squanders (The board and Dealing with) Rules, 1989 distributed under The earth (Assurance) Act, 1986. Afterward, the term 'Review' was supplanted by 'Explanation' and subsequently Organizations began accommodation of non monetary information. Numerous organizations began joining their corporate social obligation activities, administration, condition, social and manageability measures. The corporate world is presently moving towards an examination of the effects and interconnections of material budgetary and non-money related chances, dangers and execution over the worth chain as coordinated revealing. Incorporated announcing along these lines can be considered as a mix of money related and non monetary information which is required by the organization, partners and government.

Association Procedure: It depicts targets of the organization, Strategic, and how those destinations contrast with its qualities make and support an incentive after some time. It additionally incorporates an announcement about the assets and connections the association relies upon.
Administration: An attention on the structure of administration and its capacity to add to the accomplishment of goals.

Plan of action: Explanations about business mode, its key drivers and how it conveys a manageable development. With regards to incorporated revealing plan of action implies considering all the important capitals on which execution depends and clarifying their job in how the organization looks to make and continue esteem. The different classifications of capitals that can be considered are; Money related capital, Made capital, Human capital, Brand/client capital, Normal/social capital and Scholarly capital. As it were, coordinated announcing unites money related execution and maintainability of the organization in one spot. The different kinds of capital utilized are as per the following:

a. Financial capital:

The pool of assets i.e. available to the association for use in the creation of products or the arrangement of administrations and obtained through financing.

b. Intellectual capital:

Intangibles that give upper hand, including,intellectual property, for example, licenses, copyrights, programming and authoritative frameworks, techniques and conventions and the intangibles that are related with the brand and notoriety that an association has created.

c. Human capital:

Relationship building abilities' and experience, and their inspirations to develop alignment with and backing of the association's administration structure and moral qualities, for example, its acknowledgment of human rights, ability to comprehend and actualize an association's systems and loyalties and inspirations for improving procedures, products and ventures including their capacity to lead and to team up.

d. Manufactured capital:

Fabricated physical articles (as unmistakable from common physical items) that are accessible to the association for use in the creation of products or the arrangement of administrations, including buildings, equipment and infrastructure.

e. Social & Relationship Capital

The foundations and connections set up inside and between every network gathering of partners and different systems to upgrade individual and aggregate prosperity. Social capital incorporates common qualities and practices, key connections and the trust and reliability that an association has created and endeavors to assemble and secure with clients providers and colleagues and an association's social permit to work.

f. Nature capital:

Nature capital is a contribution to the creation of products or the arrangement of administrations. An association's exercises likewise sway, emphatically or adversely on common capital. It incorporates water, land, minerals, biodiversity and eco-framework wellbeing.

Incorporated detailing is the joining of an organization's money related report and its corporate social duty or maintainability report into a solitary record. An incorporated report furnishes peruses with a total image of how an association is performing by including non-budgetary data on natural, social and administration execution alongside money related data. Incorporated Reporting depends on coordinated reasoning including thought of different sorts of capital, their association and effect on short, medium and long haul possibilities of the organization and linkage with technique, execution and administration. The central ideas of IR are spoken to by the capitals that an association uses and influences, just as the way toward making an incentive after some time. That worth is typified in the capitals once in a while additionally alluded to as assets and connections. The appraisal of an association's capacity to make esteem relies upon a comprehension of the network between a wide scope of inside and outer elements in its plan of action.

Associations rely upon six unique sorts of capitals which are stores of significant worth that, in some structure become contributions to an association's plan of action. They are money related, produced, scholarly, human, social and relationship and normal.

Conclusion

The trip of Integrated Thinking and Integrated Reporting begins at the center of any association its plan of action. Assets, exercises, yield and results speak to the establishment of any business. Procedure definition, activity arranging, administration and hazard the executives put the organization's model for esteem creation moving. Nobody realizes the plan of action better than the executives bookkeepers since they have an all encompassing and novel point of view of an organization's qualities and shortcomings. Thus, they will wind up at the core of the drive to Integrated Reporting utilizing their Integrated Thinking. Bookkeepers and regulators should be set up for that drive they should be prepared and prepared to make the most of the chances to lead that will prosper in this space.

Again, Integrated Reporting is making the jump from promising idea to incredible practice all through the world. Extra Integrated Thinking and the executive's bookkeepers have the chance to lead these new works on going about as fashioners and pioneers of a space where organizations are consistently looking for a commonsense harmony among intensity and feasible development by and by. They can be originators on the grounds that Integrated Thinking and Integrated Reporting speak to an open stage that requires envisioning and understanding the plan of action instead of inflexible consistence with principles. They can likewise go about as pioneers since this procedure needs bearing since it requires interceding the associations and compromises between the various drivers of significant worth creation. These open doors are accessible and it's up to administration bookkeepers and money experts to exploit them.

Bharti Airtel Ltd.: A CASE STUDY

Bharti Airtel is one of the world's leading providers of telecommunication services with operations in 18 countries across Asia and Africa. The Company's diversified service range includes mobile, voice and data solutions, using 2G, 3G and 4G technologies. Airtel Money (known as Airtel Payments Bank' in India) extends our product portfolio to further our financial inclusion agenda and offers convenience of payments and money transfers on mobile phones over secure and stable platforms in India and across all 14 countries in Africa.

Financial Capital

To create sustainable value for all stakeholders, Airtel manage financial capital in an astute, optimum and diligent manner, thereby harnessing opportunities for long-term value creation. The EBITDA for 2018-19 is 25.87 and in 2017-18 is 33.83. the return on capital employed in 2018-19 is 1.71 and in 2017-18 is 2.65. the dividend paid is 19,888 as compared to 15,350 in 2017-18.

Intellectual Capital

In an evolving industry, their intellectual capital comprising of skilled & experienced team, technologies, processes & systems and most of all the innate command of brand keeps them a step ahead. They have always been a company of "many firsts" like 1st 4G, 1st open network, 1st payments bank, 1st rewards program in the industry. Finding innovative solutions to real customer problems keeps us running.

Human Capital

Airtel, believe that people are our key differentiators. Embedding a culture of organisational agility and collaborative team efforts, they have strengthened people agenda to create a harmonious environment

fostering a culture of innovation, pride and trust. The digital platforms therefore ensure that the employees progress dynamically to sustain their career growth.

Manufactured Capital

A great foundation always precedes great service in a telecom industry. Our strong infrastructure base enables us to serve our customers with highest standards of services they deserve.

Social & Relationship Capital

Airtel brings integrated and diverse product portfolio brings multiple benefits to the people helping stimulate social and economic growth .They make a positive contribution to the communities building a strong relationship driven by enduring values of Alive, Inclusive, Respectful.

Redefining customer experience

Operating in a dynamic and competitive business environment, they keep customers at the heart of our business strategy. Our long-term strategy of 'win customers for life' strengthens our commitment to ensure a superior customer experience product like AirtelThanks, Google Assistant, Next-Gen Airtel Store, Foreign Pass, Konnect App..etc.

Natural Capital

Airtel built a resilient and energy-efficient infrastructure system to support the growing telecom user base extending our sustainability philosophy. Through their persistent efforts along with their network partners, have been able to upgrade and convert the existing telecom towers into energy efficient towers. In addition to this it is their constant endeavor to maximize sourcing green energy from renewable sources through wheeling agreements for sourcing our power and in the process, reducing our carbon footprint.71% reduction in network emission intensity for mobile (carbon emissions per terabyte) from FY 2017-18. 30.48% reduction in CO2 emission per rack in our data centres from FY 2015-16. 10,147.78 KL diesel saved since 2015-16 in our own mobile network infrastructure. 18 Tonnes paper recycled/ reused in our facilities.

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25. SOCIALLY RESPONSIBLE INVESTING

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Abstract

"Socially Dependable Contributing (SRI), also known as feasible, socially cognizant, "green" or moral contributing, is any venture system which looks to think about both budgetary return and social great. When all is said in done, socially mindful Financial specialists empower corporate practices that advance ecological stewardship, shopper security, common freedoms, and decent variety. Nowadays, the Investors, companies and financial institutions believe that ESG factors i.e. environmental, social justice and governance factors can have long term consequences/ impart on a company's financial performance, either for better or for worse". It very well may be characterized as a cycle of distinguishing and Putting resources into an organization that meet certain norms of corporate social duty and is progressively rehearsed globally. Socially capable Contributing is as yet another idea and in its incipient phase of advancement in India. The explanations behind this are-absence of mindfulness among Speculators just as restricted accessibility of freely accessible ecological, social and administration data on organizations for Financial specialists to settle on money related choice. SRI is also sometimes called green investing due to the environmental screening criteria commonly used. An investment is considered Socially responsible because of the nature of the business the company conducts. Sustainability Investment or Socially responsible Investing strategies would mean wilfully avoiding investment in companies that produce or sell or render services which are harmful to society as well as the environment and specifically choosing companies which are engaged in rendering Socially and environmentally sustainable products and services. As the Investor is limiting himself from making investments in Market portfolios companies that are not regarded as Socially responsible investments, whether it would increase the risk of the portfolio or decrease the return of it, relative to a well. Diversified portfolio. This paper seeks to investigate if Socially responsible Investments are in fact paying a price for making ethical investments. The objectives of the study are to measure the Socially responsible investments (Greenex Carbonex) when compared with market portfolio BSE sensex and NSE Nifty 50 and to examine if Socially responsible Investors must accept a lower return for investing in ethical funds relatives to market returns in the short time.

Keywords: Socially responsible Investing: BSE Greenex, BSE Carbonex, BSE Sensex and NSE Nifty 50.

Introduction

Social duty is the possibility that business should adjust benefit making exercises with exercises that advantage society; it includes creating business with a positive relationship to the general public in which they operate. The Global Association for Normalization (ISO). Underscores that the relationship to the general public and condition wherein business work is "a basic factor in their capacity to keep on working successfully. It is likewise progressively being utilized as a proportion of their general exhibition."

In straightforward words, it is a venture cycle that thinks about the social and natural results of speculations, both positive and negative, inside the thorough money related examination. It can likewise be characterized as a cycle of distinguishing and putting resources into an organization that satisfy certain guidelines of corporate social obligation and is progressively drilled globally. SRI is otherwise called Practical and Dependable Contributing and Green Contributing.

Socially Capable Contributing (SRI) otherwise called reasonable contributing - alludes to venture techniques that try to give budgetary return as well as be steady with virtues and have positive cultural effect. SRI can be as clear as a speculator who abstains from putting resources into any industry, they find

ethically sketchy, for example, a tobacco maker to as unpredictable as a billion-dollar support that screens in or out various kinds of venture openings dependent on key execution markers in ecological and social zones. The ecological boundaries relate to environmental change and related dangers, measures received by organizations to lessen harmful deliveries and squanders and so on. Social boundaries incorporate conduct of the organization towards partners, working environment wellbeing and security standards. Also, administration boundaries incorporate board structure and responsibility and so on. In spite of the fact that this idea of "socially capable contributing" is now pervasive in created nations; it is currently assembling force towards developing markets.

S&P BSE CARBONEX

Launched in November 2012, the S&P BSE CARBONEX is designed to provide a cost-effective way for equity investors to manage the risks associated with climate change over the long term, by identifying key climate change exposure, sensitivity and responsiveness factors. The UK Foreign & Commonwealth Office, through its Prosperity Fund and British High Commission in India, contributed to the cost of development up to the launch of the index.

SENSEX

The term Sensex was coined by Deepak Mohoni, a stock analyst. The S&P BSE SENSEX (S&P Bombay Stock Exchange Sensitive Index), also called the BSE 30 or simply the SENSEX, is a free-float market-weighted stock market index of 30 well-established and financially sound companies listed on Bombay Stock Exchange. The 30 component companies which are some of the largest and most actively traded stocks, are representative if various industrial sectors of the Indian economy.

The file is determined dependent on the free buoy capitalisation technique, a variety of the market capitalisation strategy. Rather than utilizing a organization's extraordinary offers it utilizes its buoy, or offers that are promptly accessible for exchanging. Free Skimming capital suggests absolute capitalization less Chiefs Shareholding. Asper free buoy capitalisation approach, the degree of list anytime of time reflects the free buoy market estimation of 30 segment stocks comparative with a base period. The market capitalisation of an organization is dictated by increasing the cost of its stock by the quantity of offers gave by of corporate activities, substitution of scrips.

NIFTY 50

The Nifty 50 index is National Stock Exchange of India’s benchmark stock market index for Indian equity market. Nifty is owned and managed by India Index Services and Products (IISL), which is a wholly owned subsidiary of the NSE strategic Investment Corporation Limited. IISL had a showcasing and authorizing concurrence with Standard and Poor's for co-marking value files until 2013. Clever 50 List has gotten down to business as a biggest single monetary item in India, with an environment involving: trade exchanged assets (coastal and seaward), trade exchanged fates and choices (at NSE in India and at SGX and CME abroad), other file reserves and OTC subsidiaries (generally seaward). Clever 50 is the world's most effectively exchanged agreement. WFE, IOMA and FIA reviews underwrite NSE's administration position.The NIFTY 50 covers 22 segments of the Indian economy and offers speculation administrators introduction to the Indian market in one portfolio. The Clever 50 file is a free buoy market capitalisation weighted list.

BSE GREENEX

About the Index The BSE-GREENEX is the 25th dynamic Index hosted on the Bombay Stock Exchange. It is a first of its kind benchmark index, which assess the 'carbon performance' of stock based on purely

quantitative performance-based criteria. Unlike existing global indices that measure environmental performance through various scaled quantitative criteria, the BSE-GREENEX applies sector specific proprietary algorithms, developed in cutting edge research facilities, to assess energy efficiency performance of various companies based on publicly disclosed energy and financial data.

Literature review

Brammer, Brooks and Pavelin (2005) studied the relationship between corporate social performance and stock returns in the U.K. This study employed data at the firm level, rather than at the fund level, which they argue is highly desirable. They observed that firms scoring highly on ethical appear to represent poor investments. Thus, their research lends support to the notion that findings of ethical funds under performance may be the result of bad stock rather than fund managers. They find that all of the performance attribution financial variable (beta, price-to-book, market capitalisation, and the previous year's return) had negligible correlation with the CSP variables expect for market capitalisation.

Benson, Brailsford and Humphrey (2006) examined whether the portfolio allocation across industry sectors and the stock-picking ability of SRI Managers are different when compared to conventional fund managers. The study first found that the performance of SRI funds is not distinguishable from conventional funds over the period 1994-2003. Moreover, using data at 2003, they found no material in fee levels.

Bauer et al. (2006) investigated whether there is a money related punishment for being a moral Financial specialist in Australia. They watched no proof of huge contrasts in hazard balanced returns among moral and regular assets during 1992-2003. During 1992-1996. Homegrown moral assets failed to meet expectations different assets fundamentally. Though during 1996-2003 moral subsidizes coordinated the exhibition of different supports all the more intently.

Bauer et al. (2007) also examined the performance and risk sensitivities of Canadian ethical mutual funds and the conventional funds using single factor model and Carhart multi-factor model. Ethical and conventional fund is statistically insignificant. Moreover, they found no evidence that the Investments style of ethical mutual funds is significantly different from other funds.

Kempf and Osthoff (2007) concluded whether Investors can increase their performance by following a simple trading strategy based on SRI rating from the KLD research and analytics. Buy stock with high SRI ratings and sell stocks with low SRI ratings. They implemented this strategy for stocks included in the S&P 500 and the DS 400 for the period statistically significant excess returns and that the performance of such mutual funds is not statistically different from the performance of conventional Mutual funds.
Hendrick (2010) inspected whether the Blue Grass People Group Establishment (BGCF) ought to think about a system of Socially Capable Contributing (SRI). Based on one-year returns, there was a distinction of roughly five rate focuses for SRI reserves and minuscule P-esteem shows that the thing that matters was measurably noteworthy. Long term period results show that non-SRI reserves having a bigger normal return than SRI reserves, the reverse from the one-year returns. However, based on P-esteem, there is no factual contrast in the methods between the two examples, accordingly showing that being a SRI reserves doesn't have any kind of effect.

Objectives

- To understand the concept of Socially Responsible Investing.
- To analyse the performance of the select Socially Responsible Portfolio's in terms of return and risk.
- To compare performance of Market Portfolio with Socially Responsible portfolio.

Methodology

Two Market Portfolio's "SENSEX" and "NIFTY50"have been chosen and
Two Socially Responsible Portfolio's "GREENEX" and "CARBONEX "have been chosen.

Data analysis

All studies so far have examined the risk return performance of ethical funds in the long run. The present study evaluates performance of these funds in the short run. It is a well-established fact that though equity gives good results in the long run there are investors who prefer a short-term investment horizon and the returns in the short period are taken as indicators for long term returns.
Two stocks in India, Greenex and Carbonex and two Traditional Portfolio Nifty50 and Sensex have been chosen for evaluation.

GREENEX The BSE Greenex comprises of top 25 stocks having minimum carbon footprint along with market capitalization and turnover from the BSE 100. It assesses the energy efficiency of firms.
CARBONEX The BSE carbonex tracks the presentation of the organizations inside the S&P BSE 100 file dependent on their pledge to moderating dangers emerging from environmental change.
SENSEX Sensex involves the 30 biggest and most effectively exchanged stocks on BSE, giving a check of India's economy. The list's creation is evaluated in June and December every year. Experts and financial specialists use it to watch the patterns of India's economy and the turn of events and decrease of specific businesses.
NIFTY 50 The index comprises of 50 stocks of blue-chip companies in India. it is considered as an efficient portfolio as it covers all major sectors of the Indian economy. It is the flagship index of the National Stock Exchange
A period of 3 years i.e., 01 april 2017 to 31 march 2020 was chosen for the study.
The yield on 10 year Government of India Bond has been taken as the proxy for the risk free rate of return.
The following procedure was used to measure the performance of the selected portfolios.
Returns $(P_t-P_{t-1})/P_{t-1}$ was used to calculate the daily returns and converted into percentages.
Standard Deviation which is an accepted measure of the total risk is calculated as the square root of variance by determining the variation between each data point relative to the mean
Coefficient of Variation It is a measure of relative risk i.e., risk per unit of return. Coefficient of variation allows us to determine how much risk we are assuming in comparison to the amount of return we are expecting from our investment.
Beta The volatility or systematic risk of a security or a portfolio in comparison to the market as a whole is measured by Beta. If Beta is greater than 1 indicates aggressive portfolio.
All the above measures were calculated with the help of MS Excel Application

Risk Adjusted Performance measures

Shape Ratio It is also termed as reward to variability ratio and is calculated as the excess return per unit of total risk. Sharpe Ratio can be calculated as:

Sharpe Ratio = Rp –Rf / □ p

Where, Rp = average return on portfolio

Rf = risk free rate of return

□ p = standard deviation of the portfolio return.

Treynor Ratio It is also called reward to volatility ratio and is calculated as the excess return per unit of systematic risk. Systematic risk is indicated beta (β).

Treynor Ratio = Rp –Rf / □

Where, Rp = average return on portfolio

Rf = risk free rate of return

□ = Beta coefficient of portfolio

Jensen's Alpha It is the excess of actual return over CAPM return and is also termed as abnormal return.

Jensen's Alpha α = Rp – $\overline{Rp}$

Where, $\overline{Rp}$ = average return on portfolio

$\overline{Rp}$ = Rf + □(Rm-Rf)

Rf = risk free rate of interest

□ = a measure of systematic risk

Rm = average market return

Results and Findings

The results of the study have been tabulated below. The study analyzed monthly returns of two social portfolios and two traditional portfolios for a three years period. The mean return of Sensex is higher than nifty and two proxy social portfolios which shows they are performing low than traditional stocks. (table:1)

Table 1: Risk Return Profile of Ethical and Traditional Portfolios.

Measure	**Greenex**	**Carbonex**	**Sensex**	**Nifty 50**
Ave. Returns	-0.000059286	0.00006904	0.000084956	0.000074394
Std. Dev.	0.000562483	0.00084940	0.00091498	0.000834447
Beta	0.275	0.959	1.000	0.941
Annualized Return	-0.07%	0.08%	0.10%	0.09%

Source: Authors compilation

The standard deviations which measures the risk indicates a marginal difference. Greenex and Carbonex seems to be less volatile than the market.

Table 2: Correlation Matrix

Portfolios	*Greenex*	*Carbonex*	*Sensex*	*Nifty50*
Greenex	1			
Carbonex	0.101661	1		
Sensex	0.133431	0.984749414	1	
Nifty50	0.118971	0.995332793	0.995497958	1

Source: Authors compilation

The correlation matrix (table: 2) indicates very low positive linear relationship exists between the two social portfolios. The correlation between the Carbonex and the market is positive and indicating portfolio returns may be exactly replicating the market returns. This is justifiable as the market portfolio comprises

of stock from best performing sectors of the economy but not all the social stocks. While Carbonex portfolios are replicating market but Greenex portfolios are not performing in accordance to market.

Table 3: t-test results for returns of portfolios

Portfolios	Mean Difference	t.stat	P value
greenex and carbonex	0.000128326	-0.78274	0.219599
greenex and sensex	0.00014424	-0.84651	0.219599
greenex and nifty	0.00013368	-0.83318	0.20528
carbonex and sensex	0.000015916	-0.56265	0.288682
carbonex and nifty	0.000005354	-0.38299	-0.38299
sensex and nifty	0.000010562	0.540594	0.296156

Source: Authors compilation

The t-test (table: 3) results throw light on how significantly different are the mean returns of the four stocks. The p values indicate that the returns of the two social stocks are different in performing in accordance to market portfolio. Thus, social stocks are differently impacting on performance in choosing the portfolios. Hence restricted choice has affected the return of the portfolios.

Table 4: Risk Adjusted Performance Measures of Traditional And Ethical Portfolios.

Measure	*Greenex*	*Carbonex*	**Sensex**	**Nifty 50**
Sharpe Ratio	-41.83776857	-0.009954282	-0.011272663	-0.010159856
Treynor's Ratio	-0.085727793	-0.022931865	-0.021804924	-0.023304378
Jensen's alpha	-0.017547395	-0.00108092	0	-0.001411085

Source: Authors compilation

The sensex has been taken as the benchmark index and annual yield on 10-year Government of India Bond has been taken as the proxy for the risk-free rate. The results have been presented in the table 4 above. According to Sharpe and Treynors ratio greenex has underperformed the market index and as per Treynors ratio social stocks provided very less risk adjusted returns than sensex. Jensen's alpha indicates that both the social stocks have given returns very less over market returns. Thus, their risk is higher than the conventional portfolios.

Conclusion

The study concludes that the carbonex is performancing in accordance to the market but Greenex is performing low and away from the traditional markets. This means their returns are different with traditional market portfolios.

It is thus concluded that carbonex are the best to invest even in the short run with are proportional to traditional markets. Although both Greenex and Carbonex are towards the social betterment, carbon emission companies are performing low and the companies with atmosphere conscious are performing well in the market in accordance to traditional markets. So, there need to be wise decisions while investing in the social companies.

Scope for further study

The study has been limited to the Indian Context and has covered a short period only. It may be extended to include social companies in other countries of the region. Further the returns of social stocks can be compared with returns of other investment avenues apart from equities.

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26. SUSTAINABLE FINANCE: ESG INVESTING

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Abstract

As we are reeling from an ongoing pandemic, these unprecedented times have made it more evident why we need sustainable measures across the globe. As everyone around the world is growing conscious about the environment, these measures are being adapted in each and every sector. The issues this paper examines include sustainable financial measures being adopted worldwide and more specifically ESG Criteria, the United Nations Principles of Responsible Investment, the globally adopted GRI reporting and the Business Responsibility Report and the ESG Indices. After the financial crisis of 2008 and the numerous scandals that rocked the world, investors became conscious of investing their money in businesses that not only aim at maximizing shareholders wealth but also those that included sustainable practices. Various reports have shown that responsible businesses that have adopted ESG are performing better and are the hot choices for investors in comparison to companies and businesses that are yet to adopt them. Organizations are now more responsible about the carbon emissions, dumping of industrial waste and simultaneously creating a safe work environment and having diversity among their workforce. The governance measures include reporting of the remuneration of the members and following of practices that promote wholistic well being of all its stakeholders. There are several measures used to judge an organization's performance based on these factors. The paper also sheds light on what sustainability means and the evaluation of ESG in India so far.

Keywords: Sustainability, ESG, Investors

Introduction

Sustainability can be defined as the ability to exist constantly whereas sustainable development is a broader term. Sustainable development is the approach that emphasizes, development, keeping in view the needs of future generations. The availability of natural resources is limited and thus it calls for practice of sustainable measures.

The aspects of sustainability are being adopted across every sector. This is being done keeping in mind the best interest of all the stakeholders. One such sector is Sustainable Finance. The main aim of Sustainable Finance is to carry out the financial activities in a way that they integrate "environmental, social and governance" criteria into business which is popularly known as ESG. There is a rising awareness amongst the investors about the long term impact of businesses on the environment. The investors, be it individual investors, institutional investors or fund managers, look to invest after considering the social, environmental and ethical consequences of their investment which is known as Socially Responsible Investment (SRI). Sustainable finance includes a plethora of activities such as:

Sustainable Funds: these funds use ESG Criteria to evaluate investments rather than a value based approach.
Microfinance: individuals and small businesses that lack access to banking and credit services can benefit from microfinance for their requirements
Impact Investing: refers to investment made in those options that generate an environmental and social benefit and just not monetary.
Green Bonds: are bonds used to raise finance for projects that relate to climate and the environment.

Socially Responsible Investing: involves investment in companies and funds that have positive social impact.

ESG criteria's is aimed at measuring a company's operations on the basis of how diligently the company uses the environmental resources, its social relationships with the various stakeholders and the governance standards followed by a company. Firstly, the environmental criteria of assessing a company includes issues related to disposal of hazardous waste, toxic emissions, treatment of animals, natural resource conservation etc. Secondly, the social criteria used to assess a business are related more towards the conservation of the interest of various stakeholders, corporate social responsibility initiatives, the work environment created for the employees etc. Lastly, the governance criteria look at whether the accounting practices of the business are done diligently and transparently or not. Since investors of late, give more importance to sustainable businesses, the companies now publish ESG approaches in their annual report and state the same on their websites.

Table 1.1: ESG related issues

S.No	Environmental Issues	Social Issues	Governance Issues
1.	Carbon Emissions	Working Environment	Accounting Practices
2.	Disposal of Hazardous waste	Human Rights	Executive Remuneration
3.	Climate Change	Gender Equality	Conflict Resolution
4.	Natural Resource Management	Safety Standards	Composition of Board of Directors
5.	Pollution Levels	Data protection policies	Management Committees

Source: Author compiled from KPMG report on Sustainable Finance and other sources

The adoption of ESG criteria by companies began in 2010 when in the aftermath of financial crisis of 2008, companies started adopting governance reforms. The focus was on having diversity and independence on the board and later it shifted to adapting environmental and social issues as well. ESG movement was globally recognized in various summits and the need to adopt these measures was felt necessary.

United Nations Principles for Responsible Investment (PRI)

In April 2006, with support from the United Nations, the UN Principles for Responsible Investment (PRI) came into existence to promote incorporation of "environmental, social and governance" factors into investment. There are over 2000 financial institutions that are signatories and collectively are responsible for total assets under management (AUM) of over $80 trillion. The organization has six core principles that are to be adhered to by the financial institutions who were the signatories.

Table 1.2 Six Core Principles for Responsible Investment (PRI)

Principle	Includes
Principle 1	Incorporate ESG issues into investment analysis and decision-making processes.
Principle 2	Be active owners and incorporate ESG issues into our ownership policies and practices.
Principle 3	Seek appropriate disclosure on ESG issues by the entities in which we invest.
Principle 4	Promote acceptance and implementation of the Principles within the investment industry.
Principle 5	Work together to enhance our effectiveness in implementing the Principles.
Principle 6	Report on activities and progress towards implementing the Principles.

Source:www.unpri.org

Each principle specifies possible action that can be taken with regard to them and broadly include addressing ESG issues in investment policy statements, develop and disclose policy consistent with the principles, make standardized ESG related reports, support collaborative initiatives, disclose ownership activities and communicate about ESG etc.Kotak Mutual fund is the first asset management company from India to have signed the PRI and there are four more asset management firms that are signatories.

A Timeline of ESG and related Disclosures in India:

In India, Corporate Social Responsibility was made mandatory in April 2014, following an amendment notified in the Companies Act, 2013. Section 135 of the Act requires companies with turnover of INR 1000 Crores or more, net worth of INR 500 Crore or more or net profit of INR 5 Crore or more to spend 2 per cent of their average net profits of the last three years on social development projects. In the wake of adoption of Sustainable Development Goals by 193 countries, the CSR activities adopted by Indian Companies became even more eminent as it is an extension of committing to the long term welfare of our society at large.

Now, the investors focus is shifting towards ESG. According to an article in the Economic Times, the focus of ESG disclosure initially was more on the big companies as they lead with example.
Corporate Social Responsibility Guidelines were issued by the Ministry of Corporate Affairs in 2009 which recommended that businesses have a policy regarding CSR.

In 2011, these guidelines were made more inclusive and detailed as "National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business".

As per a circular issued by Securities Exchange Board of India in 2012, the top 100 listed companies were mandated to issue an annual business responsibility report. This limit was later extended to include top 500 listed companies.Further in 2018, the Bombay Stock Exchange came out with a guidance documents that included a more detailed approach towards ESG reporting and provides 33 specific issues and metrics on which companies are required to focus.

Keeping in the mind the above stated disclosure requirements, the ESG reporting is still voluntary. There is still a shift in investor's perception and they are demanding that businesses behave sustainably.

Table 1.3 Nine Principles of Business Responsibility Report

S.No	Principle
1.	Ethics Transparency and Accountability
2.	Product Life Cycle Sustainability
3.	Employee Well-Being
4.	Stakeholder Engagement
5.	Human Rights
6.	Environment
7.	Policy Advocacy
8.	Inclusive Growth
9.	Customer Value

Source: Author compiled from The Economic Times: How evolving ESG disclosures rules are altering investment dynamics

Other attempts to bring ESG into practice in India include the launching of a $1 billion ESG fund in India by Avendus and Quantum Advisors, an investment firm along with three former employees of TATA group. Several investment management firms from India are signatories to PRI which integrates ESG practices in investing. SBI Funds Management has a thematic fund that invests in companies that follow ESG norms by the name of 'Magnum ESG Equity Fund'.

The Economic Times article published in January 2020 reported that The National Stock Exchange's NIFTY 100 ESG Index and Nifty 100 Enhanced ESG Index outperformed the benchmark Nifty 50 index. This makes the case even stronger for companies to adapt ESG criteria as they attract investors and will benefit them and the stakeholders in the long term.

Global Reporting Initiative (GRI)

The business houses that are adopting ESG criteria are also disclosing them in their reports. However, there is a need to standardize the reporting of ESG criteria to make them more comparable and understandable to investors. One such standard is the Global Reporting Initiative (GRI). GRI is an independent organization which introduced the GRI Standards in October 2016. These standards are the first set of standards for reporting on sustainability and aim to represent the best global practices on economic, environmental and social impact. These standards are also used for reference by policy makers and regulators as they enable trustworthy reporting by companies across the globe. As per the GRI standards, there are three universal standards applicable to all organizations, which are:

- GRI 101: Foundation is the starting point for a business to report the economic, social and environmental impact made by it. It is a part of GRI 100 series and seeks to define the principles that determine reporting quality and content.
- GRI 102: General Disclosures are used to report the contextual information about an organization which includes the size, geographic location and other activities that help the stakeholders in understanding the business better. It also includes the sustainability reporting practices which reveal the ethics and integrity, strategies, governance, stakeholder engagement practices etc.
- GRI 103: Management Approach disclosures are meant for disclosure of economic, environment and social impact related to material topics.

All these standards are issued by an independent standard body, Global Sustainability Standards Boards (GSSB). The GSSB is formed by 15 members who have a range of expertise and multi-stakeholder perspective. They represent diverse sectors, backgrounds and regions around the world. They work for public interest and imbibe the mission and vision of the GRI. The meetings of GSSB are at large open for the public as well. The most recently issued guidelines are the G4 guidelines and it includes various categories namely, economic, environmental, social, product responsibility, human rights and society.

Business Responsibility Reporting (BRR)

As per a circular issued in August 2012, the Securities Exchange Board of India (SEBI) mandated the top 100 listed companies to undertake Business Responsibility Reporting. This report is also uploaded on the company website. Later this limit was extended to include top 500 listed companies based on market capitalization. To provide a transparent report on sustainability to the various stakeholders, an organization

can comply with the guidelines of both the GRI and the BRR standards. Bombay Stock Exchange has also joined the bandwagon of the Sustainable Stock Exchange Initiative and guides the companies in complying with sustainable reporting. By including the top 500 listed companies under the purview of this reporting mandate, these businesses set an example for smaller businesses. Since these businesses have access to more resources both quantitatively and quantitatively, there responsibility is considerably more. The companies that are required to submit a BRR adopt the BRR policy and constitute a committee for the same. A director is designated to implement these policies in the organization and a system is formulated to assess the business responsibility performance of the company.

ESG Indices

Another major uptrend has been in the launch of new green indices each year as the investors focus has largely shifted from profit making or wealth creation to sustainable investing. There is evidence that sustainability related indices are performing better in comparison to other indices. To meet the investor's requirement, there is launch of new indices each year by organizations as they are becoming more and more diligent towards addressing investors concerns. As stated by The Index Industry Association (IIA), they recorded a 60% rise in the number of ESG indices in 2018.

One major index is the MSCI ESG Index Morgan Stanley Capital International). The ESG indexes of MSCI represent the performance of the most common ESG approaches. It is the first ESG rating provider to measure the companies risk exposure. There are over 1500 equity and fixed income ESG indexes that help the institutional investors to manage, measure and report ESG documents. Under this framework, the indexes have been organized into three categories which are undertaken considering integration, value and impact. The main aim is to integrate a broad set of issues by:

- Re-weighting companies in a broad and diversified index
- Maximize exposure to high ESG rated companies
- Selecting highest rated ESG performers in each sector
- Selecting highest rated ESG performers while excluding controversial activities

MSCI Inc. is also the first to launch Low Carbon Indexes that address the carbon emissions and fossil fuel reserves. It has also launched the Provisional Climate Change EU Climate Transition and EU Paris aligned indexes in 2019.

Conclusion

As this decade commences, the need for sustainable development is being felt worldwide and thus measures to address the same are being widely adopted. The Sustainable Development Goals were also adopted by member states of United Nations in 2015 to end poverty, protect the planet and ensure peace and prosperity by 2030. There are 17 SDGs in total that address issues of hunger, poverty, education, gender equality, responsible consumption and production etc. There is rising awareness amongst people to contribute their share to the environment and this awareness has given rise to adoption of sustainable measures. An investor today is equally concerned about the sustainability aspect as much as wealth creation. They want to associate with organizations that promote well being of their various stakeholders and behave responsibly. This has given rise to adoption of ESG and SRI measures. The companies are evaluated on the basis of their sustainability reports and the more they score on ESG factors, the more investors they attract. The ESG criteria is here to stay and can go a long way in the coming years in terms of contribution to the society at large.

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27. GREEN ACCOUNTING – THEORY AND PRACTICES

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Abstract

Social responsibility with respect to environment is one of the key elements under corporate social responsibility. In order to withstand in this competitive markets, many companies have integrated the concept of environmental elements as a part of their business activities, where a new system of social and environmental accounting has emerged known as, "Green accounting". It can be defined as, "a type of accounting that attempts to factor environmental costs into the financial results of operations". Green accounting will help the companies to identify the usage of resources and the cost spent on the environment by the activities of the companies. The present study emphasize the concept of green accounting and also review the need for and the importance of green accounting and also elucidates varied approaches that are used by the companies in the process of internal decision making.

Keywords: Green accounting, corporate social responsibility, environmental costs, internal decision making.

Introduction

The celerity and essence of changes in the environment has an extensive impact on business organizations. Now-a-days, organizations have to face so many challenges to improve ecological performance that are said to occur from various houses like new laws and regulations, market and other stakeholders. It has become mandatory for the companies to strengthen their responsibility with respect to all the aspects of environment. Schonberger (1990) in his study noted that the traditional system of accounting fall behind with respect to the growth in quality, design, purchasing and remodeling responsibility of people. As a part of this companies are adapting green accounting practices to minimize the ecological degradation. Green accounting concept accounts for factors of environmental costs as a part of business activities. Green accounting attempts to assign value for the environmental resources which do not have a market value.

Objectives of the study

The following are the objectives of the study:

- To understand the concept of green accounting.
- To review the need and importance of green accounting.
- To understand how green accounting can be incorporated into financial accounting and reporting.

Review of Literature

The theory of Green Accounting and its significance in decision making are examined by few authors in their articles and are discussed hereunder:

Vasanth Vinayagamoorthi (2012) evaluated the internal decision making tools that are used by the business corporations to make decisions regarding environmental considerations. Dina Wahyuni (2009) has mentioned green accounting as a means to separately identify, quantify, analyze, and interpret corporate environmental aspects. Oren Perez (2007) outlined the differences between three fields of financial regulations i.e., project financing, ethical green investment, and environmental reporting as a

part of institutional framework which facilitates the work of the financial markets. Dimitra Vouvaki (2007) focused on constructing a new method to total factor productivity growth measurement methodology, at a macroeconomic level by considering the use of environment in the traditional method of calculation.

Research Methodology

The study titled, "Green Accounting-Theory and Practices," has been organized based on alternate method of gathering information from various sources like national and international research articles, e-libraries, and e-books. The current studies have been classified into two sections for further discussion and are mentioned hereunder:

Section-A: Concept of Green Accounting and its need and importance.

Section-B: Various Internal decisions making tools that are used by the companies to incorporate green accounting practices as a part of their financial accounting and reporting.

Need for the Study

In the present contemporary era of highly wavering business environment, organizations are said to confront the challenges in environment issues. Environmental distortion has become a global problem that demands for a global solution. This has become most significant in the sector of corporate social responsibility. This led the companies to adapt the concept which also accounts for environmental costs and benefits that are used by companies. The study helps to understand the concept of green accounting by briefing the reasons for adapting and also interpret the decision making tools that are taken into account as a part of including green accounting in the financial reporting.

Discussion

Section-A Concept of Green accounting and its need and importance

Sustainable management system entails the business organizations to use triple bottom line framework. The framework allows the companies to review the traditional essence of business which focus only on profits but ask to look beyond what business actually makes socially, ecologically and economically by using triple P's concept i.e., People, Planet, and Profits. The responsibility towards the environment is an influential issue for the business organizations in the competitive modern era. The organizations are needed to formulate those methods which promote green principles for present and future. Green accounting is the recent emerging concept that adapts the principles given by "system of environment and economic accounting", which helps the organizations in the process of recognizing, evaluating, and allotting the environmental outlay and their integration into business decisions. In short, it can be understood as a type of accounting that accounts for the full disclosure of information related to the environment to assess both the substantial and financial benefits to consider environmental decision making.

Reason for adapting Green Accounting In the ambitious modern era, we need an ideological concept to protect and conserve the elements of earth's ecosystem. And this increased awareness made the public and industries to look for a possible solution for the major environmental problems which lead to environmental degradation and degeneration. This may be caused due to various types of pollution such as air, water, sound, soil erosion, deforestation, etc. The following are the reasons for adapting the green accounting practices

- Accounting for environment has become outmost relevant for the organizations as it is evident that the negative impact of environment is to be borne by the economy which in turn affect the organization and thereby also shows its notable impact on gross domestic product
- Preserving environment and development of economy are the two major concerns, where the companies can adapt green accounting in order to maintain a balance between the two.
- Although the companies are tend to comply with corporate social responsibility activities, there are no clear policies that are mentioned with respect to the environmental resources used by the companies that has cost and benefits.
- It is out most important to bring awareness among the common people regarding the safety of environment and need for accounting of environmental resources.

Importance of Green Accounting Environment which has play a vital role in the existence and living on the planet earth, is facing problems from all over has the ability to slow down the economic growth. The system of green accounting is viewed as one of the prominent system that can improve the economy and environment. The importance of green accounting are stated here under

- The concept of capital will be covered which not only talks about the human capital, but also focus on the natural capital
- Helps to assess the cost and benefits that are elicited with the changes in the environment and pollution along with the impact on overall production and consumption.
- This tool provides the organizations with the potential quid pro quo between the emerging economic and environmental goals.
- Companies that adopt for green accounting can gain a competitive advantage with respect to the products, processes and services that are offered to their customers.
- Green accounting concepts can be applied to all the levels of management that helps the organization in the internal decision making process.

Section-B Various internal decisions making tools that are used by the companies to incorporate green accounting practices as a part of their financial accounting and reporting

This section of discussion gives us a clear understanding about the various tools that are convenient for internal decision making by considering the environmental aspects in business. This can be classified in to three main heads namely, cost analysis, investment appraisal and performance management. These are discussed below

a. *Tools for Cost analysis:* The following are the tools under cost analysis

- *Life Cycle Assessment LCA*

  It is a mechanism that is used to evaluate the ecological impact of a product, its process and other activities from cradle to grave. The system of LCA estimates the consequences that are said to arise from various raw material, processes, production activities as well as recycling activities till their disposal. And give detailed information of the impact during its life cycle on the environment and human health. And finally take up an improvement analysis which would result in lowering the impact on environment at each stage of a product or service.

- *Activity Based Costing*

It is a tool that helps to assign the cost to a product or service by identifying the operating cost and thereby selects the cost drivers for the purpose of assigning the cost. This method is considered as an improved method as it allocates environmental costs in such a way that the environmental cost is best associated with the operational cost. And thereby helps to take decisions for reducing the impact on environment.

- *Flow Cost Accounting*

  Also called as Material Flow Cost analysis. It helps the organizations to measure and understand the usage of resources. It is used in calculation of actual cost waste that is hidden. It assists the organizations to improve the operational efficiency. The primary aim is to delineate the energy and material that flow through a product or service for a certain period at every level and carry out the detailed cause and effect analysis. The information that is derived from cause and effect analysis is used by the management in the process of decision making.

b. Tools for Investment Appraisal

- *Total Cost Assessment (TCA:*

  Total cost assessment is a traditional method of financial analysis which was developed in the year 1991. It refers to the assessment of long term comprehensive analysis that range from internal costs to savings of an investment. Total cost assessment with respect to green accounting includes the environmental cost into the capital budgeting analysis that takes into account for all the direct and indirect costs and savings, and time value of money. It helps to incorporate both financial and non-financial information that allows the manger to take decisions which offer distinct benefits of trade-offs.

c. *Tools for Performance Management*

Balanced scorecard is a strategic performance management tool that is used to track the performance by the management evaluation team. It also helps the organizations to evaluate the environmental aspects in terms of performance management.

- *Environmental Balanced Scorecard*

  Environmental viewpoints can be integrated into the balanced scorecard. Environmental balanced scorecard is a process that allows the management to take decision regarding the selected environmental indicators by collecting and analyzing the data with respect to the performance criteria. After detailed analysis a report is issued that gives a review of the performance as well as improvement analysis. It includes the specific environment indicators in all the phases of performance evaluation and therefore helps the organization in decision making process.

Conclusion

Green accounting is an emerging concept in India. It is gaining international acceptance with the increased awareness created by International Environmental Management Standards. If these green accounting principles are incorporated in all the levels of organization may witness major changes in the betterment of environment. It also helps the organizations in better utilization of the resources by maintaining sustainability in the environment. It is evident that all the possible efforts are made to introduce a mechanism which can include environmental data in the process of computation of national income to improve the economic development. And in this process India Government has explored various alternatives to reduce the carbon-growth path, five Indian companies have made it possible and exhibited their leadership in adapting new measures which would help in preserving the environment. And those

companies are CDP climate performance leadership index, Essar Oil, Tech Mahindra, Tata consultancy services, and Wipro. And there after so many other companies have joined the list to contribute towards safeguarding the valuable resources of environment.

Suggestions

There is a need to create increased awareness about green accounting to the common public as well as the organizations. Government should take initiative to make green as a mandatory policy for all the organizations along with the corporate social responsibilities. There is a need to provide clear guidelines about the green accounting policies and the detailed procedures for accounting various costs of environment.

Limitations of the Study

- The study is purely based on secondary sources of data.
- The study limits itself by providing only the theoretical aspects of the concept.

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28.GREEN FINANCIAL PRODUCTS AND SERVICES : SUSTAINABLE DEVELOPMENT

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Abstract

To satisfy growing demand, new financial instruments, such as green bonds and carbon market instruments, are being established, along with new financial institutions, such as green banks and green funds. Together, these instruments and institutions constitute green finance. In simple terms, green finance involves engaging traditional capital markets in creating and distributing a range of financial products and services that deliver both investable returns and environmentally positive outcomes. The focus can be on greening of existing infrastructure spending or mobilizing additional investments in key sectors, such as clean energy, sustainable transport, natural resources management, ecosystem services, biodiversity, sustainable tourism, and pollution prevention and control. In other words, Green Finance provides the financial tools required by active agents to increasingly generate activities with positive and durable externalities. The promotion of renewable energies, energy efficiency, water sanitation, environmental audits are some examples of Green Finance projects are but not only these but also many that strengthen healthy environments like the reduction of transportation and industrial pollution, climate change, deforestation, carbon footprint.

Key Words: financial instruments, green bonds, carbon footprint, industrial pollution, traditional capital market, renewable energy.

Introduction

Green finance had its roots in Western countries, which were the first to face widespread environmental problems from consumption of fossil fuels and industrialization. China will benefit greatly from drawing on their experiences with synergizing financial policies, building institutions and facilitating product innovations to promote green investment. India is extreme **climate conditions**, from **flash floods** to droughts and record breaking **heatwaves**. As a climate change has a drastic causes and effect relationship with agriculture and rural development activities, it has been recognized that activities like forestry and agriculture and other land use activities, viz, dairy, soil conservation, energy use practices, use of renewable energy, etc. have tremendous potential for reducing emission of **GHGs**(Green House Gasses emmissions). **Climate change** and **agriculture** are interrelated and climate may have significant effects on crop production and food availability. It is speculated that by 2050, there would not be any glacier in the world. The melting of ice would result in frequent floods and significant rise in sea level etc. It is estimated that transitioning to a low carbon and climate resilient economy and more broadly greening growth over the next 20 years will requires significant investment and consequently private sources of capital on a much larger scale than previously particularly given the government policies are therefore needed to support the commercialization of new technologies and to correct market failure through carbon.

Objectives

India has made a commitment to reduce its GHGs by 33-35%. Increase the share of non- fossil fuel- based electricity to 40% and enhance forest cover to absorb 2.5 to 3 billion tones of CO_2 by 2030. These goals

are articulated in the governments Intended Nationality Determined Contributions (INDC's) under the United Nations Framework Convetion on Climate Change (UNFCCC) in conference of parties (COP 21) in Paris in 2015

Some examples of Green Projects:

- Energy efficiency improvement and waste heat utilisation projects
- Green housing/habbit- Rain water harvesting , waste management, renewable/solar energized, sanitation, eco friendly material.
- Biomass energy- Bio gas, Rice husk, sugarcane bagassel molasses waste
- Bio fertiliser/ bio pesticide, Azotobactor, Tricoderma , Tricogramma
- Rural & eco-tourism
- Improved Jute retting technology
- Bee keping
- Finance projects which address conservation issues Prawn hatchry, fish seed prparation, ornamental fisharies.

The World Bank's Climate Change Fund Management Unit is home to climate finance initiatives that deliver innovative and scalable climate and environmental action. With more than **$5 billion in capital** these initiatives:

- Create partnerships to develop new financial instruments for **low-carbon**, **climate-resilient development**,
- Build supportive policy and regulatory environments to help lower the cost of capital and dismantle barriers to projects,
- Catalyze private sector capital to finance and **scale-up climate action**.

Climate Change Project Examples

Finance impacts the natural environment directly and indirectly. The environment also directly and indirectly impacts finance and the performance of investments. There are many possible definitions of green finance but for the purposes of this course, green finance is defined as any financial initiative, process, product or service that is either designed to protect the natural environment or to manage how the environment impacts finance and investment.

Countries can unlock new economic opportunities and jobs through climate action.

- Investing in resilient infrastructure in developing countries could deliver $4.2 trillion over the lifetime of new infrastructure. An investment of $1, on average, yields $4 in benefits.
- Making infrastructure more resilient avoids costly repairs and minimizes the wide-ranging consequences of natural disasters for the livelihoods and well-being of people.
- A shift to low-carbon, resilient economies could create over 65 million net new jobs globally out to 2030.
- The IFC estimates that the NDCs of 21 emerging market economies alone represent $23 trillion by 2030 in investment opportunities.

The following is a brief overview of some of the typical practices to promote green finance internationally.

Categories of green financial products

- **Green lending Green**

lending policy usually refers to supportive products such as preferential interest rates offered by banks for environmentally friendly projects or restrictions of projects with negative environmental performance.

- **Green private equity and venture investment fund**

Large-scale green direct investments are currently dominated by well-known international financial conglomerates with the participation of some professional investors. There have also been several experiments in investment targeted at scaling up investment in environmentally sustainable entrepreneurship.

- **Green ETF and mutual funds**

A considerable number of highly liquid green financial products are already available in overseas financial markets. Many of them are Exchange Traded Fund (ETF) indices and fund products while others are derivatives of carbon emission rights. These products have attracted extensive investors including individuals.

- **Green bonds**

Green bonds are bonds issued by international financial organizations and government-backed financial institutions. Due to their high credit ratings, such issuers can raise funds at lower interest rates to support green projects. Green bonds are attractive to investors for the following reasons:

- **Green banks**

The Green Investment Bank is a policy bank wholly funded by the British government. The British government injected £3 billion into the bank as its capital and holds one seat on its board, but the bank is otherwise operating independently from government control.

- **Green insurance**

Green insurance is also known as ecological insurance and serves as a tool for managing environmental risks in a market-based economy. Generally speaking, environmental insurance policies cover potential liabilities arising from the pollution of water, land or air by the policyholder. The significance of this type of insurance is twofold.

Leverage effect of fiscal measures on green finance Analysis:

Incentives supported by fiscal funding represent a major means for the internalization of the externalities of environmental protection projects.

- **Government offers interest rate discounts for green loans**

An important characteristic of Germany's green credit policy is state participation. The KfW Development Bank is a policy financial institution with state controlling shares but not affiliated with the government. It has played a decisive role in supporting the financing of SMEs, particularly SMEs in the area of environment.

- **Government offers green loan guarantee**

The British government mentioned in the research documents on SME financing that the government is not in the best position to decide whether individual SMEs can have access to financing (BIS, 2012). Therefore, the government must facilitate investment and financing decision-making by the private sector.

- **Feed-in tariff**

Feed-in tariff (FIT) is an effective instrument of economic subsidy, i.e. the government offers a long-term guarantee of the purchase price of outputs for clean energy companies, groups or individual investors, so

as to ensure relatively good return. Today, more than 50 countries have employed FIT with maturity ranging between ten to 25 years

- **Government procurement**

Government procurement refers to the procurement of goods, engineering and services using fiscal funds. The EU explicitly advocates green public procurement and encourages member states to sign green contracts to increase the share of green products in government procurement to more than 50 percent. Major green products include: energy efficient computers, chairs and tables made of renewable materials, electric or hybrid vehicles and renewable energy power generation.

- **Tax exemptions for green bonds**

According to the laws of most Western countries, the proceeds of negotiable securities must be accounted into the total revenues of investors and subject to income tax. In order to attract the investment of green bonds, some countries have exempted income tax for green bonds.

- **Fiscal financing for the creation of green banks**

According to the 2012-2013 Annual Report of the Green Investment Bank, direct investments of green investment banks amounted to £635 million while third-party private investments totalled £1.63 billion

Guidance of financial institutional development for green investments

Aside from fiscal funds, a series of financial institutional arrangements may also help encourage private investments in green industries. These arrangements may not require much fiscal input yet may increase investor preferences for green projects and mitigate their investment inclinations for polluting projects by making legislation, reforming evaluation system, creating social responsibility systems and providing environmental cost information.

- **Clarify the legal responsibilities of financial institutions for polluting projects through legislation**

In 1980, the US pushed out the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), under which banks may be held liable for pollution caused by their clients and any environmental restoration expenses.

- **Require institutional investors to consider environmental factors in their decision-making process**

The United Nations for Responsible Investment (PRI) is an international framework sponsored by United Nations and organized by major international investors with the objective of launching on a global scale a set of principles for responsibility investment. By April 2013, a total of more than 1,200 institutional investors took part, with total assets under management worth more than US$35 trillion.

- **Inclusion of environmental factor in credit rating**

An emerging trend among banks and credit rating agencies is the consideration of environmental factors when evaluating corporate and sovereign credit risks. Barclays has a dedicated environmental and social risk evaluation system that is tightly integrated with its loan division, internal ratings division, the environmental and social risk management team, and the Reputation Council.

- **Require listed companies and bond issuers to comply with green social responsibilities**

Public companies and bond issuers in various countries are often required to disclose information related to their environmental responsibilities, which usually includes: the types of projects that the company is currently running, the actual and potential environmental impacts of their investments, efforts made by the company to mitigate such impacts, and its investment in environmental technologies.

- **Create networks of green institutional investors**

Numerous international networks for institutional investors already exist. These networks have produced social responsibility agreements relating to green investments that facilitate the inclusion of environmental considerations in the investment decision-making process and press investees to fulfil their social responsibilities. Current major green investor networks include:

Methodology

In this study I used the secondary data which is collected from various sources, like online reference, different authors books, websites, and latest news about the Green Finance available in social media etc.

Analysis

India's applications to become a US$5 trillion economy by 2024 are contingent on the steady growth of its GDP. To this, perhaps the most formidable challenge is runaway climate changes. Anthropocentric activity is encoding human capital (education, productivity) as well as produced (infrastructure, property) and natural(air, water) at an unprecedented pace. According to reports, at least 1351 people lost their lives due to floods and heavily rainfall in just two months (July-August) of 2019. 1562 monsoon related deaths recorded for entire 2018. Climate included floods have become increasingly frequent; submergence of many parts of Mumbai has become an annual affairs too. Parts of north and central India experience deadly heat waves that break their own record every year.

Project Impact High Lights

- 106 world bank projects eligible for Green Bonds Financing
- 16 Additional projects included in FY 2019
- Additional projects completed in FY 2019
- 46 Total projects completed
- 20 Renewable energy & energy projects completed (4 in FY 2019)
- 10 water, waste water & solid waste management projects completed (2 in FY 2019)
- 9 Agriculture, landuse, forests & ecological resources, Resilient infrastructure, built environment projects completed (5 in FY 2019)
- 7 clean Transportation projects completed(5 in FY 2019)
-

Climate change projects examples

Mitigation

- Solar & wind installations
- Greater sufficiency in transportation including fuel switching and mass transport
- Waste management (methane emission)
- Construction of energy efficient buldings
- Rehabitation of power plants & facilities to reduce GHGs
- Corbon reduction through reforestation
- Avoided deforestation

Adaption

- Protection against flooding(including reforestation and watershed management)
- Food security improvement & improvementing stress reslient agricultural systems
- Sustainable forest management & avoided deforestation

Eligible projects by sector

Target results & committed & allocated amounts

- Renewable energey & energy efficiency
- Clean transportation
- Water & wastewater management
- Solid waste management
- Agriculture, landuse, forests & ecological resources
- Resilient infrastructure, built environment and other.

Findings

NABARD to address the issue of previous natural resources viz, land and water, had organized a workshop for bankers and other stakeholders on the theme of "Opportunities in Green Finance" number of issues pertaining to opportunities in Green Finance were deliberated and the workshop threw up several action points for various agencies, which need to be addressed urgently. A part from these extreme climate induces natural disaters, the natural capital of the country is depleting at an accelarated pace.

Sustainability: six ways the corporate world will have to change

- Re- Writing social contracts: responsible '**saint**' companies will outperform the '**Sinners**'
- Companies must be better prepared for 'black swan' events
- Political reprioritization: Governments will come under pressure to tackle societal problems
- Employee protection: supporting vulnerable workers
- Globalization under pressure: long-term structural shifts in global supply chains
- Technology adoption: Driving workplace changes and new sales channels

In conclusion

It is good to "go green" but it also involves investment and extensive transformation in business as usual. As India changes the way products are made or packaged, favoring eco-friendly options and adopting new technologies to meet sustainability, the new targets can involve high cost and risk. The temptation to greenwash may rise. It is important to ensure governance in labelling and verification process to avoid such an eventuality.

Suggestions

Raising financial resources for climate change adoption and mitigation actions of this scale is an unprecedented challenge, but given the existential crisis, failure is not an option. Success will depend on how policy makers are able to draw a comprehensive map for raising the requisite finance and how quickly the financial sector both public and private is able to respond to the needs on time.

Limitations and Scope for further study

In this study unlimited data available. It is purely based on secondary data, in green finance there is difficulty in gathering primary data due to various reasons. Lack of soundness of green finance/ lack of fully expertise persons in that particular field. This study has limited boundaries/limited points, so it is very difficult to sort the data. It is time consuming process and very critical to undergo the study.

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29.GREEN IT IN EDUCATION FOR EMERGING STRATEGIES FOR SUSTAINABLE DEVELOPMENT

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Abstract

As per the proverb "Every dark cloud has a silver lining", this COVID 19 Pandemic situation has made devastating effects on all walks of life, but on the bright side it has brought in a great change in the overhauling system of education in general and Legal education in particular. Reading and constantly acquiring knowledge is an important for a student and specially Lawyers/ Law students but a difficult task to purchase the book for reading , attending the classes, seminars from distant places, visit to the library, use of paper, chalk, fuel for transport and pollution have become more dominant factors in a traditional way of learning. But the practice of e-learning eases not only ecological balance but also effective tracking mechanism for the administration, faculty, students and parents. Starting from home as a parent and for a teacher the usage of Learning Management Systems and password protected e-classrooms brings in the creativity in utilizing the online resources to plan, prioritize and prepare the course materials, teach through webinars, customize in the way of learning and save them in the digital repositories which will be useful for further references and also for the later batches. Students can listen, save, share, converse and also have a wide scope to collect information from different online resources to complete their assignments and project works. Discussions through chat boxes improves the communication between the peers and faculty. E-libraries help in further reference to the students. It is cost effective, progressive and eco-friendly way of learning. Implementation of Green IT in Education is an eco-friendly practice of transforming hard work in to a smart work.

Keywords*:* Cost effective, Cumulative, Eco-friendly, Global classroom, Smart work

Introduction

Anything can wait in this world but not Education. There are many international schools and colleges that have adopted Learning Management Systems (LMS) where they offer courses to the students both online and classroom. Internationally all the educational institutions are temporarily closed because of COVID and education is provided to the students through webinars, online classrooms etc., There has been many universities sending the students back to their students to their home countries as they can take classes online. Though e-learning had been a long-term practice, we started to realize its importance due to the effect of this pandemic situation around the world. Even the interviews both for higher education and for jobs were conducted online and only if they are satisfied with the candidacy in to study in that university or get a job in that office, then only they were called to talk in person, but people started to understand the importance of this system and formalized Skype/ Online interview as part of the selection process. Every youngster is interoperable these days, and the global pandemic impact had made people of all ages without any gender disparity made e-learning an inevitable part of learning mechanism. Apart from the necessity in technological advancement there's an immediate necessity in the implementation of eco-friendly practices in protecting the environment. COVID lock down had already brought in visible climatic changes globally and specially in India. The news in the media that "Himalayas are seen from Jalandhar" shows the visual impact. The lock down had reduced pollution caused due to traffic, promotion of e-

learning methods in the education system can save environment, saving paper, chalk, time, money and also reduces pollution. Green IT in Education is a common concept globally across the world, the kindergarten kids to 40 year old persons irrespective of the gender use the technology, tools and gadgets usually but for the 40+ year old is in between traditional model of teaching/learning and unless it is inevitable Green computing helps in assimilating lot of information for the faculty, administration and students at the same time it not only reduces the cost of books and travel expenses but also save fuel, paper and reduces pollution caused due to traffic. This paper discusses about the Green IT in Education in general and for Law students in particular.

Review of Literature

There have been numerous researches conducted on E-learning mechanism and Green IT. There was a Chinese commentary published in April 2020 – by Zhu, X., Liu, J. Titled – "Education in and After Covid-19: Immediate Responses and Long-Term Visions". Postdigit Sci Educ (2020) emphasizes the adoption techniques along with hands on experience during this crisis and sustainable education after COVID. The European Institute of Innovation and Technology had conducted a student webinar on "A green recovery from the COVID-19 pandemic" about the courses they offer via online learning for Master's program, interview preparation and gaining a job which is a perfect example of Green IT in Education. In California Google has decided to provide internet access and chrome books for free, as a generous offer which is a Green approach of providing education. There was a press release in Nairobi that the government had taken a step with the initiative of United Nations Environment Program (UNEP) and TED-Ed to launch "Earth School," where by children can learn and have adventurous fun staying home. All the above-mentioned factors are one side for the coin, on the other side there are few media reviews referring that countries in South Asia, such as India, Pakistan and Afghanistan did not have a plan to cope up with the situation and mentioned that the e-learning was a major failure. This was published by Moderndiplomacy in July 2020 as a news article. Coming to environmental perspective World Health Organization in its report mentioned that there was a reduction in concentrations of NO2 caused due to combustion of fossil fuels, this pollution is caused by vehicles and PM 2.5. As there are not many people who access internet on a regular basis the research is conducted using questionnaire to extract and analyze the views and difficulties both regarding e-learning and protection of environment. Man being a social being, if restricted to four walls and computer desktop/laptop/mobile screen for learning will it improve the socialization is also a question that is being considered.

Objectives

During this pandemic situation it is inevitable that the data must be collected from the tools available online. The primary object is to compare the environmental change in the normal circumstances with that of the changes during the pandemic situation. This inevitable situation compelled the students and faculty to take a step to transform themselves from traditional practice of classroom learning to e-learning techniques. This being the primary objective there are other circumstantial factors that the stakeholders have to cope up with are being analyzed in this paper. When it comes to sustenance there is a need for adaptability to turn into a long-term practice that can change the e-learning practice into a global school and also protecting environment.

We have seen that due to lock down there are many families that have made their home ready for home schooling and media also shows many other families who sold their ornaments to purchase gadgets, T. Vs for online learning. The faculty and administration who never thought of exploring the technological

gadgets not only have started to learn, adopt but also got acquainted with the process of teaching by utilizing all the available sources. So, as a blessing in disguise COVID 19 had brought in a technological advancement in the field of education.

Circumstantial factors:

Financial capability of faculty and students to avail/purchase the gadgets for e-learning

Ability to learn the process of the creating and sharing course materials for faculty and the capability of the student for accessing the same

- If they have any Internet/Data/Wi-Fi issues
- Inability to participate in a webinar/class as you are not familiar with the access
- Preference of class room, black board, chalk and face to face over face to face conversations, webinars and online classrooms
- Communication of questions/doubts with the faculty and getting them addressed
- Analyze to see if they are waiting for all that this pandemic settles down and go back to normal class room teaching
- Students/faculty miss their peers and team spirit
- Do not get the usual feel of quizzes, seminars, moot court competitions
- There is no need to get ready and travel to classes from distant places by catching bus public/private/academy provided
- Students and faculty can refer but not copy and paste the contents and must be aware of Plagiarism checkers.

Methodology

This paper is based on an Interdisciplinary research, in which I have analyzed the information, in both Qualitative and Quantitative methods using the data derived from Questionnaire method. The Questionnaire has been formulated aiming to extract the perception of e-learning and on the grounds of protecting the environment in the least possible way.

Analysis

This paper is intended to know the views of the stakeholders about environmental perspective with trends and difficulties in e-learning and sustainability of the same. The questionnaire revealed facts that most of the students and faculty prefer classroom teaching/learning. To start with not majority number had previous experience of having participated in the webinars before this pandemic situation. But the results are impressive as everybody were able to adopt to the change very quickly. Faculty and students adopted to free/ economic way of utilizing, Google forms for enrollments, Google classroom for posting of course materials where the students have an access to view and retrieve at all the time, Learning Management Systems to post and analyze the assignments, conducting online Quizzes, Webinars in the place of seminars, Publishing papers online in the place of public speaking. Many are getting well acquainted with Power Point Presentations. There are few people who cannot purchase the gadgets in general but majority of the participants accepted the fact that they can afford to have gadgets, but also have issues with Data/Wi-Fi/Internet connections, there are not many members who have uninterrupted internet connection which can highly influence on the e-learning mechanism. Many of the faculty opted for Classroom training. Even though very few students opted for distant learning they preferred that there should be few online classes. But it is strange that no one had opted for “Distance education with a few interactions between student and faculty”. These responses clearly state the opinions of the stakeholders that they are ready to adopt to

technological advancement only sure to this pandemic situation but their preference is traditional way of learning. The reasons being Man as a social being miss that feel of being with the peers, that might be because of the reason that they miss their peers / friends/ colleagues. There is also a possibility that theoretical part can be learnt via e-learning but there are other tasks like lab work, court observations which needs personal observation. As there are not many resources were the students can observe these and faculty can show the same, during those circumstances the references change.

Preference being on one hand there is a drastic response that the e-learning mechanism saves Paper, e-learning helps in saving time and money and finally the GHG are reduced as there is a visible change in the Pollution caused due to traffic. So, the Green IT in Education had brought in a big change for sure but ultimately people are accepting the change but preferring to go back to the traditional way of learning.

Findings

Sample from Questionnaire – Total of 33 responses

Table based on the designations

Designation	Percentage
Student	39.4%
Faculty	33.3%
Management	3%
Advocate participating in the webinars	12.1%
Research associate	0%
I/C Principal	3%
Working Professional	3%
Counsel legal	3%
Advocate	3%

Table based on modes of learning – Preferences

Are you interested in	Percentage
Class room teaching/learning	30.3%
Online teaching/learning	9.1%
Distance education with a few interactions between student and faculty	0%
Distance education with a few interactions online between student and faculty	6.1%
Class room teaching with in-person interaction between student and faculty	48.5%
Online teaching with face to face interaction between student and faculty	6.1%

Table based on learning choices – Classroom learning vs. e-learning

Question	Yes (%)	No (%)
Are you attending any online classes /webinars / discussions/quizzes/ any online learning methods	90.9%	9.1%
Have you ever had past experience participating in the online classes and webinars before COVID 19	33.3%	66.7%
Do you have / Can you purchase the gadgets (Laptop/ Computer/ Smart phone/ Touch pads) for e-learning?	84.8%	15.2%
Do you have Internet /Data / Wi-Fi issues?	81.8%	18.2%

Do you prefer class room studies, black board, chalk and face to face teaching with faculty and student?	93.9%	6.1%
Do you prefer online classes with online classrooms, webinars, and online teaching techniques with faculty and student?	45.5%	54.5%
Were you able to freely communicate lectures/ questions / doubts between faculty and students and getting them addressed?	66.7%	33.3%
Are you waiting to see that this pandemic settles down and we get rid of technology and go back to traditional class room teaching?	97%	3%
Do you miss your peers / colleagues and team spirit?	84.8%	15.2%
Do you feel of that the quizzes, seminars, moot court competitions online are not as usual as you do it face to face (Physically rather than online)	78.8%	21.2%
Due to E-Learning do you feel that there is no need to get ready and travel to School/College/University, which saves fuel, time and money?	69.7%	30.3%
Do you feel it is necessary to have some training sessions about the usage of Online learning Apps	78.8%	21.2%
Do you use Plagiarism check for the online submissions?	51.5%	48.5%
Would you prefer to have online classes forever?	15.2%	84.8%

Recommendations

By implementing Green IT in Education there will be reduction in the usage of paper, chalk ,time and money and reduction in pollution caused due to traffic but there is also one question that needs to be focused and arrangements have to be made accordingly to justify the learning when it comes to practice, which is the possibility of observation factor in e-learning system. It is not only for the Law students but also applicable for engineers, doctors, etc., where they learn things by observation initially and then hands on experience of tactfully handling things under supervision.

A law student being “Jack of all trades” need to have awareness about multi folded aspects of the society and have to utilize all the available resources and deal with people, minds, act according to the situation in a strategized manner and promptly answer to defend the clients and question the opposite party. This happens when a law student / Junior Advocate personally watches and learn themselves by observation in the college for moot court or filing and arguments in the Court of Justice.

Not only that the teachings are recorded but also there is a need for making demos for the students and also record few court proceedings for the benefit of the students. This will also apply to the engineers in learning programming, testing, business requirements gathering etc. For intern doctors in conducting operations, there is a need to have a visual understanding/detailing of the inside organs functioning from the beginning.

Conclusion

There are three major aspects that have been discussed in this paper – technological advancement in the system of education, impact of the same on the environment and to practices that there is a sustainability of the same. Though majority of the people got acquainted to e-learning during this pandemic situation, they are more inclined towards traditional way of classroom learning for different reasons. But on a positive outlook those who never even were interested in trying the online tools and techniques adopted themselves and learnt using technology on par with the younger generation and the younger generation had developed both subject knowledge and technical advancement hand in hand. The environment had

17% reduction of GHG emissions so there is a visible positive outcome because of implementation of Green IT in Education. There are few suggestions that were made to improve sustainability of both the education and environment equally for us and for the future generation.

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30. AN APPROACH TO FIND BUSINESS-FRIENDLY LOCATION FOR TERRORISM IMPACT

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Abstract

Terrorist acts can origin ripple effects through the economy that have negative impacts. The most obvious is the direct economic demolition of property and lives. Terrorism indirectly affects the economy by creating market uncertainty, xenophobia, loss of tourism, and increased insurance claims. Terrorism has developed its roots quite deep in unquestionable parts of the places. With increasing terrorist activities, it is crucial to curb terrorism and stop its spread before a certain period. So as identified internet is a major source of outspreading terrorism through speeches and videos. Terrorist organizations utilize internet to brain wash independent and encourage terrorist activities with provocative web pages that bear up helpless people to associate terrorist organizations. So here we suggest an efficient web data mining system to find such web properties and flag them impulsively for human review.

Keywords: Anti-Terrorism, Data Mining words, online tokens, Terrorism organizations, World.

Introduction

Every day the usag0065 of internet is going on increasing rapidly, relatively the large number of methods are there emerging day to day on different dynamic platforms. Usage of internet has progressively but along with these leveling minded peoples are choosing internet for making damage to the society and peoples. To interchange information Internet infrastructure is chosen by Terrorist cells and they recruit new people and supporters. For example, high-speed Internet connections were chosen intensively by people of the infamous 'Hamburg Cell' that was extremely responsible for the indication of the September 11 attacks against the United States. This is one cause for the major work made through law enforcement agencies around the places in the world in gathering the information from the www regarding terror-related works. It is noticed that the detection of terrorist's activities on the Web might stop further terrorist attacks. One method to detect terrorist activity on the Web is to eavesdrop on all traffic of Web sites joined with terrorist groups, organizations in order to detect the using users based on their IP address. Unexpectedly it is hard to detect terrorist sites since they do not access fixed. Many terrorists or terrorist groups are accessed to make use of such procedures, applications, and internet to spread the terror. They used to attract the young to be associated in such activities. It is compulsory to detect such attempts in order to remove such hazardous things. Terrorists groups are accessing social sites. It is the big challenge to invent such hazardous terrorist attacks. It is equal to eavesdrop. Terrorists are accessing different IP addresses interchanging them frequently such that it will become more difficult to identify them. Our system will detect methods, keywords and relative information in unstructured texts in web page in web mining as well as data mining. In this we will mine webpage using web mining techniques to mine textual content on web pages and find those web pages that are relative to terrorism. Data mining along with web mining is used in combine at times for accurate outcomes.

Review of Literature

Hassan wad Hassan, Azuan Ahmad [1] in 2019 has proposed "A Review of Web Classifier concept with Possible Research Direction to Detect Terrorists Extremists". The internet is ever spreading and online

content is booming, making identification and finding of various web information vitally crucial, mainly those of dark web or Cyber extremists. Webpages with extremist and terrorist information are believed to be main things in the radicalization and recruitment of dissatisfied individuals who might be associated in terrorist works at home or those who struggle alongside terrorist members abroad. They utilized Meta heuristic algorithms. It Move respective quick toward major quality mixture offering a successful way of dealing with complex intricate problems.

Zinab Abdullah, Sara Almatrafi, Fadia Alenezi, Bushra Alhazmi [2] in 2018 suggested "Using Data Mining concepts To pathway ISIS Activities". Terrorist groups make benefit of the Internet as their infrastructure for dissimilar purposes that might guide to the formation of new local cells in the terrorist web. These local cells delayed become active and carry out acts of terror. This paper track down online access to uncommon content that may contain terrorist-generated sites by using the k-means congregate algorithm as a tool to identify and put a stop to terrorism. The terror tracking system suggests plans to examine the delighted data retrieve from Internet users. This system supports Arabic intelligence.

Yinghui Wang, Bo Wang, Xuelun Li [3] in 2016 they prefer "A Case of education to excavate and Correlation inspect of Terrorism Events in Heterogeneous and Unstructured netting Messages." The methodology is to extract events from noisy web messages instinctive. Then, established on the extract and the multiplication of features of event ontologies, we analyze the correlation between three classic kinds of general security event in China. With a heterogeneous dataset accommodates micro blog messages and news reports during 2011-2014, the case research shows that our methodology can discover the security event on agenda with a fault less than 1 day. It uses Multi-Layer Perceptron, SVM and Naïve Bayes algorithms.

George R. S. Weir, Emanuel Dos Santos[4] in 2016 present "Enhancing Classification of Extremist Web contented Through Textual Analysis" by using skill removal algorithms from weka. Terrorism along with Extremism Network Extractor (TENE) WebCrawler, a custom-written scheme that ruminate the World Wide Web, collecting vast number of data, retrieving the pages it visits, examine them, and recursively the links out of those pages. Results are then delivered in knowledge extraction procedure using knowledge extraction algorithms, e.g., from the WEKA tool.

Wingyan Chung, Wen Tang [5] in 2015 suggested "Building a Web Collection for Online Surveillance of U.S. Domestic Terrorism" Developed a novel approach to extract textual, hyperlink, and useful information from websites. The ongoing works include learning hidden patterns from a group of U.S. domestic terrorism websites and uncovering interesting usage and data patterns. This work should contribute to the core area of online security surveillance using website data. It employs k-means algorithm.

SyedAhsan, Abad Shah [6] in 2014 proposed "Data Mining, Semantic Web along with Advanced Information techniques for fighting terrorism". Countries such as USA and Pakistan, which share a familiar enemy in the form of Al-Qaeda, have been the target of terrorist attacks and more recently have also been solemnly affected by natural disasters. These places should help and acquire knowledge of with each other experience. Latest Terrorist groups like Al-Qaeda and other varieties of organized crime are the important potent threat to the free world and are usually geographically and temporally dispersed. It utilizes every clustering algorithm.

Dongjin choi, Byeongkyu ko, Heesun kim [7] in 2013 presented "Text analysis for detecting terrorism associated articles on web". Classifying web documents pages is noticed as single one of the familiar critical tasks to reveal the terrorism related data. Internet services a lot of valuable data to the users and the more number of web contents is progressively increasing. This makes it most burdensome to identify potentially critical data. Easily extracting keywords from documents is not adequate to classify the data. It utilizes Word Net hierarchy and n-gram data frequency algorithms.

Objectives

The preferred system is an efficient web data mining system to perceive terror related web properties and flag them spontaneously for human review. Data mining is utilized to mine out patterns of important data from complex data sets and make the most use of attain results. Data mining as well as web mining is reaching us down together at times for systematic system development. Web mining also has text mining techniques that grant us to scan and extract useful data from unstructured content. Text mining allows us to investigate patterns, keywords and relevant content in unstructured texts. Both Web mining and data mining systems are extremely used for mining from content.

Data mining algorithms, structured at manipulating organized data sets items, while web mining algorithms are substantially mainly used to scan and mine from unorganized along with unstructured web pages and text data obtainable on the web.

Methodology

We apply web mining algorithms to mine textual information on web pages and find their relevancy to terrorism. Websites created in different platforms procedures can be tracked by utilizing this work. This work will verify web pages whether a webpage is promoting terrorism. This system will categorize the web pages into various categories and order them suitably. There are two features crucially used in this paper work those are data mining and web mining. Data mining is a technique used to mine out patterns of important data from complex sets and find the use of gain results [4]. Web mining also has text mining methodologies that authorize us to scan and extract important content from unstructured information. This System makes use of only by the government officials who work for country security. System will encourage the cops to easily track the susceptible section who are held in terrorism. Website will have following features:

Load Balancing: Since the work will be convenient only the admin logs in the consignment of load on server will be bounded to time period of admin access. Easy Accessibility: Records can be easily acquired and store and other data appropriately. User Friendly: The Website will be permitting a very user-friendly method for every user. Efficient and reliable: supporting the all secured and database on the server which will be approachable according the user guidelines without any maintenance price will be a very systematic as compared to storing all the customer content on the spreadsheet or in physically in the form of record books.

Easy maintenance: Web Data Mining for Terrorism Analysis website is design method as efficient way. So maintenance is also efficient.

Modules and Their Description

The system comprises of 5 modules as follows:

- *Login module*

  Here, the admin or the authorized person needs to enter the login credentials.

- *Add Keywords*

  After successful login, admin can add various keywords which specify terrorism.

- *Check Website*

  Here, admin can add multiple URL's to scan the website for any suspicious word.

- *View/Check all Websites*

  All the URL's which are entered by the admin are listed here. Can check the suspicious keyword.

- *Update Password System*

  Allows admin or the authorized person to update their password.

TF-IDF

In information retrieval, tf–idf or TF-IDF, abbreviated as frequency–inverse document frequency, is a numerical statistic that is useful to reflect how efficient a word is to a document in a collection or corpus. It is often utilized as a weighting factor in finding of information retrieval, text mining, and user modeling. The tf–idf value increases proportionally to the number of times a word seems in the document and is offset by the number of documents in the corpus that hold the word, which helps to adjust for the fact that few words appear additional frequently in general. Tf–idf is one of the supplementary popular term-weighting schemes.

Variations of the tf–idf weighting scheme method are regularly mainly used by search engines as a central tool in scoring and ranking a document's relevance allocated by a user query. Tf–idf can be successfully used for stop-words filtering in various subject platform fields, including text summarization and classification.

Term frequency

Suppose we have a set of English text documents and wish to rank which document is most appropriate to the query, "the brown cow". A simple way to start out is by eliminating documents that do not hold all three words "the", "brown", and "cow", but this still leaves more documents. In future distinguish them, we might count the number of times each term occurs in each document; the number of times a term occurs in a document is called its *term frequency*. Finally in the case where the length of documents varies mostly, adjustments are frequently made (see definition below). The first form of term weighting is due to Hans Peter Luhn (1957) which may be aggregated as the weight of a term that found in a document is simply proportional to the term frequency.

Inverse document frequency

Because the term "the" is so common, term frequency will be likely to incorrectly emphasize data which come about to use the word "the" more rapidly, without giving sufficient weight to the most meaningful terms "brown" and "cow". The term "the" is not a good keyword to differentiate relevant and non-relevant documents and terms, unlike the less-common words "brown" and "cow". Hence an *inverse document frequency* factor is consolidated which diminishes the weight of terms that found very rapidly in the data set and increases the weight of terms that occur hardly ever.

Karen Spark Jones (1972) conceived a statistical interpretation of term-specificity termed as Inverse Document Frequency (idf), which is cornerstone of term weighting the specificity of a term can be noticed as an inverse function of the number of documents in which it appears.

Example of Tf-Idf

Suppose that we have term count tables of a corpus has only two documents, as stated on the right

The calculation of tf–idf for the term "this" is calculated as follows:

Document 1	
Term	**Term Count**
This	1
Is	1
A	2
Sample	1

Figure 4.1 Example document

In its raw frequency form, tf is just the frequency of the "this" for every document. In this method, the word "this" appears once; but as the document 2 has more words, its relative frequency is lower noticed.

Tf ("this", d1) = 1/5 = 0.2 Tf ("this", d2) = 1/7 = 0.14

An idf is constant per corpus, and accounts for the ratio of documents that noticed the word "this". In this case, we have a corpus of two documents and all of them include the word "this".

Idf ("this", D) = log (2/2) = 0

So tf–idf is zero for the word "this", which indicates that the word is not very much important as it occurs in all documents.

Tf ("this", d1, D) = 0.2 * 0 = 0

Tf idf ("this", d2, D) = 0.14*0 = 0

In the case of the term frequency tf (t, d), the effort less choice is to utilize more the *raw count* of a term in a document, i.e., the number of times that term t found in this document d. If we characterize the raw count by $f_{t,d}$, then the easiest tf scheme is tf (t, d) = $f_{t,d}$. Other methods include

- Boolean "frequencies": tf(t,d) = 1 if t occurs in d and 0 otherwise;term frequency adjusted for the document length : $f_{t,d}$ ÷ (number of words in d)logarithmically scaled frequency: tf(t,d) = log (1 + $f_{t,d}$);[6] augmented frequency, to prevent a bias towards longer documents, e.g. raw frequency divided by the raw frequency of the frequently occurring term in the whole document The inverse document frequency is a measure countable of how much content exponentially the word provides, i.e., if it's

Document 2	
Term	**Term Count**
this	1
is	1
another	2
example	3

- Common or rare across all documents. It is the l exponentially scaled inverse fraction of the documents that hold the word A high weight in tf–idf is reached by a high term frequency and a low document frequency of the term in the total collection items of documents; the weights hence ready to netting out common terms. Since the ratio inside the idf's log function is usually greater than or equal to 1, the value of the idf (and tf–idf) is greater than or equal to 0. As a term finds in more documents, the ratio inside the logarithm approaches 1, bringing the idf and tf–idf closer to 0.

TF IFD Algorithm *Input: Chat History ch, URL Output: result r. (Ranked Statement) Let,*

*D is data extract from URL, words=get Words (chat); //Using Split ("\\s+")*Term Frequency TF: for each statement s ϵ D

For each word, w ϵ ch

$$tf = \sum_{k=0}^{n} (\alpha/\beta)$$

α= Number of times w appears in a s; β= Total number of terms in s;

Inverse Document Frequency IDF:

For each word, w ϵ ch

Return tf*idf;

End; n

$$idf = \sum \log \frac{k=0\text{Total No. of Statement}}{\text{No. of Statements w presnet}}$$

End for

End for End For

System analysis

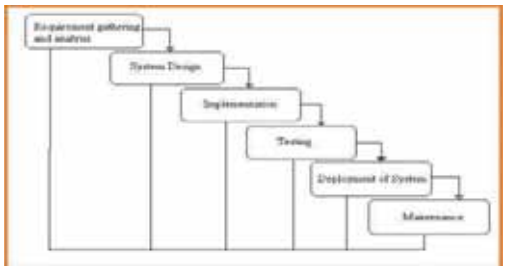

Figure 5.1 system analysis

- Project Requisites Accumulating and Analysis
- Application System Design
- Practical Implementation
- Manual Testing of My Application
- Application Deployment of System
- Maintenance of the Project

Requisites Accumulating and Analysis

Though traditional requirements analysis centers on functional needs, data requirements analysis complements the functional requirements process and focuses on the information needs, finding a standard set of procedures for identifying, analyzing, and validating data requirements and quality for data-consuming applications. Data requirements analysis is a significant part of an enterprise data management program that is deliberated to help in Articulating a clear understanding of data needs of all consuming business processes ,finding matching data quality dimensions associated with those data needs.

Findings

Project Home page

Figure 6.1Admin login page

Figure 6.1 represents Admin login page. It contains username and password fields with constraints.

Figure 6.1 Home page

Figure 6.2 admin home page

Admin home page is shown in figure 6.2.It consists of home module, crawl module, add keywords module, and logout module. It displays welcome admin message when admin logged in.Crawling URL's

Figure 6.3 Crawling URL's

In this we provide a specific URL which is related to terrorism which is shown in figure 5.2.4.

Crawl all sub URL's

Figure 6.4 Crawl all sub URL's

Crawling all sub URL's is shown in figure 6.4.whenever the specific URL is specified it returns all the sub URL's related to terrorism.

TF-IDF calculation

Figure 6.5 tf-idf calculation

After returning all sub url's the term frequency and inverse document frequency will be performed. This

calculation returns all url's with certain weights. The weighted url's are stored in the database parallelly. And also sorted in descending order. It is depicted in figure 6.5

Graph

Figure 6.6Graph of tf-idf weights

After tf-idf calculation the graph is returned which is plotted with x-axis ratings and y-axis tf-idf.

Conclusion

To restrict the utilization of terrorism and to destroy the online appearance of dangerous terrorist groups like ISIS and other radicalization websites. We require a proper method to detect and terminate websites which are spreading harmful information used to radicalizing youth and helpless members. The aim of this paper is an innovative; knowledge-oriented procedure for terrorist works detection on the Web is located. The outcome of initial case measurements proposes that the methodology can be innovative for detecting terrorists and their associates using legitimate paths of Internet utilization to view terror associated content at a sequence of evasive websites. Present situation just identify the words of terrorist's language. By producing such system, relationship between human and computer becomes closer and highly secure. Then it provides in bearing the problem of Terrorism on web. The suggested method is efficient one to detect terror associated jobs.

Limitations and Scope for further study

By finding such methodology, relationship between human and computer becomes highly secure. Thus it helps in conquer the problem of Terrorism on www. The advance approach is well ordered one to detect terror related schemes.

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31. ASYNCHRONOUS E-BIDDING APPLICATION

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Abstract

Asynchronous bidding application is focused on creating an environment for users where they can host their products and give their bidding value to products posted by other users. The users can also see the values proposed by other users. The user with the highest bidding value gets the product. Asynchronous Bidding application is implemented using Angular which helps in getting asynchronous real-time updates of the bidding amount given by other users. The user has to Login/Sign up before posting products or giving their amount for other products. The backend is deployed on Node JS using Express JS, which performs all the business logic and is responsible for the communication with the client. The user data and other important data is stored in Mongo DB community server, which is a NoSQL database that uses collections of documents to store data.

Keywords: Asynchronous, MEAN Stack, Node JS, Mongo DB, Angular

Introduction

Asynchronous E-Bidding Application (BidBucket) is a web based application which can be used by aspiring bidders and sellers for taking the auction. Asynchronous E-Bidding application is focused on creating an environment where sellers can get the right price for their products and the buyer can get the right product at a lesser price.The application allows users to post products and other users can give their bidding value for the product. The user with the highest bidding value within the defined time gets the product. The user has to set a base price for their product. A product can be anything ranging from a phone to buildings, a television set to vehicles etc.

In the traditional public auction there is a major problem like, very limited participation of the common public. The main aim of the project is to conduct the auction on a platform that is global so that common people from different distances like near, far & wide and even around the globe can participate in the auction. The Asynchronous E-Bidding site (BidBucket) is developed with an intuition to exterminate the existing problems of "Conventional auction".

Review of literature

This literature review shows how application development can help solve the problem of global auctioning and reach out to several individuals across the globe.

Janhavi Baikerikar, Vaishali Kavthekar, Esmond Dsouza[1] proposed a paper on “Hammer down — an online auction application”. The paper proposes an application that provides a solution for the buyers and sellers from different geographical locations to come together on a single platform and to host and participate in auctions at ease. This kind of auctions have a major effect on merchandising in the B2B (business to business), B2C (business to consumer) and C2C (consumer to consumer) areas. An auction is nothing but buying and selling services and / or goods by placing them for a bid, accepting the bids, and then selling the items to the bidder who quoted highest price. Online auctions are very useful and provide lot of transparency and hence they are the upcoming e-business applications. The evolution of developing Android applications with web services has brought many changes in the mobile applications and their development areas. Keeping these things in mind, we have considered an Android-based mobile

application to develop which facilitates in online auctions to buy and sell services as well as products. One drawback is that it requires GPRS to function, which is an outdated feature.

Calin Constantinov, Andrei Mocanu, Elvira Popescu[2] proposed an approach on "Online auctioning and recommendations: The eBidLand platform". In this paper the authors suggest that online auctions are marketplaces with dynamic pricing that bring individual buyers and sellers together; A fixed protocol exists for each type of auction so that the participants can bid by using the protocol. Out of the several online auction systems that are available at present, accounting for a large part of the overall e-commerce. But many of the implementations have only one auction type; The authors also introduced a new platform, called eBidLand, that offers the seller to choose the possibility between two auction types: a soft-close version of the English auction (to prevent auction sniping) and a Dutch auction. EBidLand is the system that is enhanced with truth, reliability, privilege as well as a robust recommendation system based on collaborative filtering. Applicability, directness and intuitiveness, as well as race against time were the design process guidelines. But the process of bidding requires the remote server system to be online and with a high ping rate. And as communication is not asynchronous, high traffic can cause the server to crash.

Wutthichai Chansuwath, Twittie Senivongse[3] proposed a technique on "A model-driven development of web applications using Angular framework". This technique notifies that AngularJS is the most widely used framework for modern single-page web application development that is designed for supporting dynamic views in the developed applications. This research discovers the concept of model-driven development which can be applied to AngularJS-based development. We propose a UML profile for AngularJS for building a model of an AngularJS web application and a collection of transformations that converts the model into a template of code. This template can be filled by the developer and the filled template acts as a complete working web application. A case study is used to demonstrate the application, and the evaluation is done in terms of rate of transformation. According to these results it is proven that automatically generated code covers 87% of the complete code of the case study, This demonstrates that a greater reduction in development time is achieved.

Trinh Duy KhueNguyen Thanh Binh[4] proposed a paper on "Design and implementation of MEAN stack-based scalable real-time Digital Signage System" which says that MEAN stack framework is simpler, more flexible, faster and more suitable for web-based application than LAMP framework. In this paper, we propose a design and implementation of MEAN stack-based scalable real-time digital signage system (SR-DSS), The proposed system handles real time tasks and provides services like urgent/instant messaging, monitoring of system status so that efficiency will be more when compared to conventional digital signage CMS tasks. The architecture of the proposed digital signage system, SR-DSS is described and design and implementation issues are clarified in more detail. Through testing, it is observed that SR-DSS operates smoothly and shows better throughput performance compared to a well-known open-source LAMP-based digital signage system Xibo, but it is also observed that we need more extensive testing and improvement for securing reliability.

Yunhua Gu, Shu Shen[5] proposed an approach on "Application of NoSQL database MongoDB" which implies that NoSQL database is the wide ranging definition of non relational data storage. As a result of the new storage model, the traditional normal-form theory cannot be adopted in new applications. In this paper, the distinctive features of the data logic model of NoSQL database MongoDB and the principles of mode design were analyzed, and then a method based on the anti-normal form model was proposed.

This method is based on the theory of data dependency and uses the decomposition strategy or composition strategy to join the data for various dependencies in order to get the logic schema design of a non-relational database.

Objectives

The objectives of the system are as follows:

- Paperless auction system
- The system is accessible to people across the globe and at any time.
- Reliable user validation & checking.
- Easy and quick online settlement at any instant.

Our application is user friendly in terms of easy to use and understand. Therefore any aspiring bidder or seller can visit the site with high probability and engage themselves in bidding with minimal effort.

Methodology

Architecture

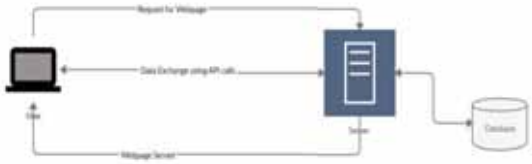

Figure 4.1: Architecture of the Asynchronous E-bidding Application.

From Figure 4.1, upon startup, the user initially has to login or signup into the app. The login/signup details are fetched/stored from the node backend by accessing the RESTful APIs. On the backend, when the request comes, the database i.e MongoDB is contacted for user details The browser usually looks up in the cache for the application, before sending a request to the server for the application. The node server sends the application in the form of a single page to the client. Then user data and the data regarding the products uploaded by the other users is fetched from the backend.

The user can then browse the products uploaded by other users and send their bidding values for the products. The user can also upload products for other users to see. Finally, the user can see the contact information of potential buyers, so as to ease up the process.

Modules used

App Component

App Component is the root component of an angular application. All the components of the application are child components of the app component. It is the first component that is loaded when the application is started. It acts as a container for all the other components. It contains the following files:

- app.component.ts
- app.component.html
- app.component.css

The first file has the business logic, which is to be executed when the application runs. The second file has the format in which the content is to be displayed. And the third file contains all the styling elements of the component.

Product-add component

This component enables users to add or post their products for the auction. It uses NgForms Module to fetch user-entered data using two-way binding. This component also allows users to delete and edit their

products and product details. It also performs form validation using HTML attributes to ensure that the data entered is consistent.

Product-list component

This component acts as the home screen of the application. It lists all the products uploaded by different users. It uses data binding to show updated data on the client-side. The products data is fetched from the 'products' collection in the Mongo DB community server, which is hosted on 27017 port.

Header component

This component defines the business logic and view structure of the navigation bar which is present on the top of the screen. This bar helps the user to navigate from one page to another, and also helps them to login/logout from the application.

Browser module

Browser Module provides services that are essential to launch and run a browser app. This module provides all the browser-specific functionalities. Browser Module is also able to re-export the Common Module from @angular/common, This states that components in the AppModule module can also get access to the Angular directives and it is important to mention that every app needs, such as NgIf and NgFor.

AppRouting module

Angular Router is a powerful JavaScript router. This router is built and is maintained by the Angular core team which can be installed from the @angular/router package. AppRouting Module provides a complete routing library with the possibility to have multiple router outlets, various strategies for path matching, easy access to route parameters and route guards. All this facilitates the components from preventing unauthorized access. The Angular router is a core part of the Angular platform. This enables the developers to build Single Page Applications with more views and allow switching between these views.

Forms module

It helps users create template-driven forms. In this kind of forms the work is mostly done in the template where as in the model-driven form, the work is mostly done in the component class. This is the reason behind creating the model form controls by adding the ngModel directive and the name attribute in template driven forms. Hence, wherever we want Angular to access our data from forms, we will add ngModel to that tag.

Analysis of asynchronous e-bidding application

As shown below, The Figure 5.1 depicts the various use cases for a user in chronological order. Upon startup, the user first has to login, if he already has an account. The users can then browse the products uploaded by other users and provide their bid rate to any of the products. The users can also upload products for other users to see. The role of the admin here is to manage all the user accounts and ensure that user data is being handled properly. The admin is also responsible for consistency maintenance of the application's database.

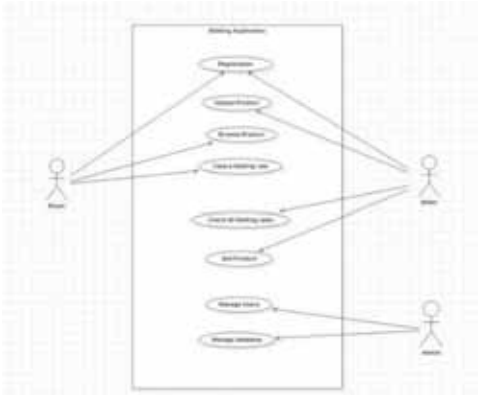

Figure 5.1: Use case Diagram of Asynchronous E-Bidding Application

The Figure 5.2 shows the class diagram for the Asynchronous E-Bidding Application. The diagram has three classes, namely Buyer, Seller and Product.

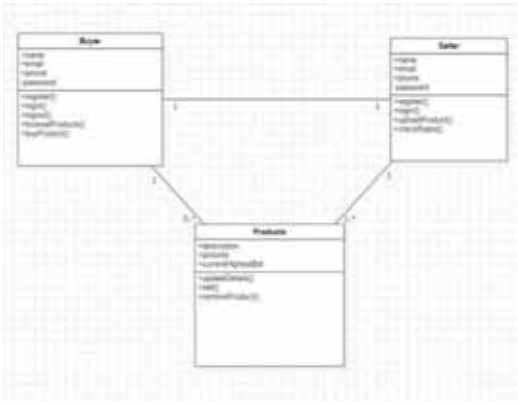

Figure 5.2: Class diagram of Asynchronous E-Bidding Application

As shown in the below Figure 5.3, shows the Sequence Diagram for Asynchronous E-Bidding Application wherein the following list of steps are being followed:

- Registration
- Login
- Upload products
- View products
- Propose bid
- Sell product

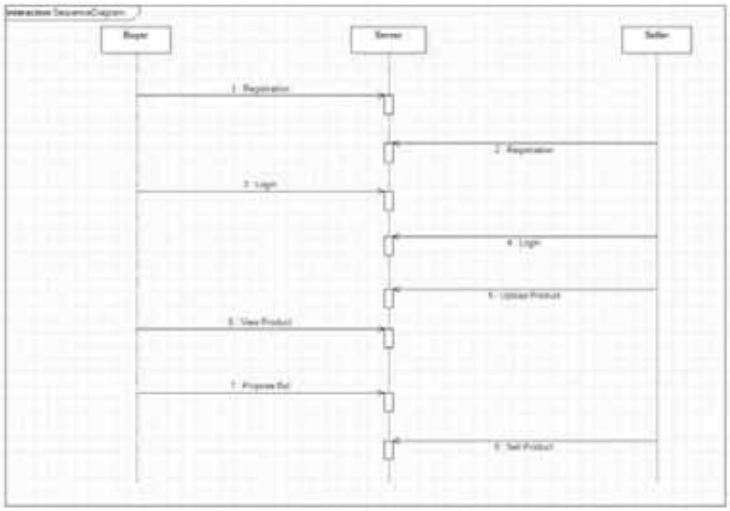

Figure 5.3: Sequence diagram of Asynchronous E-Bidding Application

Findings

From figure 6.1 shows the login screen where the user where the user can enter their login credentials. This is the page to which the user lands, when the user opens the application. The user can enter their credentials to log in to the application. Or the user can sign up if they don't have credentials.

Figure 6.1 Login Screen

From figure 6.2 shows the sign up screen. The user can enter their details to create an account into the application. Using the given credentials, the user can then login and use the application

Figure 6.2 Sign up Screen

From figure 6.3 shows the homepage screen. The user can see the products uploaded by other users and also quote their price for the products that they are interested in.

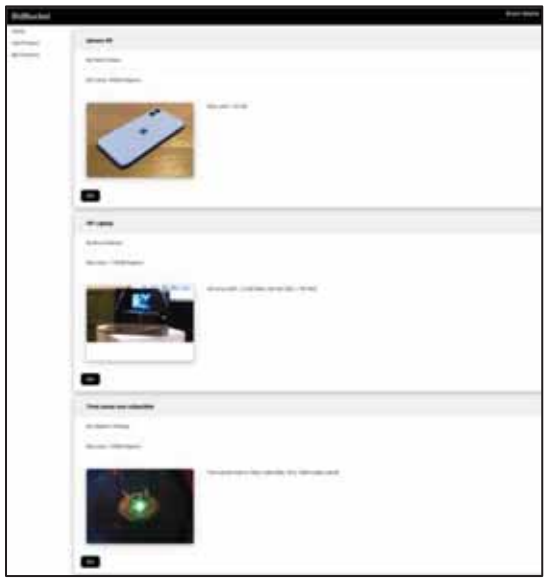

Figure 6.3 Homepage Screen

From figure 6.4 shows the upload screen. The users can upload products along with their description and images on this screen. These uploaded products can be then seen by other users.

Figure 6.4 Upload Products Screen

From Figure 6.5 shows the User's products screen. This is where users can delete or edit the products that they have uploaded.

Figure 6.5 My Products Screen

Conclusion

The main objective of the Asynchronous E-Bidding application is to take the auction to the fingertips of the aspiring bidders and sellers and creating an environment where sellers can get the right price for their products and the buyer can get the right product at a lesser price. The use of Angular framework as front end helps in making the application asynchronous and hence the app can reach out to several places even with a slow internet connection. The use of a NoSQL database like Mongo DB helps in easing of the database management process to a great extent. Also, Express JS over Node JS provides a powerful backend which acts as a strong server and also providing other services like authentication, authorization, pagination, image uploads, routing, RESTful API exposure. All in all, the app serves its objective, without any setbacks.

Scope for further study

The application can then be deployed onto a remote server or cloud computing platform with its own URL so that it can reach out to everyone across the globe.

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32. MOODLE: AN OPEN SOURCE E- LEARNING MANAGEMENT SYSTEM TO SUPPORT HIGHER EDUCATION

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Abstract

According to the Swami Vivekananda Education is the manifestation of the society. The sustainable development of the society starts with a value education. An online education is the only solution to continue the education system in this pandemic. This paper reviews the adoption of Moodle (modular object-oriented dynamic learning environment) as its LMS (Learning Management System) in the learning and teaching process in the universities and colleges to support Higher education. Moodle is a learning stage intended to give teachers, administrators and students with a solitary powerful, secure and incorporated framework to make customized learning situations. Moodle is a no-cost online LMS. It permits educators to make their own private online center loaded up with dynamic courses for learning whenever, anyplace. The item gives a total arrangement of student driven applications and community learning situations that support both educating and learning. The Moodle represents one of the most widely used open-source e-learning platforms, that enables the creation of a course website, ensuring their access only to enrolled students [1]. This platform allows the exchange of information among users geographically dispersed, through mechanisms of synchronous and asynchronous communication. In an utilitarian viewpoint, it has effectively configurable highlights, permitting the making of understudy evaluation cycles, for example, tests, online tests and overviews, just as dealing with their assignments with their schedule, other than offering a wide assortment of corresponding apparatuses to help the educating and learning measure. This paper also explores the pros and cons of open source products and the strategies necessary to ensure successful adoption across multiple campuses and also provides a rationale for selection of Moodle as its LMS.

Keywords: Learning management system; Moodle; Higher Education.

Introduction

With a world population of 7 billion people and limited natural resources, we, as individuals and societies need to learn to live together sustainably. We have to make a move carefully dependent on the understanding that what we do today can have suggestions on the lives of individuals and the planet in future. Education for Sustainable Development (ESD) empowers people to change the way they think and work towards a sustainable future [11].

A Learning Management System (LMS) is playing very important role in this pandemic situation. The education system is in transformation stage. There are no pure guidelines are available from the government about starting of schools and universities. Several countries tried to start the school but was closed because of number of cases of coronavirus positive are increased. An online learning or e learning tools is only suitable available in our hand to continue the education system.

Moodle is a free and open-source LMS written in PHP Hypertext Preprocessor (PHP). It is distributed under the GNU's Not Unix (GNU) General Public License. Developed on pedagogical principles, Moodle is used for distance education, flipped classroom, blended learning, and other e-learning projects in universities, colleges, schools, workplaces and other sectors.

Online learning may transform students into passive listeners rather than active participants, unless it is thoughtfully designed. While these unengaged students can acquire the substance of the lesson, beyond the simulated classroom they are unable to apply their learning. They can pass tests and complete learning exercises but they do not expect to use their new information to interact with previous content or real-world examples. To be successful in learning , students need to be interested in the consistency, scope and depth of their learning. Particularly as students study remotely, educators need to understand that if they perceive them as useful, students would only interact with materials from the course. Online teachers should follow or build a personalized, immersive curriculum with digital courseware to expand active learning beyond class meetings. With in-line interactive questions, it is easy to track completion and comprehension of course content. Such questions may be used to incorporate novel ideas, improve the comprehension of topics by the students and assess learning. Often teachers can conveniently submit ratings and details on attendance to their learning management program. Most of the studying is done asynchronously in an online classroom and students sometimes feel isolated from their teacher, as well as from their peers. Online teaching can be challenging for teachers as they fail to gage whether students understand the content of the course, and whether they are engaging in learning experiences.

Literature Collection

Moodle stands for Modular Object-Oriented Dynamic Learning Environment. Established and created by Martin Dougiamas in 2002. Moodle has been developed to build and provide customised learning experiences for educators , administrators and learners through a powerful, stable, free platform. Moodle is an easy-to-use LMS system that serves the learning and training needs of many organisations and organisations worldwide. Moodle is a free online learning administration framework that provides educators worldwide with a portable, personalised and safe open source elearning application that offers a broad range of activities.

Today, Moodle is the most widely used LMS in the world, with well over 100,000 registered implementations worldwide supporting over 150 million learners. Moodle's open source venture is overseen by a devoted group at Moodle HQ with an administrative center in Perth, Australia and satellite workplaces around the globe. Moodle’s modular nature and inherent flexibility make it an ideal platform for both academic and enterprise level applications of any size.

Community-driven, this globally supported effort makes one of the largest open source teams in the world. Moodle comes with a comprehensive range of software , which allows both companies and educators to create a private learning room online, with resources which can quickly create courses and endless events. There are several ways in which Moodle can be used as learning and training tool:

- It can be used as a substitute for instructor-led training where traditional training is not possible or too expensive.
- It can be used as a tool for blended learning to support training seminars to improve quality and enhance efficiency.
- It can be used for new ways of learning such as for just-in-time learning and training:
- Just-in-time learning can be accomplished by gathering the required information by using various tools and restructuring it according to one‟s needs to construct one‟s own knowledge representation and interpretation.
- Just-in-time training can be achieved by gathering and reusing various existing information pieces and by combining them into a new course with specific training and learning goals. When the course has been created, it can be immediately assigned to other users (by notifying them and

putting the course announcement on the personal portal) to let them virtually complete the course within a specified amount of time. Lecturers can also use Moodle to create, maintain, and offer courses and also to administrate student affairs.

Study About Moodle

Moodle is being used for:

- Instruction on enforcement
- On boarding and Related-training
- The teaching and maintenance of competencies
- A health course in the workplace
- The resources for professional learning and continued education
- The creation of the Online Course
- Releases of the goods and facilities
- The realistic societies and the professional communities

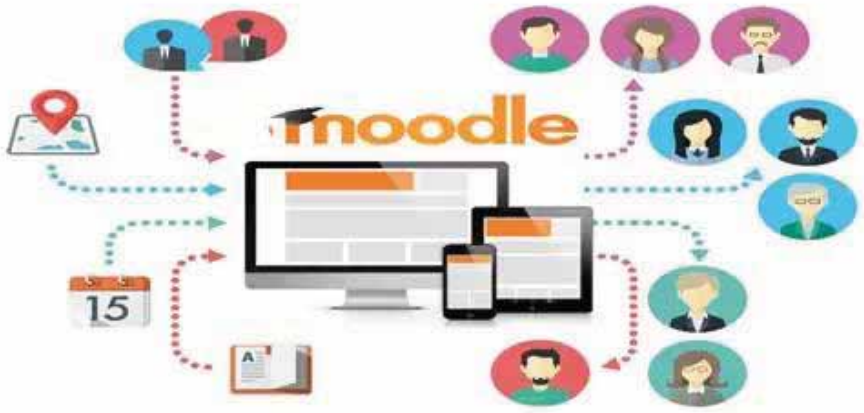

Fig : Modular Object-Oriented Dynamic Learning Environment (MOODLE) interface

With 100 million clients worldwide and developing each day, Moodle is hands down the most broadly utilized LMS by associations of every kind. "Moodlers" love the framework since it's so generally utilized as well as in light of the fact that it is easy to understand, profoundly adaptable, configurable, highlight rich and very much upheld all through the world. The things we should know before using Moodle are Setup Moodle on server, Add and Upload User Accounts to Moodle, Set Up a Moodle Course, Enroll Students into a Moodle Course, Create a Moodle Quiz

Results and Discussion

Google Classroom is a free collaboration platform which enables teachers to build online classrooms that invite students to speak. It allows it simpler to construct, assign and review assignments. Simply stated, Google Classroom is a cloud application network that provides Google Education Applications and lets teachers' co-ordinate regular workouts. Moodle is a learning management program, on the other hand, that can both produce and monitor learning experiences. The website facilitates the creation of software and will access courses in significant numbers. It can also be configured to generate detailed reports to track student development. We can say Moodle is certainly a better device, since it can be invented and personalized. For eg, an appraisal may include questions from a list, random questions or, if possible, a timeframe for each evaluation question can be allocated. In Google School, that is not necessary.

Conclusion

Various LMS are available in the market. The security is the biggest concern for us. To provide high security of data , keeping the data in our server is one solution. There are solutions are available like cloud storage. But this type of storage is costlier. Moodle aims to gain the maximum profit by modern approaches and techniques of studying and teaching and its simple use by both teachers and students. Their functionalities have been developed in contrast with other frameworks that just innovation on the market through their incorporation of connectivity, teamwork and content creation. The technology industry is revolutionizing technical innovation, rich digital services , internet connectivity and innovative Web architecture. Today, live web-based programming for teachers, optimized online tools and up-to-date usage of 'created on the Internet' material to create a highly efficient multi-dimensional online climate. Such digital educational models deliver much more competitive cost advantages, improved student environment and set the framework for e-learning over the next decade.

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