KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS), COIMBATORE – 29.

INSTITUTION INNOVATION COUNCIL (IIC)

'CALL FOR PAPER WRITING AND RESEARCH REPORT ON INNOVATION'

CIRCULAR

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)
Re-accredited by NAAC with A$^+$ Grade (4th Cycle)
College of Excellence (UGC)
COIMBATORE – 641 029

CIRCULAR **12.01.2021**

Institution Innovation Council (IIC) is planning to conduct an event on ***"Paper Writing and Research Report on Innovation"*** for Semester – I (Second Quarter). In this regard, the Heads of the Departments are requested to circulate the information among the students (both UG and PG), Research Scholars and Faculty members to contribute the research paper on Innovation. Also, the IIC Staff-In-charges of the respective department is advised to guide the students and research scholars in the preparation of research paper/ report and submit the same on or before **23rd January 2021** to the e-mail id given below. ***Three best papers will be honoured.***

E-mail id: arunkumarsk_cm@kongunaducollege.ac.in

Further details, contact: Mr.S.K.Arunkumar, Assistant Professor of Commerce

Mobile: 9842605210

PRINCIPAL

To
1. All Heads of the Departments for any necessary action
2. All the staff members through the Heads of the Departments
3. All the students and research scholars through the Heads of the Departments

Copy to
1. Secretary's Office
2. Dean, Academics
3. Dean, R&D
4. Controller of Examinations
5. Librarian
6. Director of Physical Education
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Copy for favour of information of :
Chief Executive Officer - Unaided courses

INVITATION BROCHURE

-Report-

Institution Innovation Council (IIC), Kongunadu Arts and Science College (Autonomous), Coimbatore, organised an event on 'Paper writing and Research Report on Innovation' for Semester - I (Second Quarter). Regarding this, circular was released on January 12, 2021. Students, research scholars and faculty members were invited to contribute research paper on Innovation. Also, the IIC Staff-In-charges of the respective departments was asked to guide the students and research scholars in the preparation of report.

Department of Physics, Bio-technology, Commerce, English and Chemistry actively participated and twenty six papers were received. Particulars of the participant were as follows:

S.No.	Name of the Participant	Class	Title of the Paper
1.	T.Swathi	I M.Sc. Physics	Electricity from Lightning
2.	A.B.Ramsailesh	III B.Com.	Innovation
3.	R.Anusha	III B.Sc. BT	A Research Report on Innovation
4.	J.Ashna	I M.Sc. BT	Medicins from Mimosa Pudica
5.	B.VishnuPriya	Faculty – Bio-tech	Development of Honey-based natural Jelly from Beetroot Peel: Analyse its stability and sensory properties
6.	Malini and Mekha	II B.Sc.BT	Bio-printing and Cancer Research
7.	Sivakumar and Chellakumar	II B.Sc.BT	Comparison of Innovation between India and China
8.	SakthiNAchiyar&Abarna Devi M	II B.Sc.BT	CRISPR and Genetic Engineering
9.	Aswini R	II B.Sc.BT	Genome Editing
10.	K.Mouliya	Assistant Professors, Department of Bio-chemistry, Sri Ramakrishna College of Arts and Science, Coimbatore	Nutrition Knowledge and Food-health Awareness through Gamification
11.	Karvannan and M.Vinothini	II B.Sc.Chemistry	Aquaphonics
12.	Nivethitha	III B.Com.	Innovation and Agriculture
13.	Srinila and DivyaDharshini	III B.Com.CA	Innovation n Green Marketing
14.	S.Gowtham&V.Gughan	III B.Com.CA	Innovation in HRM

15.	Abarnaa. G &Nisha.S	III B.Com.CA	Innovation in Rural Marketing
16.	M.Gokul and S.Gughan	III B.Com.CA	Innovation in Social media marketing
17.	S.Madhusree	III B.Com.	Innovation on Solar Energy in India
18.	AngelinSophiya and PoojaSampath	III B.Com.CA	Innovative Approaches to understand Consumer Psychology
19.	S.Vidhyashri	III B.Com.	Innovative Organic Farming in India
20.	Veenavarshini	II B.Sc.BT	Cruelty-free Lab Grown Meat
21.	Ganesh.S and AnishPrasanna.E	II M.Sc.BT	Nucleic Acid Extraction without Centrifuge
22.	S.R.SreeMeena	I MA English	The Outcome of Ignited Imagination (Innovation)
23.	PrathibaP.Nair	M.Sc.BT	Rice Cultivation in Oceans
24.	Florenci. A	II M.Sc. BT	Increasing the seed germination rate through priming and externally increasing the enzyme concentration
25.	Selvakumar	II B.Sc.BT	Innovation
26.	Deepthi Ashok	II M.Sc.BT	UV tolerance from the fluorescence emitted by eutardigrade*Paramacrobiotus*sp. : A possible natural sunscreen

Dr.R.Swarnalatha, Department of B.BA. (RA), PSG College of Arts and Science, Coimbatore, was asked to evaluate the papers to select the best three papers. Evaluation was based on: (i) Innovation Idea/Concept, (ii) Content, (iii) Presentation of thought, (iv) Review of Literature and (iv) Layout and Grammar.

Kongunadu Arts and Science College (Autonomous)
Coimbatore 641 029
Institution Innovation Council

SCORE SHEET FOR THE COMPETITION ON PAPER WRITING AND RESEARCH REPORT ON INNOVATION

S.No	Name of the student	Class and Department	Roll No	Mark Break up					
				Innovative Idea/concept (10)	Content (10)	Presentation of thought (10)	Review of literature (10)	Layout and Grammar (10)	Total (50)
1	T.SWATHI	I M.Sc-Physics	202PH040	6	7	8	4	6	**31**
2	A.B RAMSAILESH		181CM249	4	4	4	4	4	20
3	R.ANUSHA	III BSc-BT	181BT047	4	4	3	2	3	16
4	J.ASHNA	I MSc-BT		8	7	8	7	6	**36**
5	B.VISHNUPRIYA			9	9	9	7	9	**43**
6	MALINI & MEKHA	II B.Sc-BT		5	4	3	3	4	19
7	SIVAKUMAR& CHELLAKUMAR	II BSc-BT	191BT006	2	2	2	2	2	10
8	SAKTHI NACHIYAR	II BSc-BT	191BT010	3	3	2	2	2	12
9	ASWINI.R	II BSc-BT	191BT045	2	2	2	2	2	10
10	K.MOULIYA	-	-		-	-	-	-	-
11	KARVANNAN.N	IIBSc-Chemistry		1	1	1	1	1	5

12	NIVETHITHA	III BCom	181CM204	4	4	4	4	4	20
13	SRINILA	III BCom-CA		6	6	6	6	6	30
14	S.GOWTHAM	III BCom-CA		4	3	3	3	2	15
15	ABARNAA.G	III BCom-CA		5	4	4	3	3	19
16	M.GOKUL	III BCom-CA		5	4	5	4	3	21
17	S.MADHUSREE	III BCom	181CM231	5	5	4	4	5	23
18	ANGELIN SOFYHA	III BCom		3	3	3	3	4	16
19	S.VIDHYA SHRI	III BCom	181CM228	3	3	4	3	4	17
20	VEENA VARSHINI	II BSc-BT	191BT09	6	5	5	5	6	27
21	GANESH	II MSc-BT		3	3	3	3	3	15
22	S.R. SREE MEENAA	IMA-ENG.	202EL001	3	3	3	3	4	16
23	PRATHIBHA P NAIR	MSc-BT	192BT006	3	3	2	2	2	12
24	FLORENCIA	II MSc-BT	192BT019	2	2	2	2	2	10
25	SELVAKUMAR	II BSc-BT		1	1	1	1	1	5
26	DEEPTHI ASHOK	II MSc-BT		4	4	4	3	3	18

R. Swaranalatha 3.12.2021

Dr. R. SWARANALATHA
Associate Professor & Head
Department of Management Sciences
(Retail Management)
PSG College of Arts & Science
Coimbatore - 641 014

Three best papers selected are as follows:

1. B.VishnuPriya, Faculty – Bio-technology - Development of Honey-based natural Jelly from Beetroot Peel: Analyse its stability and sensory properties
2. J.Ashna, I M.Sc.BT – Medicins from Mimosa Pudica
3. T.Swathi, I M.Sc. Physics – Electricity from Lightning

The event was headed by Dr.M.Lekeshmanaswamy, IIC – Chairman, and Principal, and led by Dr.S.R.MadhanShankar, IIC – President and Dean Academics and Dr.G.Dhandapani, IIC – Convenor and Assistant Professor of Botany. Dr.B.DivyaPriya, IIC – Innovation Ambassador and Member, Associate Professor, Mr.S.K.Arunkumar, IIC- Member and Assistant Professor and Dr.V.Suganthi, Assistant Professor, Department of Bio-chemistry co-ordinated the event.

PAPER WRITING AND RESEARCH REPORT ON INNOVATION

I SEMESTER

202PH040
SWATHI T
I MSc. PHYSICS

ELECTRICITY FROM LIGHTNING

ABSTRACT:

Generation of alternate and cleaner sources of energy to meet the on growing power crisis is the need of the hour. One such viable option would be harvesting energy from lightning. Since the days of Benjamin Franklin's study of the atmospheric electricity, the first thing that leaps to our minds about atmospheric electricity is the spectacular display of lightning. Lightning is a process of spontaneous momentary high-current electrostatic discharge, which often is initiated in the cloud and the path usually stretches over kilometres in length. Though we know that lightning is a form of alternate and cleaner electricity, it is challenging to harness lightning due to its high potential electrostatic discharge that occurs in a short span of time.

INTRODUCTION:

"Drums rumble, as he peeks; blinding eyes for those who seek"

Lightning is one of the most splendid displays in nature yet it is one of the deadliest natural phenomenon known to man. Benjamin Franklin was the first to prove lightning is a form of electricity, yet it remains a mystery -how to harness and store the energy. We have been constantly depleting the natural resources for our needs. If the rate of using these resources remains the same, they would get depleted and there will be no resources for the future generations. So, developing an alternate energy source has become a necessity than an option. One such alternate renewable energy source would be lightning. But, to our unfortune, till day the methods of exploiting lightning to extract electricity from it have not been found. Yet, numerous concepts regarding harnessing lightning energy and its conversion into electricity, given by scientists have come up over the years.

STATIC ELECTRICITY –THE OMNIPRESENT FORM:

When two objects are rubbed against each other there occurs exchange of charges. One of the objects becomes positively charged and the other one becomes negatively charged. When these induced negative charges, touches a conducting metal these is a transfer of electrons from the object to the metal. This transfer of charges is actually a small electric current which is known as static electricity. This is the lightning phenomenon.

LIGHTNING FORMATION:

"Electricity is really just organized lightning. -George Carlin."

The negative charges in the clouds are concentrated at the base of the clouds and positive charges move upwards occupying the top of the clouds. As a result, the negative charges on the surface of the ground are repelled leaving net positive charges on the ground which creates electric field between the clouds and the ground. This strong electric field causes the air around the cloud to "break down" or become ionized, due to the ionization of the air a streamer may begin to propagate down towards the earth. They move faster creating an invisible stroke called a stepper ladder. As the tip of the ladder approaches ground, the electric field at the sharp objects on the ground increases. At that time one or more upward-moving positive charges are initiated from the ground and the attachment process begins which results conductive path from the cloud to the ground. The electric potential is produced between the return stroke that is at ground potential and the cloud potential. As a result, current flows between the earth and the cloud, which is nothing but lightning.

A typical lightning bolt can transfer 1020electrons in a fraction of a second, developing a peak current of up to 10 kilo amperes. It has been estimated that one lightning strike has enough energy to light 150,000,000 light bulbs or one strike can power a 100watt light bulb for three months.

TYPES OF LIGHTNING:

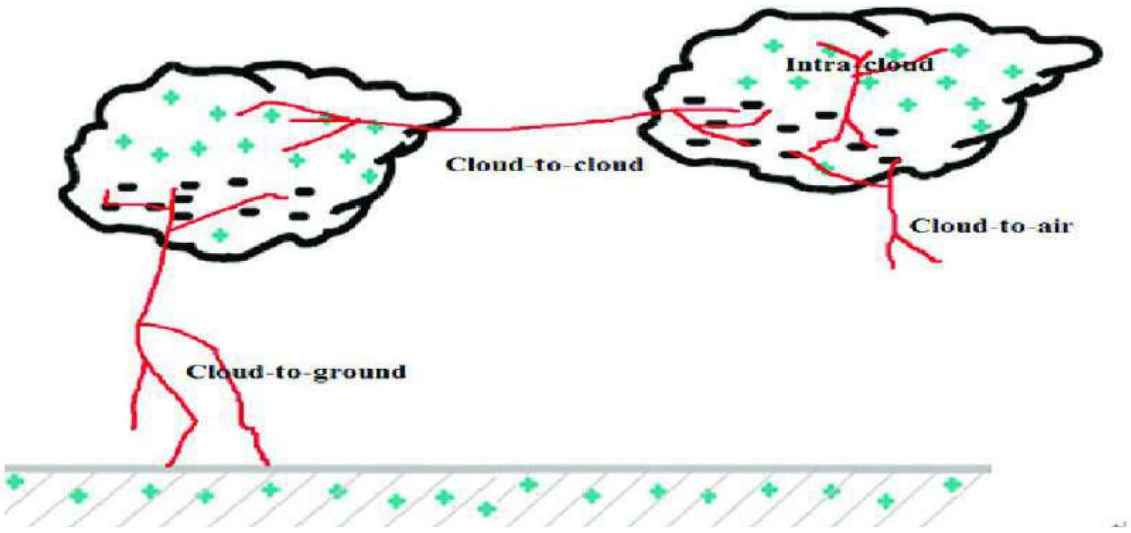


Fig.1, Source: Different types of lightning discharge (Rakov, 2007)

There are three main types of lightning classified based on where they occur:

I) Intra cloud lightning: In this type of lightning the discharge occurs in the same cloud.

II) Inter cloud lightning: When the discharge occurs between the positive charges of one cloud to negative charges of another cloud, it is called as inter cloud lightning (cloud to cloud). They account for about 75% of global lightning occurrences.

III) Cloud to air: Lightning that occurs when the air around a positively charged cloud top reaches out to the negatively charged air around it.

IV) Cloud to ground lightning: It occurs when the discharge takes place between the clouds and the ground. Though this type of lightning is the one that reaches the earth and causes damage, it could be possible to harness the electricity from them.

CHALLENGES IN HARNESSING LIGHTNING AS A SOURCE OF ELECTRICITY:

When lightning strikes earth, much of the energy arrives not as electricity but as heat. This cannot be harvested directly as electricity but should be converted from heat energy to electricity. Such huge amount of heat could also damage equipment. So, the instrument should be chosen in such a way that it has high melting point.

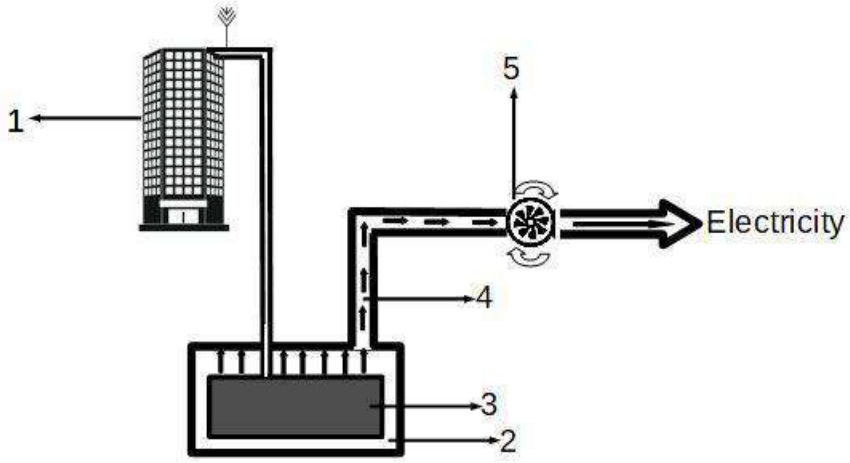
Another major challenge when attempting to harvest energy from lightning is the impossibility of predicting when and where thunderstorms will occur. Even during a storm, it is very difficult to tell where exactly lightning will strike. This makes it impossible to establish lightning power plants anywhere. It must be constructed in lightning hotspot areas (where lightning occurs frequently). The best location is in the east of the Democratic Republic of the Congo, near Kifuka.

ENERGY FROM MOLTEN METAL:

An array of lightning rods is placed on top of tall buildings. These rods would servers as a "by-pass" by means of which the high voltage is transferred to the earth surface without any causalities. Lightning rods are usually made up of copper because it conducts electricity from lightning more effectively. These rods are then connected to an underground reservoir. The reservoir is made up of metals with high specific heat capacity like tungsten, so that it

requires large amount of energy to raise its temperature. Metals with low melting and boiling point are placed in the reservoir. These metals would melt producing steam due to the lightning energy. The steam is used to rotate the turbines fast. The spinning turbines cause large magnets to turn within copper wire coils, producing electricity. This phenomenon of producing electric voltage due to a

change in the magnetic field is known as electromagneticinduction.



LIGHTNING HARVESTING UNIT.

1) Tall building with lightning rod

2) Underground reservoir

3) Molten metal

4) Steam

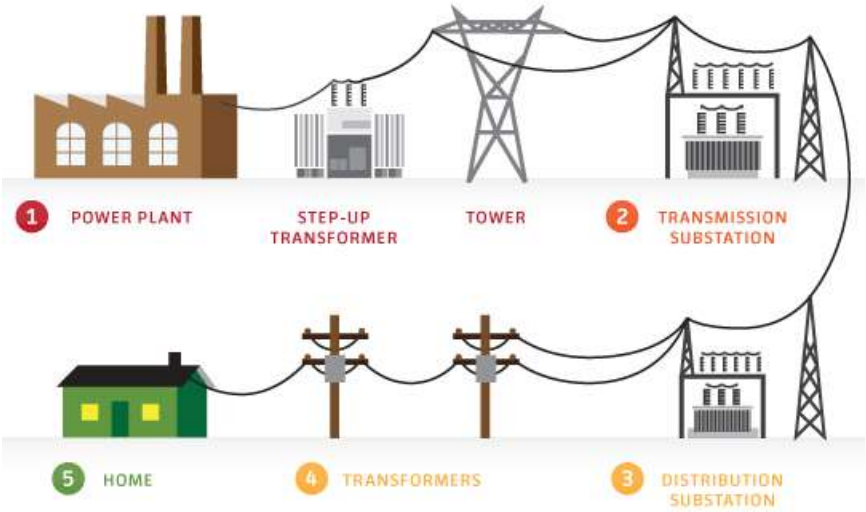
5) Steam Turbine

DISTRIBUTION OF ELECTRICITY:

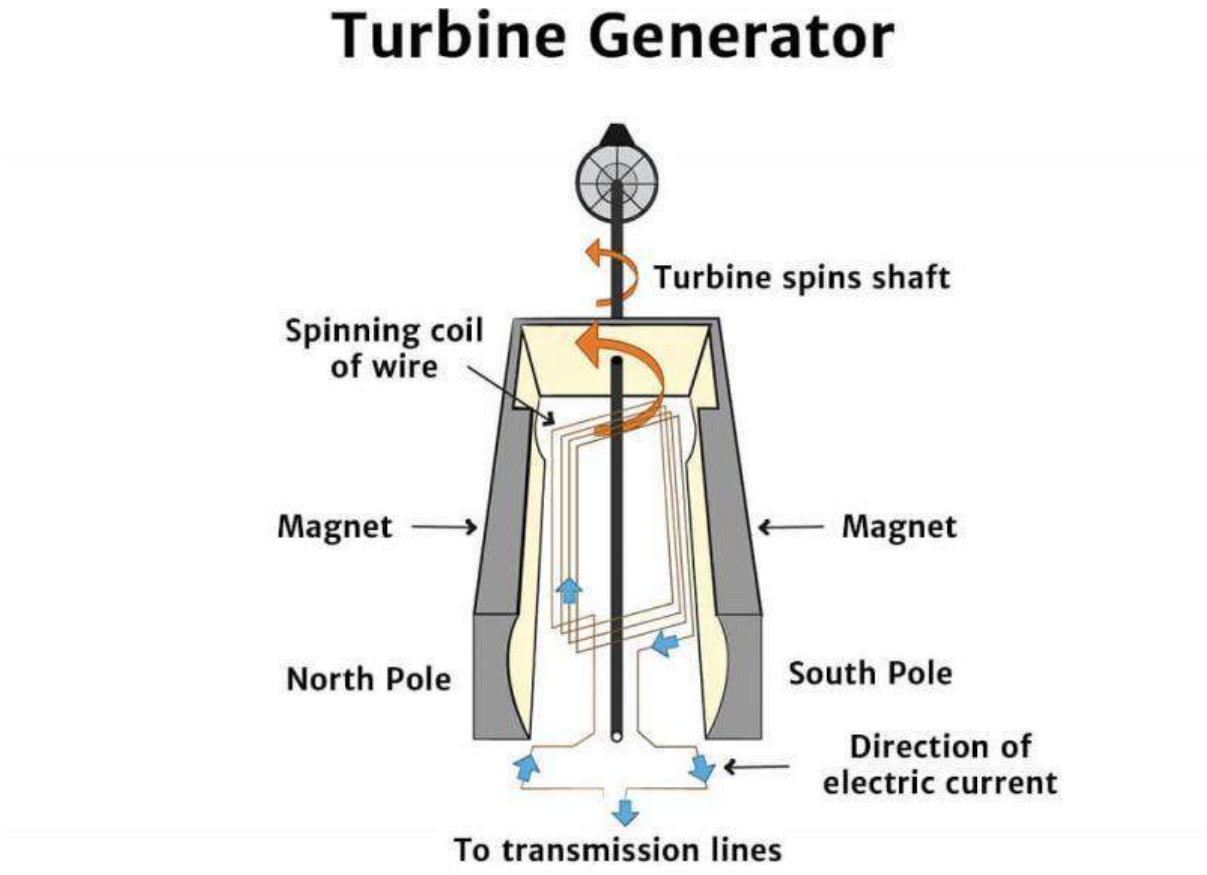
This process of converting the mechanical energy of steam into electricity is done in power station. The power plant can be established in a region where lightning is more frequent.The place on Earth where lightning occurs most often is near the small village of Kifuka in the mountains of the eastern Democratic Republic of the Congo.

From power stations, electricity flows to large transmission lines held up by huge towers. These lines carry large amounts of electricity to substations in cities and towns. From the substations, distribution lines carry smaller amounts of electricity to houses. The amount of

time taken to dissipate heat from an underground reservoir of molten metal weighing several tons would take several days, enabling us to produce electricity at a leisure pace. This plant can be established in a region where lightning occurs frequently.



Source: alphainvesco.com



Source: greengalaxies.net

CONCLUSION:

Smart electrification means using electrical energy to replace other forms of energy, such as fossil fuel. It also means using the advantages of electricity to make overall better use of energy. Electricity is basically a no-loss energy. It converts energy into useful power without losses and without pollution. Electric energy is also more efficient than the fossil fuels like coal and petroleum. So, harvesting electricity from lightning would be helpful in attaining this concept of smart electrification.

"All life is an experiment; the more experiments you make the better will be our standard of living."

One such experiment has been done by James Chyi Lai. He has acquired a patent for a Lightning energy harvesting unit, where we would be able to harness lightning energy. Harnessing electrical energy from lightning may seem like a distant dream as of now but the days are fast approaching when lightning can provide a solution for all our power crisis issues.

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Lightning a Fundamental of Atmospheric Electricity, Akinyemi M. L*, Boyo A. O, Emetere M. E, Usikalu M. R, Olawole F. O. 2014 International Conference on Environment system Science and Engineering.

Lightning Rod Improvement Studies

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www.thoughtco.com

https://www.forbes.com/sites/statoil/2015/01/28/can-we-harvest-lightning-for-the-power-grid/#414b927c1e6c

https://www.phenomena.org/weather/lightning

Kongunadu Arts and Science College
(Autonomous)

Paper Writing and Research Report on Innovation

A.B. Ramsailesh

181cm249

Introduction

Innovation is truly a confusing buzzword which many people love to hate.

Every business leader agrees that it is important. But nobody can quite seem to agree on what it actually is or what it means.

If you ask Google for an innovation definition, it is less than helpful, coming up with over 300 million results with thousands of definitions. Its own definition is pretty much useless: *"the action or process of innovating"*. Using the traditional sources for a definition such as the Oxford dictionary also doesn't help much, with their answer being *"Make changes in something established, especially by introducing new methods, ideas, or products"*

So I contacted a selection of my fellow innovation experts to see how they talk about innovation with their clients, and compiled the results for you here. I asked them all:

1. What is your definition of "innovation"?
2. What mistake do companies often make when they talk about innovation?
3. What simple thing can a company do to change their conversation / perspective about innovation?

The results surprised me. Even amongst the group of industry insiders here who teach and author books on innovation methodologies, case studies and thought leadership, there was a huge variety between the responses. So in the last section of this article, I've analysed what everyone said to find the most common themes, to try and see if it is possible to use the common threads to determine the most effective definition you can use.

Let's get started.

Definitions and Meaning of Innovation according to Experts

Nick Skillicorn

What is your definition of "innovation": Turning an idea into a solution that adds value from a customer's perspective

What mistake do companies often make when they talk about it?: They talk about it being a company value without actually putting the required level of support behind it to make it happen. Coming up with ideas is relatively easy, fast and cheap, but then those ideas need to be executed. This is where companies often fail, by not providing the required level of time and budget to take a rough idea, refine it, experiment on it and finally turn it into a real solution. Additionally, companies usually think of it just from an internal viewpoint, such as whether they think the offering is being improved when it is updated. In reality, if the customer doesn't perceive the changes as having value, then they won't be compelled to purchase it. So it is all about the customer's perceived value.

What simple thing can a company do to change their conversation / perspective about it?: Flip it on its head, and look at every new thing you are trying for various customers' perspectives.

Nick is the chief editor of Idea to Value and also the CEO & Founder of Improvides Innovation Consulting. He was voted one of the world's top innovation bloggers for 2014 and is a leader in thought leadership on the science of improving creativity.

David Burkus

What is your definition of "innovation": The application of ideas that are novel and useful. Creativity, the ability to generate novel and useful ideas, is the seed of innovation but unless it's applied and scaled it's still just an idea.

What mistake do companies often make when they talk about innovation?: The think about products or technology. Innovation is bigger than a product or a technological platform. And in truth, it's the innovations to organizations and management that precede product or technology innovation anyway. Great leaders don't innovate the product; they innovate the factory.

What simple thing can a company do to change their conversation / perspective about innovation?: Change the conversation? For starters, let's have the conversation. Conversation meaning a two-way dialogue. Telling employees that "we need more great ideas" almost never works…yet it's almost always what is done. Instead, let's open up a dialogue with everyone in the organization about how we can get better at finding, testing, and implementing the great ideas that people are already having.

David Burkus is a best-selling author, award-winning podcaster, and associate professor of management at Oral Roberts University. His new book "Under New Management" is out now. Twitter: @davidburkus

Stephen Shapiro

What is your definition of "innovation"? **Very simply put, innovation is about staying relevant. We are in a time of unprecedented change. As a result, what may have helped an organization be successful in the past could potentially be the cause of their failure in the future. Companies need to adapt and evolve to meet the ever changing needs of their constituents.**

What mistake do companies often make when they talk about it? The biggest mistake companies make is asking others for ideas. When asking for ideas, we invite a lot of noise and unnecessary work. Every person inside and outside of your organization has an opinion, suggestion, or idea about how to improve things. The reality is that most of these ideas won't be effective in producing positive results. Organizations that spent too much time on idea collection, implode from the weight of all of the ideas.

What simple thing can a company do to change their conversation / perspective about it? For the most effective results, focus on the question, not the solution/idea. I have done a number of studies that show that when you ask people to think outside the box, you reduce the quality of your solutions. By asking more abstract questions, you increase the noise, lower the value, and reduce the relevancy of solutions. The issue isn't that you need to expand the box. Quite often you are simply looking in the wrong box!

Framing the challenges correctly is a critical key to innovation. For example, bicycle safety advocates have been pushing for mandatory helmet laws. But the real goal is to improve safety. And numerous studies show that safety is greatly improved when there are a large number of cyclists on the road. Ironically, helmet laws have been shown to reduce the number of riders. Solving the problem of getting helmet law compliance is not the same as increasing riders.

Stephen Shapiro is an Innovation Instigator, Hall of Fame Speaker and Author. His books include Best Practices Are Stupid and Personality Poker.

Pete Foley

What is your definition of "innovation"? I define the innovation process as a great idea, executed brilliantly, and communicated in a way that is both intuitive and fully celebrates the magic of the initial concept. We need all of these parts to succeed. Innovative ideas can be big or small, but breakthrough or disruptive innovation is something that either creates a new category, or changes an existing one dramatically, and obsoletes the existing market leader. We can obsolete ourselves or someone else, and it can be 'sexy', or address a basic human need – both the iPad and disposable diapers qualify for me. But it needs to either create a new market, or radically change an existing one.

What mistake do companies often make when they talk about innovation? We need to stop calling everything breakthrough or disruptive, especially in internal company discussions. It is more than OK to have a balanced pipeline of big and small ideas, and we need to get comfortable with that again. If we demand nothing but disruption or breakthrough, (delivered tomorrow and on small budgets) then that is all people want to work on, and to accommodate this, everything gets labeled in those terms. But language matters, and once we start calling good but smaller ideas breakthrough, we lower the bar. This is a recipe for mediocrity, and is one of the reasons why so many companies struggle with too many small initiatives and not enough big ones.

What simple thing can a company do to change their conversation / perspective about innovation? Make a long-term investment in innovation culture. Strategy is important, but it is culture that drives most of the smaller, often largely unconscious decisions that permeate an innovation organization. Big ideas take time, productive failure, communication, and collaboration. These are enabled by a culture that protects, and to some degree nurtures big ideas, and innovative, fearless people. I'm not sure if this qualifies as simple, but I think it is essential, and often overlooked.

Pete Foley is a Consultant, Innovator, Artist, Scientist, Photographer, Musician, Accountant and Blogger, with 25 years experience of Innovation and Behavioral Science in the Fortune 50. Twitter: @foley_pete

Gijs van Wulfen

What is your definition of "innovation"? An innovation is a feasible relevant offering such as a product, service, process or experience with a viable business model that is perceived as new and is adopted by customers.

What mistake do companies often make when they talk about it? Companies lack focus in their discussions on innovation. Often there's a senior manager experiencing an urgent need for something new, fueled by a business challenge. A new competitor may have entered the market; revenues may have decreased dramatically or a big contract has been lost. One essential point is often missed at the start: innovation ideas for what? That's the question! When you focus your innovation efforts, you're much more productive. You should start innovation choosing a clear focus.

What simple thing can a company do to change their conversation / perspective about it? Don't accept the status quo. Innovation means coming up with something really new: a big idea. When you fully accept the status quo at work or in your personal life nothing will change. There's a wonderful quote by George Bernard Shaw: The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore all progress depends on the unreasonable man. Innovation often starts with something that annoys you personally and is relevant for you. Something you personally really want to change, because you need to. It's the WHY for innovation.

Gijs van Wulfen is a Linkedin influencer and the author of the FORTH Innovation Methodology. Twitter: @gijsvanwulfen

Kevin McFarthing

What is your definition of "innovation"? the introduction of new products and services that add value to the organisation.

What mistake do companies often make when they talk about innovation? Companies often confuse invention and innovation; they're different things.

What simple thing can a company do to change their conversation / perspective about innovation? Companies should really listen more to their consumers and customers.

Kevin McFarthing was voted #1 blogger on innovation in 2015 by Innovation Excellence. He is an expert in Innovation Management, Open Innovation and R&D. Twitter: @InnovationFixer

Robert Brands

What is your definition of "innovation"? Not an easy answer: Innovation needs to be defined and agreed upon in each organization, making sure it is strategically and everybody is aligned. Without it, misalignment results in less than optimal focus and results. As long as it includes "new" and it addresses customer needs and wants, any variation goes.

What mistake do companies often make when they talk about it? Innovation is not just Idea generation. It should encompass all Ten Imperatives to Create and Sustain Innovation, from Inspiration to Results; a structured repeatable process needing continued reinforcement and continuous improvement.

What simple thing can a company do to change their conversation / perspective about it? Since it is "Innovative or Perish", the ideal thing an organization can do is set a clear and simple goal, like "At least one new product per year" that can be adopted and understood at all levels. However, make absolutely sure objectives and rewards are aligned.

Robert Brands is known at the Innovation Coach®, is a serial entrepreneur and innovation practitioner, workshop facilitator, author and speaker. Twitter: @innovationrules

Paul Hobcraft

What is your definition of "innovation"? the fundamental way the company brings constant value to their customers business or life and consequently their shareholders and stakeholders.

What mistake do companies often make when they talk about innovation? They confuse it with invention, they use it to define anything new, they forget it has to contribute new value and be valued by others as better than what they have known.

What simple thing can a company do to change their conversation / perspective about innovation? Placing innovation into the core of the organization's thinking changes the conversations, it alters the time horizons, it shifts the whole dynamics of where to go to grow and sustain the organization for the future.

Paul Hobcraft has been advising numerous organisations on innovation for over 15 years and is consistently considered one of the world's top innovation bloggers. Twitter: @Paul4innovating

Mike Shipulski

What is your definition of "innovation"? work that delivers new goodness to new customers in new markets, and does it in a way that radically improves the profitability equation.

What mistake do companies often make when they talk about it? Companies do creativity when they should do innovation. There can be no innovation without commercialization.

What simple thing can a company do to change their conversation / perspective about it? Move from idea generation to product commercialization.

Mike Shipulski is an innovation thought leader, focusing on defining best practices and tools for Product and Technology Development and embed them into company culture. Twitter: @MikeShipulski

Paul Sloane

What is your definition of "innovation"? Creativity is thinking of something new. Innovation is the implementation of something new.

What mistake do companies often make when they talk about innovation? Many companies make grand statements about their commitment to innovation but do not invest in the time, people or money to prototype innovative ideas.

What simple thing can a company do to change their conversation / perspective about innovation? Commit the resources to a good staff ideas scheme with the target of implementing at least 5 ideas per employee per year.

Paul Sloane is a Speaker, Facilitator and Author, specialising in entertaining talks & workshops on creativity, lateral thinking & innovation. Twitter: @PaulSloane

Jeffrey Baumgartner

What is your definition of "innovation"? **the implementation of creative ideas in order to generate value, usually through increased revenues, reduced costs or both.**

What mistake do companies often make when they talk about it? They confuse creativity, especially idea collecting, with innovation.

What simple thing can a company do to change their conversation / perspective about it? Put more women in top management. Research studies have shown it improves the success rate of innovation, and also the bottom line.

Jeffrey Baumgartner is an author, keynote speaker and workshop facilitator specialising in creativity and innovation, and writer of the long-running industry newsletter Report 103. Twitter: @creativeJeffrey

Stefan Lindegaard

What is your definition of "innovation"? I try not to define "innovation" as we should tone down our use of the word and term.

What mistake do companies often make when they talk about innovation? They talk too much about innovation. They should get back to basics.

What simple thing can a company do to change their conversation / perspective about innovation? Stop talking about innovation. Focus on corporate transformation – in most cases, this should be driven by digitalization and disruption issues.

Stefan Lindegaard is the Chief Transformer at Transform – or Die! Author, speaker and advisor focusing on corporate transformation based on digitalization, disruption and innovation. Twitter: @lindegaard

Drew Boyd

What is your definition of "innovation"? anything that is new, useful, and surprising. That last criteria, surprising, tends to 'surprise' people because they usually don't hear many people talk about it. For me, a great innovation are the simple ones that make you slap your forehead and say, "Gee, why didn't I think of that?".

What mistake do companies often make when they talk about it? The biggest mistake companies make is not taking stock in how innovative they already are. I've worked with some of the most innovative companies in the world whose employees moan that they're not innovative enough, or that they desperately want a "culture of innovation." It's crazy. So I tell companies they don't have an innovation problem. They have an employee perception problem. My best guess is that employees get frustrated when they see their company kill a viable project in favor of other priorities. It wears them down.

What simple thing can a company do to change their conversation / perspective about it? A simple thing companies can do to change the conversation about innovation is to train it. Set up formal courses teaching systematic methods of innovation like SIT and TRIZ. Teach people about idea management, idea selection, and pipeline development. In other words, see innovation as a competency like leadership or ethics.

Drew Boyd is Co-author of Inside the Box: A Proven System of Creativity for Breakthrough Results. Innovation practitioner, professor, blogger, and speaker. Twitter: @DrewBoyd

Michael Graber

What is your definition of "innovation"? New, organic value creation by applying creativity, in-depth relationships with consumers and customers, and new thinking.

What mistake do companies often make when they talk about innovation? Because innovation is a process, they bucket it as a value engineering process, rather than a value generation process.

What simple thing can a company do to change their conversation / perspective about innovation? Live it. Host workshops. Bootcamps. Show executive support for innovation projects.

Michael Graber is Co-Founder and Managing Partner at Southern Growth Studio, and has a particular focus on innovation, to deliver high-impact go-to-market strategies and product launches.

Jorge Barba

What is your definition of "innovation"? something new or different that delivers value to the world, with the key criteria that I'm not innovating if I'm not bettering people's lives. Put simply, it is the future delivered.

What mistake do companies often make when they talk about it? Mistakes are too many, one is punishing people for trying new stuff. Leaders that want to build an organization that innovates consistently must provide six things to employees: freedom, resources, diverse teams, support, encouragement and challenge. In other words, you can put it like this: Have bold goals, get out of the way and reward people for trying.

What simple thing can a company do to change their conversation / perspective about it? Companies, just like people, get in their own way. So ask, how are we impeding people from doing the things necessary that drive innovation? Then stop doing that and start doing that does.

Jorge Barba is an innovation insurgent and a partner at Blu Maya, an innovation consultancy helping ordinary companies become extraordinary. Twitter: @jorgebarba

Analysis of the innovation definition

As you can see by all of the responses above, every expert has their own views on what innovation is and how companies can improve it. Some of them even rightly point out that it's become a bit of a buzzword and perhaps we shouldn't be looking for a singular definition as it will vary based on circumstance.

But after going through all of the responses, it became clear that there are definitely some underlying themes that crop up again and again.

Here is my analysis of the most-cited aspects of innovation according to this selection of thought leaders:

Based on all of these factors combined, if we were to create the ultimate innovation definition, it would be:

The ultimate definition of innovation

Executing an idea which addresses a specific challenge and achieves value for both the company and customer

So there you have it. The ultimate innovation definition, put together based on the analysis of some of the world's greatest innovation thought leaders.

Now we are going to see a product which had a great struggle when entering into the market and after an innovative idea its revenue increased in a greater height

When Sarah Robb O'Hagan, a general manager at Nike, agreed to assume leadership of Gatorade in 2008, she thought she was taking over an iconic brand that had grown a little tired. But when she arrived at Gatorade headquarters in Chicago in July of that year, what she found was something else—a struggling brand in obvious decline.

Gatorade had invented the sports drink category in the 1960s. But in 2007, sales had stalled, and in the fifty-two weeks preceding Robb O'Hagan's arrival, they had actually dropped 10 percent, while sales of cheaper archrival Powerade had grown 13 percent. The Gatorade product and marketing team she took over was already rushing to redesign Gatorade's logo and packaging. But that company didn't know that was not only the problem but after many attempts they succeeded What did the company do?

What would you do if you were in her position? Clearly, innovation is the key. But how can you innovate to revive the brand and restart growth? One common response is more—more products for more customers, more features or more performance for current products, and more channels of distribution or expansion into more geographic markets. This is usually the first and easiest strategy to revive sales. Unfortunately for Robb O'Hagan, Gatorade had already tried this approach. Seven years before, in 2001, when PepsiCo bought it, Gatorade expanded its range of flavors, added low-calorie versions, and put the drink through Pepsi's massive distribution network. Sales took off. But "more" has limits. Expanding distribution and adding new product variants will quickly hit a point of diminishing returns, after which each addition generates fewer marginal sales but just as much additional cost. When taken too far, new product versions begin to lose money, and, eventually, there are no new distribution channels to fill. For Gatorade, 2007 was the year it hit those limits. What were the Gatorade team's choices? Sustaining and incremental innovations—new versions, new channels, and the like—were exhausted. Conventional thinking about innovation would point the Gatorade team in a different direction. It says the only real alternative to sustaining and incremental innovation is to go big. Hundreds of articles and books, with more appearing every year, explain how to pursue revolutionary, radical change: look for "blue oceans," develop new "disruptive" products or business models, turn your product into a memorable experience, or act like a lean startup. Of course, there are differences among these approaches, as their advocates will quickly point out. In spite of those differences, however, they all share certain basic features. All promise dramatic growth and all agree: more of the same won't cut it. They all tell us to look at the icons of radical innovation transforming the world—digital photography replacing film, Uber replacing taxis, online news supplanting newspapers, Airbnb replacing hotels, and Amazon replacing everyone else. For our purposes, though, the key feature they all share is this: when pursued by existing organizations, these approaches often lead firms to rethink their businesses in fundamental ways. They typically call for large and risky investments, not just in money but also in time, effort, and strategic focus. And because these approaches typically take

organizations into new territory—new technology, new products, new markets, and new processes—the full consequences they produce are often unforeseeable, failure is common, and the cost of failure is large. One careful evaluation of revolutionary innovations estimates that failure rates are 60–75 percent, as opposed to 25–40 percent for incremental improvements. Because of these similarities, we label all these forms of innovation *radical*. Whatever external form they may take, they are all, for incumbents, internally disruptive. All of them rest on the same underlying assumption: to succeed in today's hypercompetitive global economy, you must respond to competitive threats by changing your business in some fundamental way. If you don't, someone else will disrupt it for you. The consequence of this binary thinking—if incremental doesn't work, do something radical—is that many companies respond to the first sign of a threat by saying, "We have to do something new, big and revolutionary." So they launch a major initiative and challenge their employees (or expensive consultants) to think far outside the box. A flurry of big new ideas emerges, followed by new initiatives and Skunk Works teams. But the success rate is low. The entrenched processes, systems, training, and values that produced and sustained prior success for those companies now conspire to make them less successful at radical change. If they're fortunate, after the dust settles, they've only wasted time and money. Worst case, they've put in place drastic changes with unintended consequences that cannot be entirely undone. In either case, they've poisoned the well for more big new ideas. Where does this leave Sarah Robb O'Hagan and her team at Gatorade in 2008? If more and better versions of Gatorade, along with increased distribution, weren't enough, was radical innovation their only alternative? Was that their only path to restarting growth? No, it wasn't. They chose a different path that produced one of the great brand turnarounds of the new century. Their story is one of several we will tell about leaders and companies that have refused to accept today's binary thinking. For some time now, it has been clear that neither sustaining nor radical innovation can explain a number of corporate success stories—including some, like Apple after Steve Jobs returned in 1997, that have mistakenly been held up as exemplars of disruptive innovation. The experiences of companies such as Gatorade, Apple, LEGO, Victoria's Secret, Guinness, Novo Nordisk, and CarMax—all stories that we will tell—reveal a third option that's often less risky and less costly than radical change but is in many cases equally powerful. It is this third option that Robb O'Hagan and her team used to revive Gatorade. For convenience, we will refer to this option as the Third Way simply to indicate it's not bound by the binary thinking that says innovators have only two choices: innovate small or innovate big. There is another option. The Turnaround at Gatorade was no ordinary soft drink. Scientists at the University of Florida had developed it in the 1960s as a hydration aid for the school's football players who had to play under the brutal Florida sun. It quickly became a favorite of athletes everywhere, and in 1983, it was named the official sports drink of the National Football League. PepsiCo bought Gatorade in 2001, introduced a raft of new flavors and other variations, and pushed it through the vast Pepsi distribution system as a soft drink for the mass beverage consumer. That approach hyped growth for a few years; by 2007, Gatorade commanded 80 percent of the $8 billion sports drink market in the United States. But when the economy began to falter, sales growth disappeared. And when the Great Recession arrived in 2008, three months after Robb O'Hagan joined Gatorade, sales went south in a hurry. As a first step, Robb O'Hagan helped her team finish its redesign of the logo and packaging. In the redesign, which appeared in early 2009, *Gatorade* became simply *G* with a more up-do-date lightning-strike design. The introduction of the new design didn't go well, however. On retailers' shelves, old and new designs were mixed side by side, and sales continued to shrink. Retailers and Wall Street analysts alike blamed the new design and were quick to note that TV ads preceding the 2009 Super Bowl featured the new design but never mentioned the name "Gatorade" (though the ad during the game did include it). Concerned voices inside PepsiCo called for returning to the old design and doubling down the old strategy of head-to-head competition with Powerade, the way Pepsi had always competed with Coke. Instead of panicking, the Gatorade team looked at the market data streaming in. It told them that Gatorade was losing casual drinkers, many if not most of them the customers added since PepsiCo had acquired the brand. These casual drinkers were going elsewhere, many to plain old tap water, not a bad move when the economy was tanking for those who never had any real reason to drink Gatorade in the first place. The good news in the data was that serious athletes were sticking with Gatorade. Gatorade's core customers, those serious athletes, came in two basic flavors: teenage athletes keen to win and older athletes such as marathoners and triathletes. The teenagers accounted for 15 percent of Gatorade's customers, and the older athletes another 7 percent; together, that 22 percent accounted for 46 percent of Gatorade sales. In recent years, Gatorade hadn't been marketing as deeply to those loyal segments. It was being distributed through mass-market outlets like convenience stores, grocery stores, and big discounters, but not through runners' stores, cycling shops, and

other specialized retailers that serious customers frequented. What it all meant was that Gatorade faced a choice: compete with Powerade on price, which didn't make much sense, or refocus on serious teen and older athletes and mostly ignore everyone else. Refocusing, however, would take more than a redesigned logo and a catchy advertising campaign. As Robb O'Hagan and her group looked hard at these core customer segments, they realized that truly serving them meant going beyond hydration. "Athletes needed a full range of specialized nutrition," she said, "and they needed it before, during, and after the event. We called it 'Sports Fuel' and discovered that even world-class athletes didn't know where to find it. Usain Bolt, the great runner, ate Skittles candies before Olympic races … because he couldn't find anything better designed for his needs." Their goal was to make Gatorade the "aspirational brand for athletes" it had once been. Their plan comprised two basic steps: First, refocus Gatorade on serious athletes (athletic adolescents and older performance athletes) who were Gatorade's sweet spot. Second, expand Gatorade products to supply all the fuel—hydration and nutrition—that serious athletes needed. The *G* rebranding gave Robb O'Hagan and her team the flexibility to move beyond fluids. In spite of problems during the switchover, research told them that younger athletes in particular understood and accepted the change. Their plan reversed the typical approach of mass beverage marketing. Instead of taking the same basic product to more and more different customers, they added a new line of products and aimed them all, including the Gatorade drink, at a specific customer segment, serious athletes. And they were going to do it in spite of pressure inside and outside PepsiCo to return to tried-and-true mass-marketing approaches. In taking this new direction, the team rationalized the line of drinks by eliminating many of the flavors and variations that had been added in the prior decade. The big change, though, was adding new products around its traditional drinks—gels and bars for energy prior to exercise, and protein smoothies and shakes for recovery after exercise. It all added up to an intuitive 1-2-3 G Series of products needed by an athlete before, during, and after exercise for peak performance. Prices rose to reflect this more targeted line of products. Where previously a 32-ounce bottle of Gatorade might have cost $0.99, a 12-ounce bottle of the new before-workout carbohydrate drink sold for $2.99. Before this huge product transformation, Gatorade sales came almost entirely from mass-market retailers. Now the G Series was also available where serious athletes went—cycling shops, running specialty stores, sporting goods retailers, and even retailers like GNC vitamin shops. Traditional Gatorade retailers pushed back; this wasn't the business they were used to. Not only were the products and the in-store displays different, but mass-market retailers no longer saw as much Gatorade advertising on television, where previously 90 percent of its advertising budget had gone. No more Super Bowl ads—"Why advertise," Robb O'Hagan asked, "when the players are drinking your product throughout the game?" Now 30 percent of the ad budget went online to social media and niche sites that attracted serious runners and other high-performance athletes. In light of research that said young athletes start to compete seriously around age eleven, Gatorade returned to working with coaches of adolescent athletes to stress the link between athletic performance and nutrition. The company delivered the same message in lesson plans for its four-thousand-plus sponsored summer camps and sports tournaments. And it began to sponsor training groups that local retailers organized. Returning to its scientific roots, Gatorade expanded research done at its Gatorade Sports Science Institute in Illinois to understand the physiology of athletic performance and the role of proper nutrition. And it opened a new facility in Florida, where it tested athletes. In the end, the Gatorade team was able to revive a revered but stumbling brand. By 2015, Gatorade had regained the share lost to Powerade and restarted growth.[3] And it did this in a parent company that, heart and soul, was a beverage company where the highest priority was to restore the Gatorade drink to its glory days. Some may say that what Robb O'Hagan did was smart but hardly a different way of innovating. Gatorade expanded its product line and thereby grew sales.

What's new or different about that?

We understand. What happened at Gatorade can seem obvious at first glance, but look more carefully, and you will see something not readily apparent. Robb O'Hagan and her team didn't add nutrition products to compensate for declining sales of Gatorade the drink. They expanded the product line for precisely the opposite reason: to grow sales of the sports drink itself, the company's core product. That was their mandate, and that's what she and her people did. When they launched this new approach with all the elements described above, they quickly saw an uptick in sales of the drink. Sales of the pre-and post-exercise nutrition products followed more slowly as serious athletes began to understand and adopt the Gatorade system.

A REPORT ON INNOVATION

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The topic of reasoning, characterizing and making is about advancement. There are ten critical components in the craft of Innovation. The ten central issues of the cycle. These focuses assist us with turning into a financial speculator, a business person, a consultant and a ton of things.

1. Make Meaning

It begins with the craving to make importance rather than bring in cash.Making significance implies that change the world. In the event that you end up changing the world, you will likewise presumably bring in cash, on the off chance that you solely crave to bring in cash, you likely won't bring in cash, you won't make meaning, you won't change the world, and you will most likely fizzle. So first decide how you can make meaning. How might you change the world? Here are a few models.

Macintosh needed to democratize PCs. They needed to carry registering capacity to everybody. That is the significance they made.With Google, they needed to democratize data, making data accessible to everybody. With eBay, they needed to democratize business so anybody with the site could tolerate toeing to-toe with some other huge retailer. Furthermore, YouTube needed to empower individuals to make video, to transfer video, to share video.So this is an illustration of the organization and the sort of importance they made.

2. Make a Mantra

The subsequent advance is to make a mantra. A few , possibly four-word clarification of why yours is significance should exist. Try not to make a statement of purpose. Model Nike has an extraordinary trademark "Take care of business". That is a motto. A mantra clarifies why you should exist, and the Nike mantra is "Genuine athletic execution."

A subsequent suggestion is the point at which you choose the sort of significance you make, attempt to discover a few words that depict why that importance should exist. Not a 50-word statement of purpose, a few word mantra.

3. Jump Curves

The third thing involves viewpoint. The point of view is to hop bends. Not to remain on the very bend that you're on. Not to attempt to improve. The best illustration of this happens in the ice business. In the last part of the 1800s mid 1900s, there was an ice gathering business in the United States. 9,000,000 pounds of ice was reaped in 1900. Actually development for them was: greater pony, more ponies, greater sleigh, more keen saw. Be that as it may, it was essentially sit tight for winter, live in a cool city, cut squares of ice. Presently we have the ice processing plant. Major innovative achievement. It didn't need to be winter; it didn't need to be a cool city. Water was frozen midway and conveyed. No more impediments by atmosphere. No more impediments via season. 30 years pass by, Refrigerator curve Incredible development happens when you get to the following curve, when you go from phone to Internet, when you go from a Daisy-wheel printer to a laser printer, to 3D printing.

4. Characteristics

There are the five characteristics of incredible development. Incredible advancement is "Profound". Heaps of highlights.Heaps of usefulness.

Incredible items are additionally "Keen". Ford makes an exceptionally wise item called the MyKey. Also, what the MyKey empowers you to do is program the maximum velocity of the vehicle into the key. An Intelligent item.

Extraordinary items are additionally "Finished". It's the entirety of the item. In the product business, it's not simply the product; it's not simply the DVD. It's the online course; it's the documentation; it's the android engineers on the off chance that you have an android telephone; it's the iOS designers. On the off chance that you have an iOS telephone; it's the entirety.

Incredible items are likewise "Engaging". They make you more inventive, more gainful. They improve you. They change the importance of your life. More gainful.

Furthermore, extraordinary items are "Elegant". As you experience life, and you're attempting to hop bends, ask yourself, "Am I making something that is profound and shrewd, and complete, and engaging, and rich?"

5. Can be Mediocre

The fifth thing is the point that there might be components of commonness to it. Be it the primary laser printer, there might be components of coarseness to it. At the point when you leap to the following bend, it's OK to have basic, normal components to your transformation. Boat things that are progressive, inventive.

6. Let 100 blossoms bloom.

Allowing 100 blossoms to bloom implies that toward the beginning of extraordinary advancement, you may think you have as a main priority precisely who your client is, how they ought to manage your item. What's more, you might be astounded how the individuals will utilize your item in manners you didn't envision. It will be individuals who you didn't foresee would utilize it by any means. Situating and marking comes down to what the shopper chooses, not to what you choose. With Macintosh, they thought they had an accounting page, information base, and word handling machine. Yet, what made Macintosh effective was Aldus PageMaker. PageMaker made a field of blossoms called work area distributing. Work area distributing was what saved Macintosh. Not bookkeeping page, data set, or word processor. On the off chance if we focused in on accounting page, information base, and word processor and overlooked work area distributing, Apple would be dead today. With Apple dead, it would be an alternate world. We'd all have telephones with genuine keypads; the batteries would last over a day.

7. Polarize People

Extraordinary items, incredible administrations, extraordinary development spellbinds individuals. This typically work for enormous brands and promoting offices, since individuals, watch publicizing one day a year. So don't fear polarizing individuals.

8. Always Upgrade

Number eight is beating the item. What trend-setters in business do is they take version 1, and they make it 1.1, 1.2, 1.3, 1.4, 1.5, 2.0. This is the hardest thing on the planet. Because to be an innovator, one should be in denial. Denial is required because the naysayers will tell you it can't be done, shouldn't be done, not necessary. Ignore those people. At the same time, you must get the reviews from these people to churn your product and evolve it.

9. Engineering and Marketing

Designing is a straightforward outline. On the vertical pivot, we measure uniqueness. On the even pivot, we measure esteem. It's a 2 X 2 Matrix. In the base right is the place where we have something of extraordinary worth however it's not interesting. There, you need to contend on cost. In the contrary corner, you have something really one of a kind. Just you do it, yet it is of no worth. Base left corner you have something that is not important and not remarkable. You need to be in is the upper right-hand corner. In that corner, you are extraordinary.

Best model is the Breitling crisis watch. The solitary watch that can save your life. Pull out the knob puts out a crisis signal. That watch can save your life. Another model is the smart vehicle.

In case you're an architect, make an item interesting and significant. In case you're an advertising individual, you convey to the world that your item is interesting and significant.

10. Perfect Your Pitch

In case you're a pioneer, you need to figure out how to pitch. Two central issues about pitching. To begin with, alter your presentation. Start with something altered to the crowd.

A Bonus point would be the slides. The ideal number of slides in an introduction is ten. You ought to have the option to give these ten slides shortly. What's more, the exact opposite thing is the ideal size text style is 30 focuses. A decent general guideline is to take the most seasoned individual in the crowd; partition their age by two: 60-year-old separated by two, 30. 50-year-old partitioned by two, 25 focuses.

MEDICINS FROM *MIMOSA PUDICA*

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ABSTRACT

There is a famous saying that “No smell for the jasmine in our front yard” and this is very correct. Because there are lot of medicinal plant in our yard but we are not aware of it. One of it is the *Mimosa pudica* [Touch me not]. It majorly possesses antibacterial, antivenom, antifertility, anti-inflammatory, antidepressant and various other pharmacological activities. We can utilize *Mimosa pudica* in suitable forms like tablets and ointments. It is cheaper and has no side effects.

INTRODUCTION

Most of the people doesn’t know about the value of medicinal plants. For most of the diseases we all have the tendency to visit a doctor. All the medicines are in the tip of our finger, but we are not aware of it. One among them is *Mimosa pudica*. It is a very effective medicinal plant. Here I am planning to introduce two products, a tablet and an ointment made from different parts of *Mimosa pudica*. They are very effective and has no side effects. I would like to bring people back to ayurveda.

OBJECTIVES

1.To make people aware of the benefits and uses of Mimosa pudica.

2.To enhance the people for using herbal products.

3.To develop skills among people to make medicines from cheaply available medicinal plants.

PRODUCT DESCRIPTION

Here I am planning to introduce two products, an ointment and a tablet made from different parts of *Mimosa pudica*. Not only a specific part but the whole plant itself has a lot of medicinal values. We can make medicines using the whole plant. It can be used to treat various diseases like leprosy, dysentery, asthma, leucoderma , inflammation, neurological problems, diabetes, fever, piles, bronchitis, cholera, cough, dyspepsia, jaundice, small pox, syphilis, tuberculosis, fatigue, blood diseases , cancer, whooping cough, gynecological disorders, insomnia, urogenital infections, utrine tumor, rheumatism, odema, myalgia etc. It can be also used to purify blood. The tablets made from the leaves of *M. pudica* can be used to treat various diseases such as diabetes mellitus, viral hepatitis, cervical adenitis, vaginal diseases, fistula, scrofula, conjunctivitis, hemorrhages, asthma, head ache, migraine, stomach ache, dysentery etc. It can be also used to kill parasites in the gut. It can be used to treat mental disorders. It can be used to treat cancer because the plant is rich in antioxidants, which help to stop the formation of damaging molecules called free radicals. It will give relief from static nerve pain. It will prevent liver damage. It kills harmful microorganisms. It promotes skin health due to the presence of minerals like iron, zinc, copper and manganese and also it fights against skin infections. The tablets made from its roots can be used to treat insomnia, irritability, premenstrual syndrome [PMS], menorrhagia, haemorrhoids, diarrhoea, tooth ache, urinary complaints, dysentery, inflammation, smallpox, fever, piles and fistula. The ointment made from *M. pudica* can be used to cure wounds and minor cuts and we will get a better result. It can be applied to glandular swelling and also to the forehead and it gives relief from head ache and migraine. We can see better result when this ointment is applied on skin burns

and deep wounds. We all know that diseases are increasing day by day, even new diseases too. We are running to many hospitals to solve such problems. And they will prescribe some medicines, we consume it and thereby inviting new diseases by their side effects. The solution for such problems are available in our home but we never noticing it. Medicines made from Mimosa pudica can cure millions of diseases and they are reliable. Because they are made from naturally available medicinal plants. They don't have any side effects.

METHODOLOGY

- Collection Of Plant Leaf and Root
- Preparation of Plant extract
- Finding of Bioactive compounds in plant extract
- Characterization of Bioactive compounds
- Analysis of pharmacological properties like antioxidant, antibacterial, antifungal, anti inflammatory, hepatoprotective, anticonvulsant, hypolipidemic activities etc.
- Preparation of Oinmant and Tablet formulation
- Invivo and invitro analysis of product
- Clinical analysis of product
- Product Development
- Patent filing of our product

APPLICATIONS

- The tablet and ointment possess a wide array of pharmacological properties like antioxidant, antibacterial, antifungal, anti inflammatory, hepatoprotective, anticonvulsant, hypolipidemic activities etc.
- The tablets can be used to treat diseases like asthma, cancer, ulcer, static nerve pain, small pox, skin infections, fever, piles, dysentry, head ache etc.

- The ointments can be used to cure wounds, minor cuts, head ache etc.

ADVANTAGES

- Mimosa pudica is a naturally available medicinal plant. It is cheaper and easily available. It is an unnoticeable treasure found in most parts of India.
- It possesses an array of medicinal properties
- Cost effective
- No side effects
- Instant results
- Detoxifies the body
- Reduce stress
- Rich in antioxidants and minerals
- Reduce risk of diseases
- Healthy skin
- Reduce inflammation
- Cures insomnia
- Products can be sold with affordable price

CONCLUSION

This research report gives a clear picture about uses and benefits of medicinal plants. Here I introduced a fast, cost effective and nontoxic protocol for the production of medicines from *Mimosa pudica*. The medicines made from this herbal plant have the capacity to cure millions of diseases with its extraordinary properties. The main aim of this research report is to make people aware of the naturally available medicinal plants and by this to reduce their visit to hospitals. Let's open our eyes and find time to observe the medicinal plants in our surroundings. Utilizing them properly will show a better result.

DEVELOPMENT OF HONEY BASED NATURAL JELLY FROM BEETROOT PEEL: ANALYZE ITS STABILITY AND SENSORY PROPERTIES

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ABSTRACT

The present research work was made to formulate and evaluate natural jelly from Beetroot peel. Beet root (*Beta vulgaris*) is a vegetable with high amount of biologically active substances and inorganic nitrogen. Ultra sonication assisted aqueous extraction of pigment from beetroot peel was done and total betalain pigments were measured by pH differential method. FTIR results confirm the presence of amine and carboxyl group which indicates the medicinal and nutritive value of beetroot peel. In this study two different formulations (FI and FII) were prepared by using gelatin as a gelling agent, honey as a sweeting agent. Stability of the betalain pigment was analyzed at various temperature (5, 10, 15, 20, 25 and 30°C) also evaluated antimicrobial and antioxidant property. The results of the storage properties revealed that the developed jelly can be stored under refrigerated and ambient conditions for a period of 15days respectively without addition of any artificial preservative. Based on the sensory quality characteristics viz., color, texture, shape, flavor and overall acceptabilityFI can be used in development of jelly effectively andsuccessfully also the nutritive compositions analyzed.
Keywords: Beetroot peel, Jelly, Betalain, Antimicrobial, Antioxidant, Sensory analysis

INTRODUCTION

Beetroot (*B. vulgaris*) is biennial plant grown in temperate countries and it is an alkaline food with pH in range of 7.5 to 8.0 **(Antigo *et al.*, 2013).** Beet root are the excellent source of beta carotene, calcium, ion and nitrogen. In India it is mainly grown for its juice and vegetable value which contains vitamin A, B1, B2, B6 and C also it is the good source of various minerals **(Mathlouthi, 2002)**. Recent report indicates that beet root extract possesses anti-hypertensive, hypoglycemic, anti-oxidant, anti-inflammatory, and hepatic protective activity Additionally beetroot is the natural source of dye and it is used for many food processing unit. The pigment present in the beet root is betalain, an alkaline pigment and is chemically a glucoside and hydrolyses into sugar glucose and betanidin**(Vulic*et al.*, 2014)**.Generally betalain has excellent stability at various pH, light and temperature.

Many beet products are made from other Beta vulgaris varieties, particularly sugar beet. The cellulose content of the beet acts as a bulk residue, increases peristalsis and eases the passage of stool, hence its regular use prevents habitual constipation and lowers blood pressure in hypertensive persons. Gastric ulcer can be treated with beetroot wine. It increases the urinary output due to its rich potassium content and cures hypo-glycaemia. It is also helpful in various treatment of jaundice, hepatitis, nausea and vomiting due to biliousness, piles, tuberculosis, cholera, diarrhoea, dysentery and lowered state of body resistant after major surgical operation etc**(Thakur and Gupta, 2006).**The beet root juice is a natural remedy for sexual weakness and to expell kidney and bladder stone **(Sharma *et al*., 2011).**

Waste material of beet root peel contains rich source of phytochemicals and antioxidants due to the presence of higher amount of phenolic compounds **(Goulas and Manganaris, 2012).** The betalains found in beetroot peel extract were vulgaxanthin I, vulgaxanthin II, indicaxanthin, betanin, prebetanin, isobetanin and neobetanin. Also cyclodopaglucoside, /V-formylcyclodopaglucoside, glucoside of dihydroxyindolcarboxylic acid, betalamic acid, L-tryptophan, p-coumaric acid, ferulic acid and traces of unidentified flavonoids **(Kujala*et al.*, 2001)**. In the recent report, aquous extract of beet root peel involved in the formation of single crystalline gold (Au) nanoplates (Deokar and Ingale, 2018). Due to higher antioxidant level and nitrogen it is used as a god quality fertilizer than that of standard antioxidants **(Babagil*et al.*, 2018)**.

Like beet root, itspeel extract improves the redness in tomato pastes, soups, sauces, desserts, jams, jellies, sweets and breakfast cereals.Jellies are made by cooking fruit juice with sugar. It is made from juice or aquous extract of one or more fruits or vegetables with sweetening properties with or without the addition of water**(Codex Alimentarious commission, 2009).**Kids of all ages like jelly but commercial jelliescontaining high amounts of artificial colorants, sugar or high fructose corn syrup can be detrimental to one's health.

The aim of the present study was to develop and evaluate natural jelly from beet root peel with the help of sweeting agent and gelling agent and thereby sensory analysis carried out.

MATERIALS AND METHODS

Collection and Storage of Samples

Beetroot (Vitamin A, C and B6), Gelatin (Gelling agent) and Honey (Sweeteing agent) procured from Reliance fresh Mart, Coimbatore, Tamilnadu, India. The peel was removed and dried under hot air oven at 75ºC for 2 days. The dried peel was finely powdered in a grinder and stored in a container for further studies (**Chojnacka*et al.*, 2015**).

Pigment Extraction

Ten grams of the powder was extracted with 50 ml of distilled water in a coniacal flask. The mixture was then processed under sonicator for about 6 hrsunder proper conditions and observed in proper intervals of time. The aqueous extract was then centrifuged for 10 minutes at 5000 rpm and the supernatant is collected and stored in refrigerator**(Alihosseini*et al*., 2008).**

Phytochemical analysis

Phytochemical analysis of the beetroot peel extract was carried out using standard methods **(Kezi and Sumathy, 2014)**

Estimation of Total Pigment Content

The total amount of Betalain pigment was measured by the Castellar *et al*.., (2003) method with modified dilution.

$$\textbf{Total pigment content } \left(\frac{mg}{g}\right) = \frac{A \times DF \times MW \times 1000}{\varepsilon \times L}$$

Where,

A: Absorption value at 535 nm, DF: Dilution volume, MW: Molecular weight of betalain (550 g/mol), ϵ: The extinction coefficient for betalain 60000 l/mol, L: Path length of cuvette 1 cm.

Chemical Structure Analysis

FTIR (Fourier Transform Infrared Spectroscopy)

Fourier transform-infrared spectrum of extracted pigments was obtained from pellets, prepared with 1 mg sample and 100 mg of dry potassium bromide (KBr). The spectra were recorded using and infrared spectrophotometer, Perkin Elmer FT-IR Spectrum GX (USA) in transmittance mode between 700 and 4000 cm^{-1}**(Chan-Higuera*et al*., 2019).**

Antimicrobial Activity

The antimicrobial activity of the peel extract (1.0 mg) was evaluated by the agar well diffusion method.The antimicrobial activity of the extract was tested against two Gram- Negative bacteria (*Escherichia coli*MTCC 1687, *Serratiamarcescens*MTCC 4822), two Gram-positive bacteria (*Bacillus cereus*MTCC 6840 and *Staphylococcus*aureus MTCC 96), two microscopic filamentous fungi (*Aspergillusflavus*MTCC 535 *and A. versicolor*MTCC 698). The Bacteria and fungi were collected from Microbial Type Culture Collection, Chandigarh**.** The inhibition of microbial growth was measured around the impregnated discs. Antimicrobial activity is considered high, moderate, or trace when the zone diameter is > 10 mm, 5–10 mm or 2–5 mm, respectively, and negligible effect when the value is less than 2 mm **(Boo *et al*., 2012)** and percentage of inhibition was calculated.

Anti-oxidant Property

DPPH Radical Scavenging Method

DPPH (2,2-difenyl-1-picrylhydrazyl) radical scavenging activity of Betalain pigment was estimated according to the method of Sanchéz-Morénо*et al*., (1998). For the anti-oxidant study, dried extract was used and the method was described in**Khalaf*et al,* (2008).**DPPH solution in methanol (0.1mM) was mixed with different concentration of extract (20 to 100mg/l) and read the absorbance at 518 nm.1,4-dithioerythritol was used as the standard and the results were expressed in mg/l. Standard equivalents **(Ivanišová*et al*., 2019).**

Thin Layer Chromatography

Seperation of Betalain pigment was done by cellulose coated TLC plate with the sequential use of two different polar system (Less PS I - Isoproponol: Ethanol: Water: Acetic acid: 55: 20: 20: 5 ml and More PS II - Isoproponol: Ethanol: Water: HCl: 55: 20: 24: 1 ml). One Hundred ml of beetroot extract was mixed with 2 ml of water and applied on the TLC plateand allowed the solvents moved 10cm then dried under atmosphere and run twice in two different solvents in the same direction.This method was done with modified procedure of **Bilyk, (1981**).

Preparation of Formulation for organoleptic evaluation
Two different formulations were prepared with various concentrations of the ingredients for organoleptic evaluation studies (Tab 1).

Table 1. Formulation based various combination of the extract

S.No	Sample	FI	FII
1.	Beet root extract (ml)	5	10
2.	Gelatin Powder Food grade (g)	2	2
3.	Honey (ml)	10	5
4.	Water (ml)	3	3
	Total	20	20

Preparation of Jelly
Based on organoleptic evaluation the selected formulation was heated and filled in small cups (preferably used for jelly preparation) and stored in refrigerator for 1hr. The prepared jellies can be scooped from the cups and can be consumed directly**(Chaudhari and Nikam, 2014).**

Stability and Storage Study
The selected formulation was checked for pigment stability at varioustemperatures (5˚C, 10˚C, 15˚C, 20˚C, 25˚C and 30˚C) and storage test was performed simultaneously with samples inside capped glass vials covered with aluminium foil sealed with parafilm for 30 days by measuring the samples in colorimeter at 535nm. The reading was taken at the interval of 5 days once until 30 days.

Statistical Analysis
All values presented antimicrobial and antioxidant are mean ± S.D. of three analyses. Data were subjected to one-way ANOVA followed by post hoc Duncan's Multiple Range Test (DMRT) using SPSS 17 (SPSS Inc., Chicago, IL, USA) for determining significant differences at $p<0.05$.

RESULTS AND DISCUSSION

Sample Extraction and Preliminary Screening
The beetroot peel was finely powdered and extracted with $d.H_2O$ under ultrasonicator for 6h, centrifuged and stored the supernatant under refrigeration (Plate 1). The Extract was subjected for different chemical analysis for preliminary screening and the results indicated the presence of various compounds and shown in table 2.It has been reported extensively, that betalain pigment was extracted from beetroot peel by ultra-sonication method with the extraction time of 3h and stored at low temperature **(Sivakumar*et al*., 2009).** Similarly, ultrasonication assisted distilled water extraction was carried out and reported as this method was not significantly influence on pH, soluble solids and total solids. Yield of pigment also significantly higher (Ngamwonglumlert*et al*., 2017). As can be observed in table 2betalain showed the presence of all the mentioned phytoconstituents. Our report is extensively correlated with the result of **Kezi and Sumathy, (2014).**The result obtained from

Onkar*et al,* (2013)the phyto-chemical screening of beetroot extracts showed presence of flavonoids, saponins, sterols and triterpenes. This type of biochemical profile has been observed in another study using GC-MS that dealt with *Saturejakhuzistanica* for preserving vegetable oils **(Bahrami*et al*., 2016).** Phytochemicals of different beetroot's vegetation extract were analyzed **(Baião*et al*., 2017).**

Plate 1 Ultrasonicated Aqueous Extract

Phytoconstituents	Qualitative Analysis
Tannins	+
Saponins	+
Flavonoid	+
Reducing sugars	+
Terpenoids	+
Triterpenes	+
Anthraquinones	-

Table 2 Phytochemical analysis of the extract

Chemical structural analysis

The FTIR imagesshowed two strong bands at 3309.39 cm^{-1}, and 1635.40 cm^{-1}corresponding to N-H stretch for 1º, 2ºamines and C=O stretch for carboxyl group respectively were observed. There was a minor or no shift with varying absorbance intensity for all the samples analyzed (Figure 1).

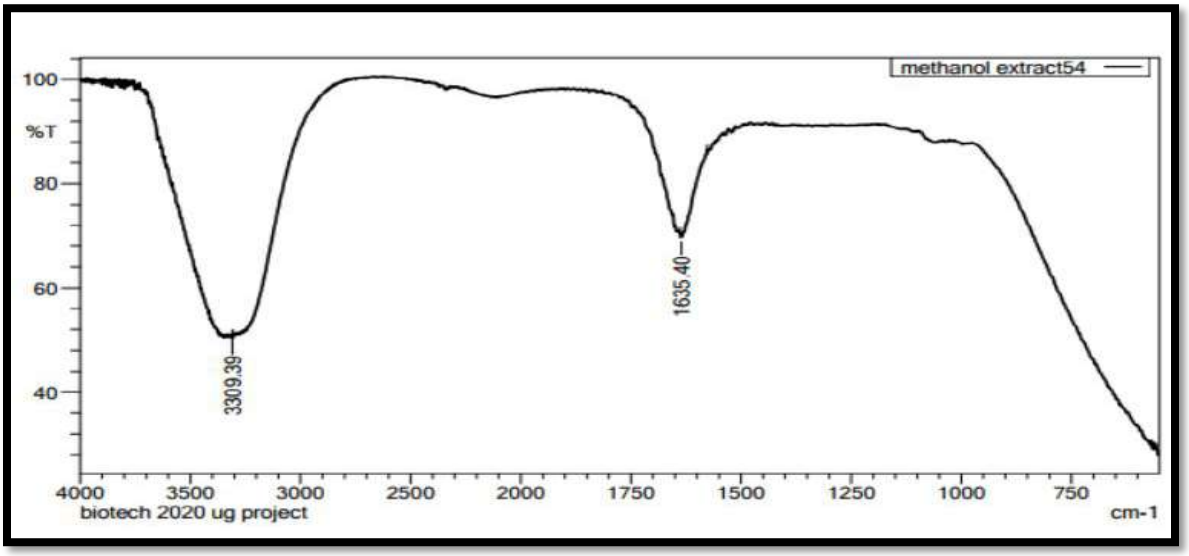


Figure 1.FTIR analysis

From figure 1, presence of amines and carboxyl groups present in the extract possessed the use of medicines, food product preparation and source of good preservatives respectively. Also the occurrence of these nitrogen holding functional groups confirmed the presence of betalains. Previously, it was detected as, the peaks were observed at 1,415 cm^{-1}, indicating the existence of nitrogen-containing functional groups which confirmed the presence of betalains**(Chhikara*et al*., 2019).** The results of transmittance at 3319 and 1637 cm^{-1} were in agreement with the results of our study, indicated the asymmetric and symmetric stretching vibrations of OH groups and H-O-H from moisture

content**(Nesakumar*et al.*, 2018).** Characterization of beet juice lyophilization study, show the stretching of -OH group and NH at 3300 and 1620 cm^{-1}**(Manel*et al.*, 2017).**

Anti-microbial activity

The antimicrobial effect of extract against selected microbes is shown in table 3. *E. coli* showed the high antimicrobial activity with the inhibition of about 90.2±0.2 compared with the standard disc of Chloramphenicol (100%).*S. marcescens*,*B. cereus*, *A. flavus*and *A. versicolor*of fungi showed clear zone formation of growth inhibition, the percentage was calculated with standard fluconazole. The extract showed trace amount of inhibition on *S.aureus*compared to other strains.The antimicrobial activity of one of the major ingredients for jelly preparation was quantified in terms of their ability to restrict the growth of the test strains.The antimicrobial activity of Beetroots have associated with the presence of phenolic compounds and and inhibiting the development of unwanted microorganisms. Few studies related to antimicrobial efficacy of beetroot have been done**.Pavlović*et al,* (2013)**suggestedthat beetroot extracts showed excellent activity against tested microbes *E.coli, P. vulgaris, S. aureus, K. pneumonia and P. mirabilis*.As it is evident from **Velićanski*et al,* (2011)** extract of 100 µl had an inhibitory activity against all tested Gram–negative bacteria, of which most susceptible strains were *Salmonella typhymurium* and *Citrobacterfreundii*, their growth inhibition was caused by 50 µl of the extract.However in some cases, Endometabolites of sugarbeet seed residues exhibited antimicrobial property like phenols, flavonoids and their glycosides that can be used as natural biologically active compounds **(Oksana and Artur, 2019).**

Microorganism	Inhibition Zone (mm)	Inhibition (%)
Bacteria		
Escherichia coli	H	90.2±0.2
Serratiamarcescens	M	52.3±0.4
Bacillus cereus	M	58.3±0.3
*Staphylococcus*aureus	T	35.4±0.2
Fungi		
Aspergillusflavus	M	49.1±0.2
A. versicolor	M	47.2±0.4

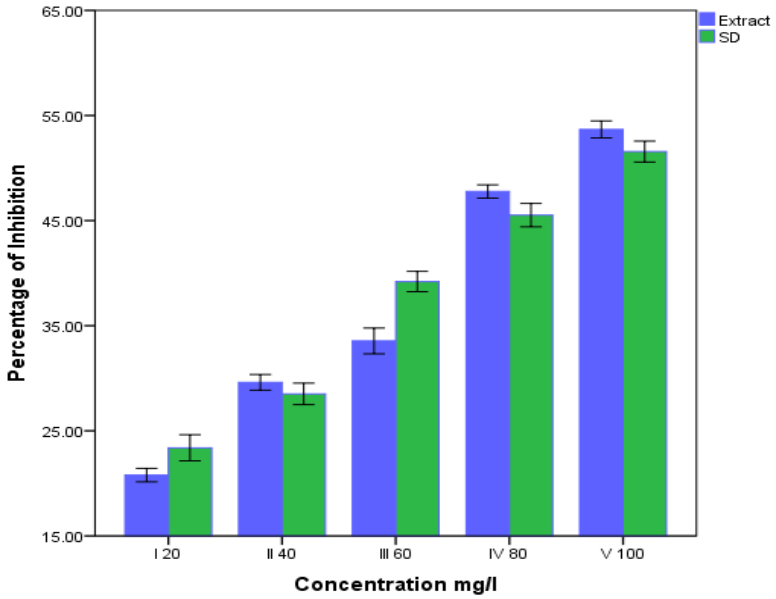
Values are mean±standard of the three replicates

Legend: H – > than 10 mm, M – > 5–10 mm, T– > 2–5 mm.

Table 3 Antimicrobial effect of Beetroot peel extract

DPPH Radical Scavenging Method

DPPH is a nitrogen centered free radicals can be scavenged by antioxidants. Aquous extract of beetroot peel exhibited potent free radical scavenging activity by increasing the concentaration from 20 to 100mg/l. It showed similar potential as standard 1,4-dithioerythritol (20 to 100mg/l). IC_{50} value of the beetroot peel extract was 80 mg/l and for standard 91 mg/l concentration. DPPH is dark purple color changes into yellow color by accepting hydrogen from donor and becomes a non-radical form known as 1,1- diphenyl-2- picrylhydrazine (Figure 2) andSignificance expressed in table 4. Similar to our study **Saani and Lawrence, (2016)** reported, DPPH scavenging activity of methanol and ethanol beetroot extract exhibited increasing scavenging activity with increasing concentration. IC_{50} value was found as 0.129 mg/ml and 0.254 mg/ml respectively. According to **Maqboo*et al,* (2019)** scavenging activity was increased with increase in concentration of beetroot peel extract (4 to 20%).



Legend: SD-Standard

Figure 2 DPPH scavenging property of Extract

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Extract	Between Groups	2171.428	4	542.857	4744.701	.000
	Within Groups	1.144	10	.114		
	Total	2172.572	14			
SD	Between Groups	1635.061	4	408.765	2189.814	.000
	Within Groups	1.867	10	.187		
	Total	1636.928	14			

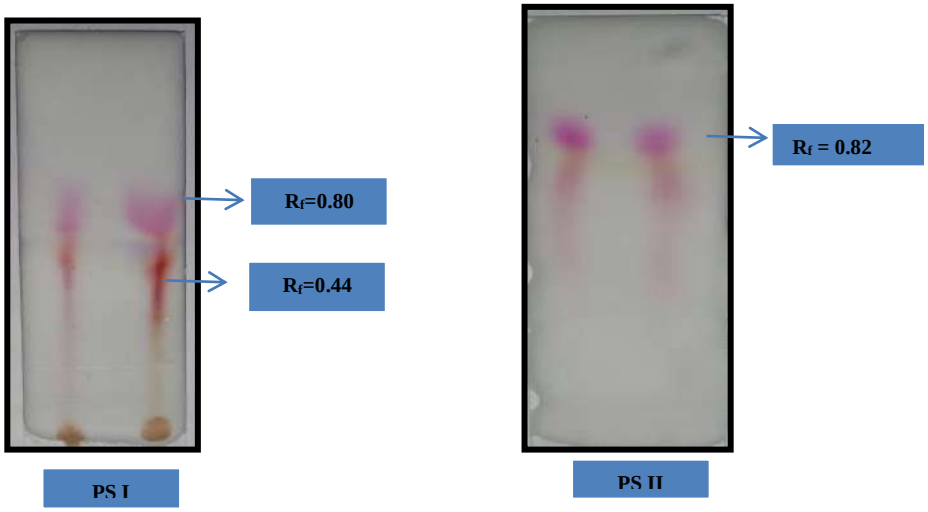
Values are mean±standard

Table 4Statistical analysis of the extract

When the effect of both samples was evaluated against scavenging activity, it was observed as both sample and extract showed highly significant ($p<0.05$). Additionally, interactions between groups and within groups were found more significant ($p<0.05$).

Thin Layer Chromatography

The presence of betalain was confirmed using TLC by separation process. The separated pigment bands seen on a TLC plate by running with PS I and their corresponding visible spectra were identified as betacyanin pigment with identifiedred spot chromatogramby calculating the $R_f$value 0.80 and pink spot chromatogram identified as anthocyanin, R_f value found as0.44. For PS II pink spot was identified with R_f value 0.82.By Interpreting the result with **Kezi and Sumathy, (2014)**the compound was confirmed to be betacyanin, R_f value was 0.98. Similar work was conducted on dragon fruit, different fraction have been shown, two have not been identified due to unavailable information. Known coloredpigemtsbetacyanin and anthocyanin was obtained with R_f value of 0.45 and 0.85**(Pangesty*et al*, 2018).**

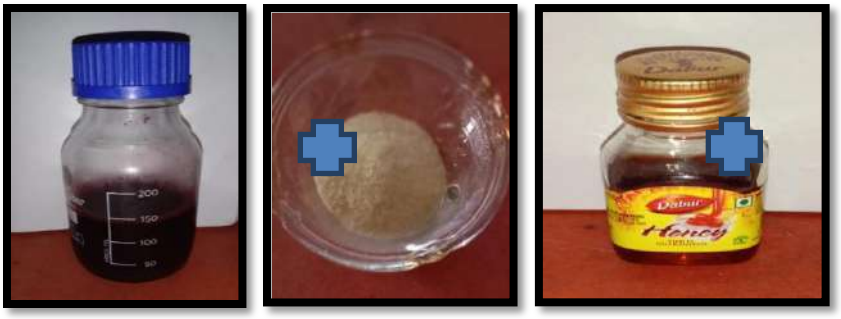


Legend: PS - Polar Systems

Plate 2. TLC of aqueous extract of beet root peel extract

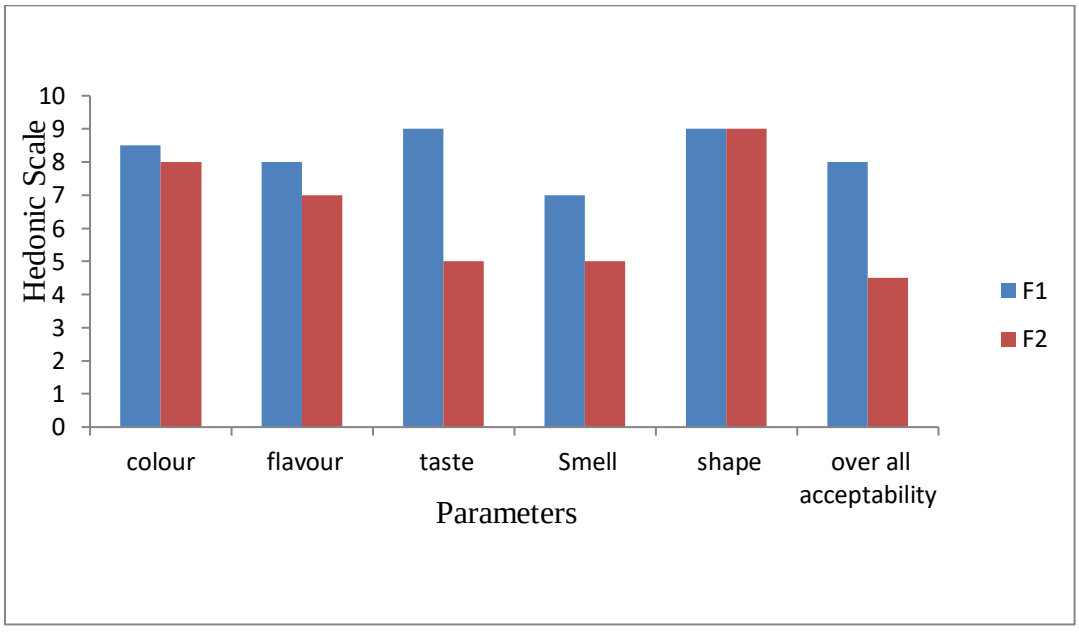
Preparation of Jelly and Sensory Analysis

Two different formulations of jelly were prepared mentioned above in the method section. Mixed the ingredients and heated for 100℃ 4 min or desired consistency was reached. Jelly was prepared and filled in small cups (preferably used for jelly preparation) and stored in refrigerator for 1 hrand illustrated in figure 3. Previously, jelly preparation was done with beet root juice, pectin, citric acid and sugar and the highest evaluation score was 8.3**(Chaudhari and Nikam, 2015).** According to **Shukla*et al*, (2016),** natural jelly was prepared from citrus waste and analyzed carotenoid content. In another study, natural jellies were prepared with carrot, papaya and beet root with different ratios and its nutritive values were analyzed **(Jothisri*et al*., 2019).**Different Sensory attributes like appearance, color, flavor, shape, texture and overall acceptability was analyzed by panel of 5 trained members having experience in sensory evaluations of the product with 9-point hedonic scale. Based on the average score formulation I was selected for further studies (Figure 4).



F1 **F2**

Figure 3 Jelly Preparation



Legend:F1- Formulation I; F2- Formulation II
Figure 4.Sensory Analysis of the formulations

Stability and Storage Test

Stability test ofbetalainfor formulation I was performed at different temperature (5, 10,15,20,25 and 30°C) and read the absorbance at 535nmfor every 5th day until 30 days and Based on the report,the pigment was found to be stable up to 15ºC for 15 days and the stability decreases when the temperature and days increases above 15ºC and 15th day respectively. The hypochromic shifts occurs when the other components of the sample react to the temperatures. The absorbance of samples stored at room temperature decreased gradually as the day increased but the jellies stored in refrigerator showed degradation of pigment after 15th day. Hence natural extract can be recommended to be used at or below 25ºC with minimum loss in pigments for 20 days (Figure 5).Previously the stability was tested with sugar free grape jelly for 60days at 4°C for diabetic patients or for individuals who desire to reduce their body weight **(Khouryieh*et al*., 2005).** The effects of storage temperature and time of jam and juices from two varieties of monkey kola stored at different temperatures 29 to 32°C, there were no significant differences (p>0.05) in specific gravity of the jam and juice samples stored for the period of 4 weeks**(Okudu and Ene-Obong, 2015).**

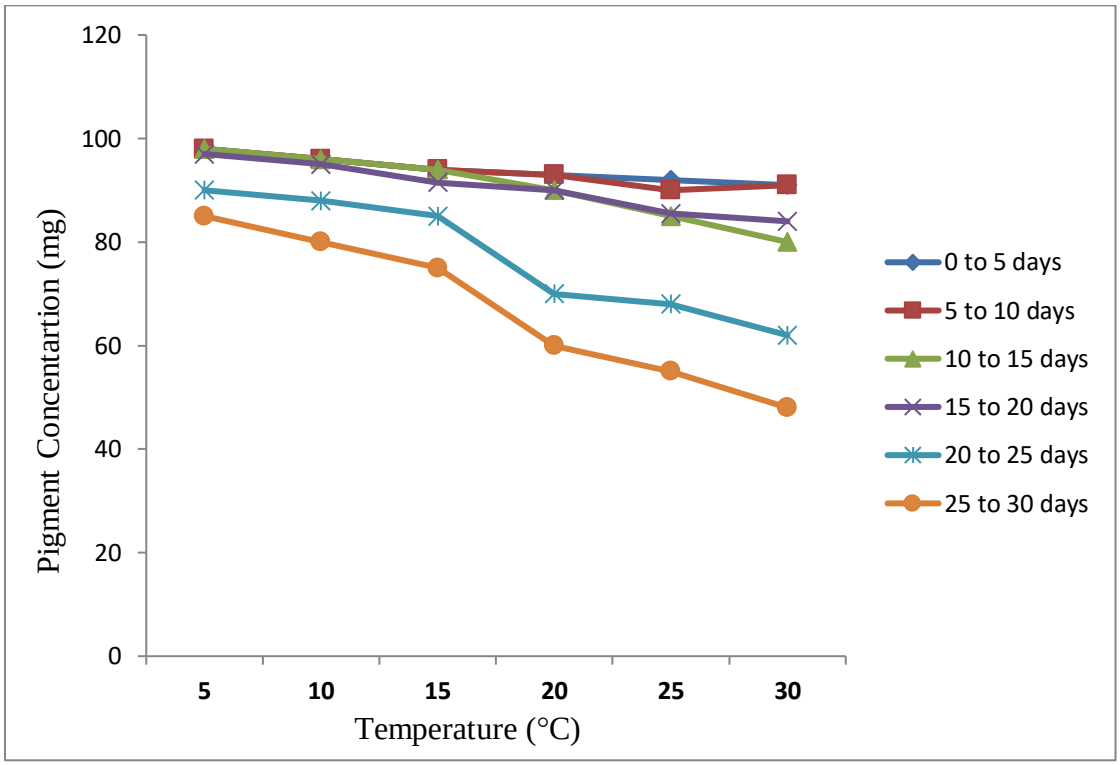


Figure 5 Stability study of the sample at various temperatures

CONCLUSION

Present study was focused on jelly preparation from beetroot peel. Commercial jelly contains synthetic colorants which causes adverse effect. But Waste material of beet root peel contains rich source of phytochemicals and antioxidants due to the presence of higher amount of phenolic compounds. For the successful development of jelly, the formulation was standardized as beetroot extract (5 ml), gelatin powder (2 g), honey (10 ml). The stability was checked at different temperature. The jellies stored in refrigerator and ambient condition showed pigment stability until 15th and 5th day respectively without addition of any artificial preservative. Formulation of beetroot jelly scored highest in sensory evaluation with 8.0 overall acceptability. The nutritional properties of the formulation will be analyzed in future.

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Bioprinting and cancer research

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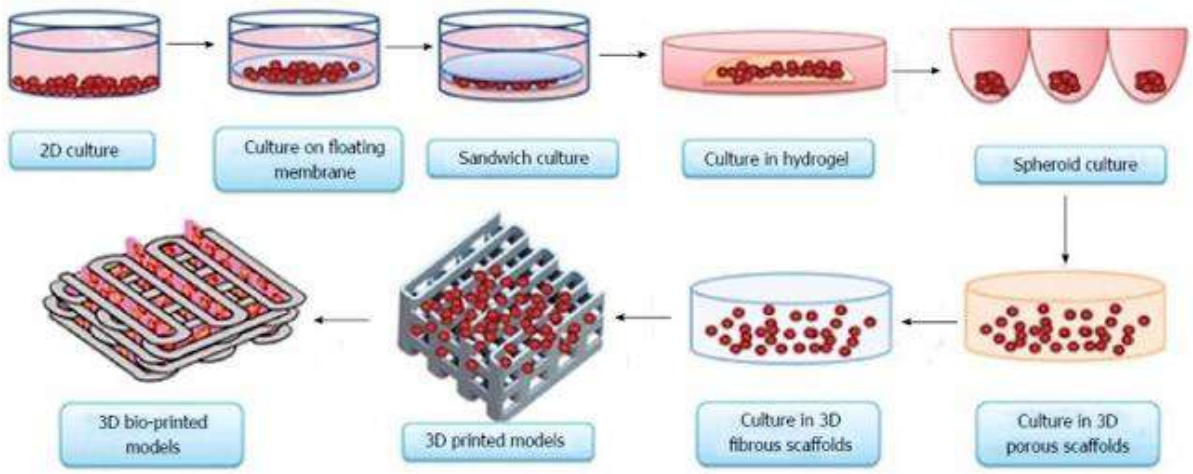
Introduction:

According to WHO, Cancer is the second leading cause of death globally, and is responsible for an estimated 9.6 million deaths in 2018. Globally, about 1 in 6 deaths is due to cancer.Approximately 70% of deaths from cancer occur in low- and middle-income countries. Yet it remains a great challenge for the pharmaceutical industry to effectively develop anticancer drugs. To put an end to this, 3D bio printerscan be used to bio print 3 dimensional cancer modelswhich provides a platform to innovate anticancer therapeutic drugs.



Tumor

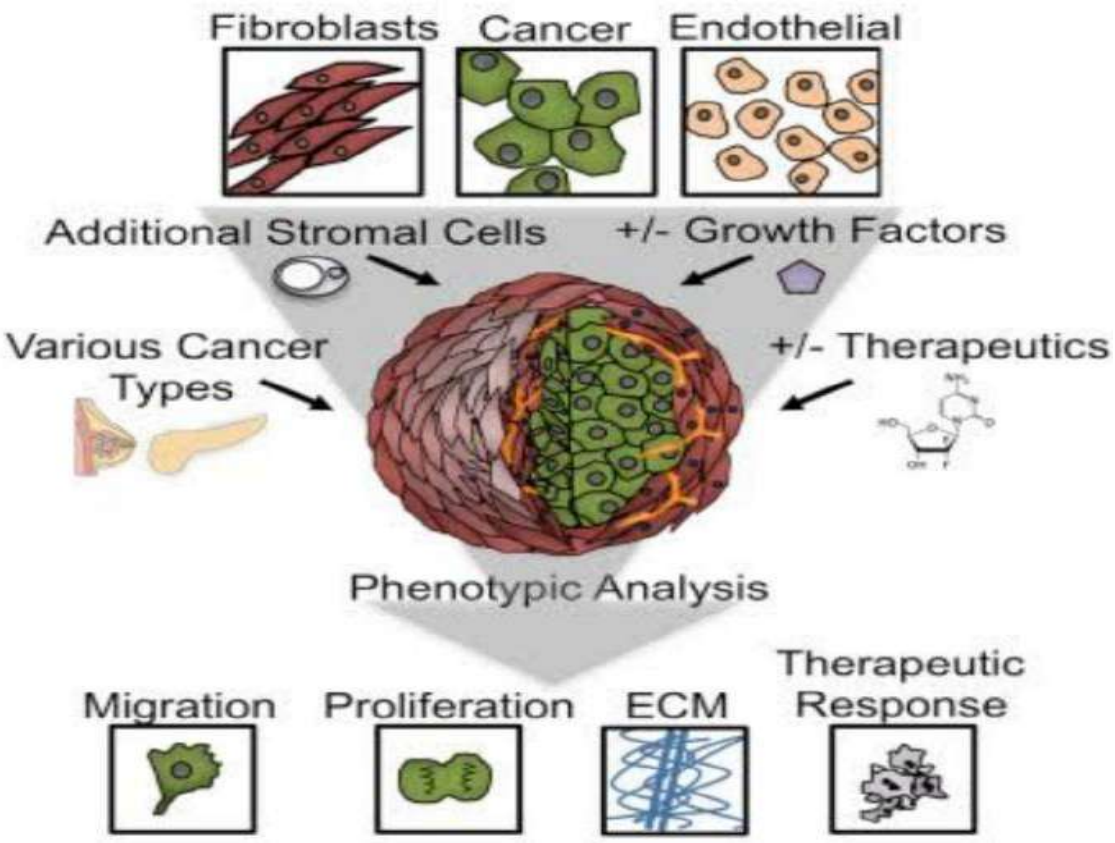
- **Metastasis:**

The unique advantages of 3D bio printed tumor models will likely improve our understanding of tumor biology. Through 3D bio printing, the resulting tumor models would further enable more faithful studies on metastasis, a leading cause of cancer-associated mortality. For example, a breast cancer bone metastasis model was reported, which integrated 3D printed nanomaterials and utilized a table-top stereo lithography-based 3D bio printing technique to create an *in vitro* bone matrix, offering a biomimetic niche for investigating breast cancer bone

invasion.**Angiogenesis:**One of the main difficulties in generating 3D cancer models is the lack of vascular networks, which plays a key role in transporting nutrients and oxygen to cells and therefore in cancer progression. Bio printing has a unique advantage to integrate the vascular network with tumor model. Vascular structures were achieved by sacrificial bio printing, where micro channels could be first formed within the hydrogel matrices through selective removal of the bio printed fugitive bio inks, followed by seeding endothelial cells onto the interior surfaces of these micro channels to mimic the blood vessels; meanwhile, tumor micro tissues could be encapsulated within the hydrogel matrices in the vicinity of the bio printed micro vessels, enabling investigations into tumor vascularization. Other bio printing strategies for vascular integration include microfluidic bio printing and stereo lithography.

Anticancer drug development:

Drug development for cancer has been experiencing low success rates for decades with over 95%



candidate drugs fail to enter the market. Bio printing is not only useful in generating 3 dimensional cancer models which are highly biological and physiologically relevant but it can also construct biomimetic models of Norma tissues in order to screen the efficiency as well as the side effects of the drugs.

Conclusion:

Bioprinted cancer models represent a significant improvement over previous 2D models by mimicking 3D complexity and facilitating physiologically relevant cell–cell and cell–matrix interactions.In summary, cancer models made possible by 3D bioprinting have become an enabling tool for screening anticancer drugs and personalizing treatment for individual cancer patients, as well as an important platform to study cancer biology and pathology in detail and precise manner.

COMPARISON OF INNOVATION BETWEEN INDIA AND CHINA

INTRODUCTION

Most of the industry experts and scholars in the current situation are focusing on the Indian and Chinese economies .The main reason for this is the human resources in these two countries and the innovations that are emerging here ,so we have written this article with the intention of comparing the innovative development of these two nations

GLOBAL INNOVATION INDEX OF INDIA

According to Global Innovation Index (GII) India ranks **48th** among the 131economies featured in GII 2020 ,In 2019 India ranked **52nd** and in 2018 India ranked **57th ,** India performed better in innovation outputs than innovation inputs in 2020.India ranked **3rd** among the **29** lower middle – income economies ,and ranked **1st** among the **10** economies in central and southern Asia .India hosts **164** of the world's top **5000** brands , including top brands TATA GROUP ,LIC and INFOSYS

India done well in indicators such as government's online services ,E-participation ,Gross capital formation, Quality of scientific publications and creative goods exports

GLOBAL INNOVATION INDEX OF CHINA

China ranks **14THa**mong the 131 economies featured in the GII 2020, It ranked **17TH** in 2018 ,china performed very well in innovation outputs than innovation inputs in 2020 .It ranks **1ST** among the **37** upper middle income group economies ,It ranks **4TH** among the **17** economies in South East Asia ,East Asia and Oceania .China is outperforming expectations in the new GII indicator , global brand value ranking **17TH** and performing well above expectations for its income level ,it hosts **408** of the top **5000** brands , with a total volume of US$ 1.6 Trillion of these 408 brands ,9 rank within the top 25 most valuable brands worldwide china hosts 17 of the top science and technology clusters worldwide

CONCLUSION

From the data from GLOBAL INNOVATION INDEX It is obvious that china performs well in innovation when compared to India. China's **REVERSE BRAIN DRAIN** since 2000 played a major role in its development, China's unchanged status on the GLOBAL INNOVATION INDEX ranking also shows that china has effectively and quickly reined in the outbreak and continues to push forward reforms and opening that aims to bolster it's technological and innovation capabilities

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CRISPR & GENETIC ENGINEERING

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Introduction:

"Innovation is taking two things that exist and putting them together in a new way"

Normally we think of our DNA as being set in stone. But what if it isn't? What if you could literally change your DNA?

"Scientists have only recently figured out how to use CRISPR to edit DNA Sequence"

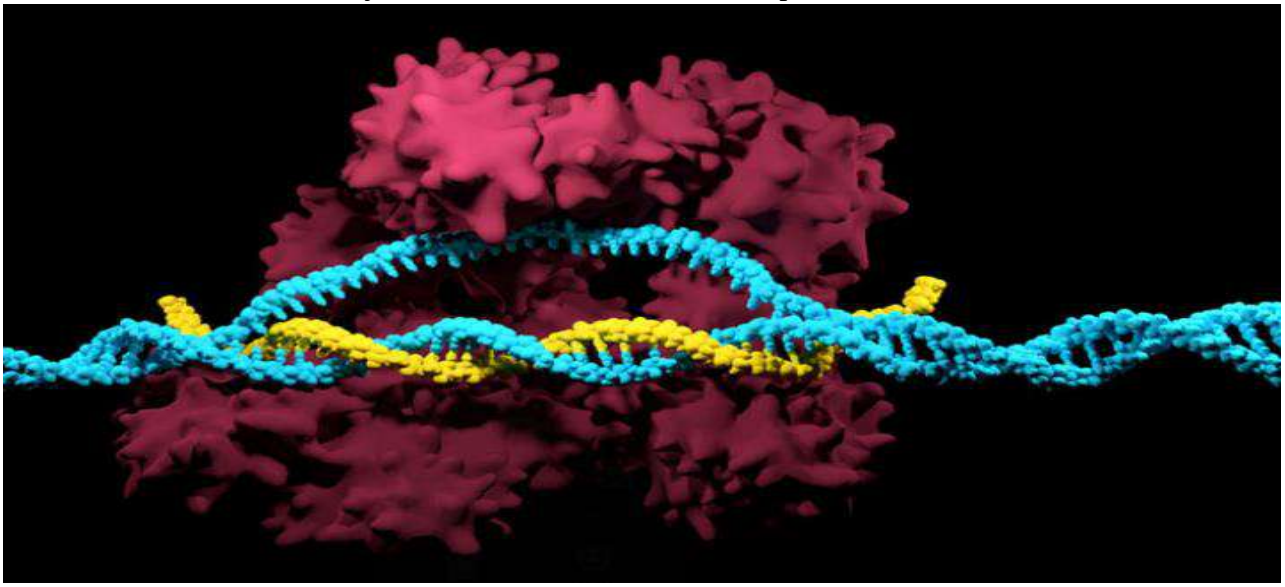
CRISPR:

ClusteredRegularly Interspaced Short Palindromic Repeat, CRISPR is all essentially a search and cut or paste function all rolled in one for DNA. This pattern appears naturally in bacteria humans and in another organisms. Imagine if you would cure or make peoples permanently resistant to tricky viruses like HIV.

Noble prize in chemistry aw awarded to scientists who discovered CRISPR-cas9 Emmanuelle Charpentier and JennifierDoudna have been given the noble prize for their discovery and development of CRISPR-CAS9 Genome editing.

CRISPR was adopted from a naturally occurring genome editing system in bacteria. The bacteria capture snippets of DNA from invading viruses and use them to create DNA segments known as CRISPR arrays. The CRISPR arrays to target the virus DNA. The bacteria then use

cas9 or 9 similar enzymes to cut the DNA apart which disables the virus.



Stage 1: 1. Design and selection of targeting sequence.

2.synthesis of DNA guide oligos

3. Clone into CRISPR

4. Sequencing

5. Plasmid purification

Stage 2: 6. Transfect cells

7. Selection e.g., puromycin

8. Clonal isolation

Stage 3:9. Functional characterization phenotype and genotype analysis

Endless applications of CRISPR:

- Using CRISPR editing to cure the genetic disease
- Increasing CRISPR reach
- Using CRISPR editing to grow new variety of crops
- Using CRISPR to develop customized seeds
- Using CRISPR to treat neuromuscular disease
- Set to protect the world form heart disease
- Using CRISPR to target point mutations in seriousgenetic disorders
- Increasing the worldwide food supply using CRISPR
- Using CRISPR to improve organ transplants.

Conclusion:

‘The first monkeys were born with genome that had been rewritten through precision gene editing, bringing the steady march of CRISPR research right to Homo Sapien's

“EVOLUTIONARY FRONT DOOR"

GENOME EDITING

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Introduction:

Innovation is defined as the carrying out of new combination. Henderson and Ckark divided innovation into four types Radical innovation, Incremental innovation, Architectural innovation, Modular innovation. Innovation –includes three basic phases. 1. Idea generation 2. Problem solving 3. Implementation of the idea. Genome editing is thus based on the use of engineered molecules that target and cut a specific site in a gene. Genome editing is method that lets scientists change the DNA of many organisms including plants, bacteria, and animals. Editing DNA can lead to changes in physical traits like eye color, and disease risk. Scientist use different technologies to do this.

Genome Editing:

Gene Editing is a type in which DNA is inserted, deleted, modified, or replaced in the genome of a living organism. It is a technique that randomly inserts genetic material into a host genome, genome editing targets the insertions to site specific locations. Genome editing was pioneered in 1990. It is a Nuclease-Based gene editing platform. It is a concept of DNA double stranded break repair mechanism. There are two pathways that repair double stranded break; non-homologous end joining and homologous directed repairing.

Genome editing in pros is one of the best innovations because it helps in tackling and defeating disease, it extends the lifespan of a human it also helps in the growth in food

production and its quality. It also provides pest resilient crops to reduce the usage of pesticide and provide it naturally. Genome editing in cons it helps to solve the ethical dilemma and it's also concerned with the safety measures.

Genome editing is a recent method of making specific changes in the DNA. Editing genome with the bacterial immune system technology has emerged as a powerful technology for genome editing. This technology has been increasingly applied to the study and treatment of human disease by modifying human blood cells that are then put back into the body to treat several diseases as cystic fibrosis, cancer and AIDS. The technology of genome editing involves cuts at specific DNA sequences with enzymes called nucleases. Genome editing can be used to edit, remove, add, or alter DNA in the genome.

Genome editing is the process of precisely modifying the nucleotide sequence of the genome. It has provided a powerful approach to research questions but, with the development of a new set of tools, it is now possible to achieve frequencies of genome editing that are high enough to be useful therapeutically. Genome editing is being developed to treat not only monogenic diseases but also infectious diseases and diseases that have both a genetic and an environmental component.

Genome editing has been used to modify human blood cells that are then put back into the body to treat conditions including leukemia and AIDS. Genome editing has been used in agriculture to genetically modify crops to improve their yields and resistant to disease and drought. Genome editing can be used to change the DNA in cells or organisms.

Gene editing techniques have benefits such as the treatment of diseases; creation of model organisms for biochemical research; development of transgenic foods.

Conclusion:

Genome editing in pros and cons give an idea of its results, there are lot of disease in the world but we don’t have medicine for some disease the genome editing will be a process of changing the person's life and bring them a bright future that nobody should suffer with any disorder. the genome editing will definitely be a huge gift for humankind.

Nutrition Knowledge and Food-Health Awareness Through Gamification

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ABSTRACT

The healthy diet with proper nutrient is very important to avoid many health issues especially among female. The need for dietary change is clearly indicated. This gamification is aimed to assess the nutritional knowledge and understanding in order to identify the most effective format for future nutrition messages. Questionnaires with games are developed to assess the early nutrition-related knowledge and importance of the value added foods. The players can improve their nutrition knowledge in the areas of food groups, food transformations, food origins, and energy balance. From this game the players can gain much knowledge on nutrients and can enter into the various levels of the game. The game includes various stages like fill in the blanks with correct nutrient, spin, answer and win, find out the cross words from the given picture, puzzle. All these levels of the game will associated with general nutrition, discouragement or encouragement on verity of food, specific nutrition, complications due to lack of nutrients, etc. This gamification can give significant knowledge and development of nutrition awareness among the players especially with young children.

KEYWORDS: Nutrients, Energy balance, Disorders, Food knowledge, Gamification.

INTRODUCTION

Nutrition is the quantity and quality of food that the body receives. The body breaks down the food to get the molecules that it actually needs: proteins, fats, carbohydrates, vitamins, and minerals. Nutrition refers to sum of all processes involved in how organisms obtain nutrients, metabolize them, and use them to support all of life's processes (Lawrence and Pearce, 1964). If body does not have these things, than the body will unable to work properly. Nutrition has been one of the basic needs of every individual living on the earth. We need a wide variety of different foods to provide the right amounts of nutrients for good health (Ensminger M.E. and Ensminger, A.H., 1993). Insufficient intake of food nutrients results in the formation of different kinds of disease, weakness, disabilities and other complications. Intricate biochemical processes extract the energy and other useful components that enable us to grow and function, and many compounds that were seemingly unimportant in the past are now accepted as being fundamental for health. Generally, nutrients are classified as either macro- or micronutrients, based on the amounts we require from the diet (Gibney et al., 2013). Some nutrients can be stored (e.g., glucose as glycogen in the liver, fat-soluble vitamins in fat reserves) while others are required

more or less continuously. There are, however, also differences between individuals, meaning some may require specific nutrients more frequently (e.g., iron), and it is challenging to determine whether individuals have adequate levels of most nutrients because levels in the blood offer only a crude measure of cell and organ status (Gibson, 2005). Where once poverty led to malnutrition because of a lack of food (energy or specific nutrients), poverty of knowledge and cheap foods high in fat, sugar, and salt are leading to weight gain and obesity as well as specific deficiencies (e.g., vitamin D) (Tulchinsky and Varavikova, 2014). Micronutrients Micronutrients are, generally, minerals and vitamins (Gibney et al., 2018). Nutrition and Health Macrominerals are required in relatively large amounts and have roles in structure and function. As with minerals, most vitamins (vital amines) are essential nutrients. Vitamin deficiencies may result in diseases including goiter, scurvy, osteoporosis, certain forms of cancer, and poor psychological health (Heaney, 2015). However, excess of some vitamins are also dangerous to health (e.g., vitamin A) (Gibney et al., 2009; Lanham-New et al., 2011). Common to all nutritionally related diseases may be inappropriate changes in gene expression. Chronic Diseases Life-stage, lifestyle, and genetics affect our risk of developing chronic diseases including cancer, CVD, type II diabetes, cataract and macular degeneration, arthritis, etc (Askew, 2002).

OBJECTIVE: Objective of this paper was to improve the knowledge and providing awareness on the Nutrients through games**.**

GAMIFICATION

Level I

FILL IN THE BLANKS WITH CORRECT NUTRIENT

.    

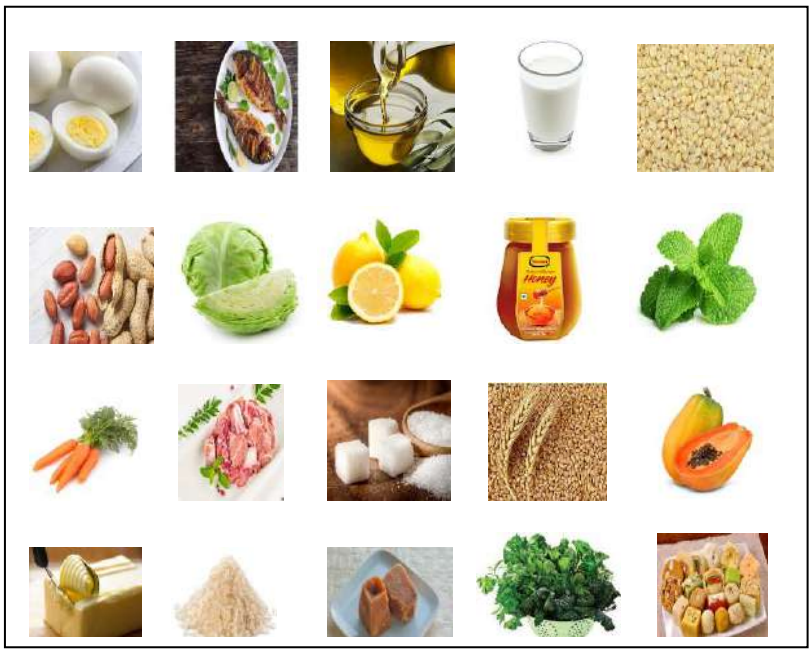
_____ _____ _____ _____

Hint: Helps for vision promote bone development increase Hb level provide energy

Level II

PICK THE RIGHT ONE

a) **Protein rich foods**
b) **Vitamin A rich foods**
c) **Calcium rich foods**
d) **Complete protein foods**



Level III
SPIN THE WHEEL

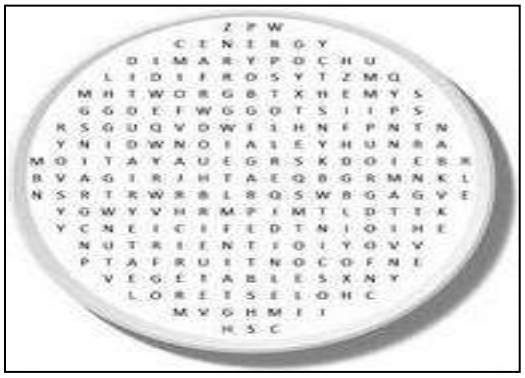
Rules: On each of the three turns, the players spin the wheel and is asked a question to answer. They have ten seconds to answer and if they get a junk food at the first spin need to quit the game.

Meat – contain _____
Ground nut – deficiency of proteins _____
Lemon – Nutrient present _____
Avacoda –% of fat present _____

Level IV
CROSS WORDS FROM THE GIVEN PICTURES

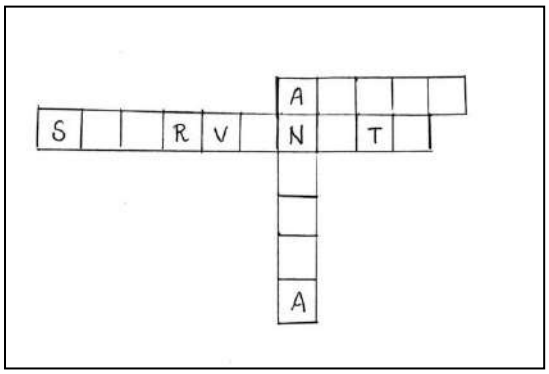






Level V
PUZZLE

a) **Deficiency of Hemoglobin in blood**
b) **Rich in proteins**
c) **Keep doctor away**
d) **Deficiency of Vitamin C**



CONCLUSION

This kind of gamification will provide significant level of nutrition awareness and importance of food related to both the quantity and the quality, specificity about foods and nutrition. While playing this game the players can fully understand the causal reasoning behind the food-health association and their description of preoperative level of thinking will also increases.

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Aquaponics.

Aquaponics refers to any system that combines conventional aquaculture with hydroponics in a symbiotic environment. In normal aquaculture, excretions from the animals being raised can accumulate in the water, increasing toxicity.

Plants that can grow in small aquaponics systems.

* lettuce
* Swiss chard
* Chives.
* Kale
* Arugula.
* Basil.
* Spinach
* Mint

Fish to plant ratio in Aquaponics.

The abundant aeration and fast water cycling also enable the commercial systems to stock fish as high as 1 fish per 8-10 litres of water. Research on an aquaponic system rearing Common Carp and Mint suggests that the ratio 1:2 (fish : Plant) showed optimum fish production, plant growth as well as nutrient removal.

Fish can Grow in Aquaponics

- ★ Tilapia
- ★ Sun fish
- ★ Catfish
- ★ Carp
- ★ Koi.
- ★ Gold fish.
- ★ Pacu.
- ★ Tetras.

Uses of Aquaponics

It uses 90% less water than traditional farming. With our system, we can grow any time of year, in any weather, anywhere on the planet. Because aquaponics recycles the water in the system, we can grow in droughts and areas with little water.
Less pests to deal with since we are growing indoors.

Aquaponics Profit.

Timmons, of Cornell, said even the most successful aquaponics ventures make only about $ 50,000 a year. Both hydroponics and Aquaponics have clear benefits over soil-based gardening: lessened, adverse environmental impacts, reduced consumption of resources, faster plant growth, and higher yields. many believe that aquaponics is a better option over hydroponics when choosing a soilless growing system.

INNOVATION IN AGRICULTURE

NIVETHITHA MEENAKSHI K

181CM204

III B.COM ADDITIONAL

AGRICULTURAL DRONES

An **agricultural drone** is an unmanned aerial vehicle used to help optimize agriculture operations, increase crop production, and monitor crop growth. Sensors and digital imaging capabilities can give farmers a richer picture of their fields. Using an agriculture drone and gathering information from it may prove useful in improving crop yields and farm efficiency.

An agricultural drone by Agridrones that can carry up to 25Kg. Certified by the Civil Aviation Authority of Israel.

Agricultural drones let farmers see their fields from the sky. This bird's-eye view can reveal many issues such as irrigation problems, soil variation, and pest and fungal infestations. Multispectral images show a near-infrared view as well as a visual spectrum view. The combination shows the farmer the differences between healthy and unhealthy plants, a difference not always clearly visible to the naked eye. Thus, these views can assist in assessing crop growth and production.

Additionally, the drone can survey the crops for the farmer periodically to their liking. Weekly, daily, or even hourly, pictures can show the changes in the crops over time, thus showing possible “trouble spots”. Having identified these trouble spots, the farmer can attempt to improve crop management and production.

As drones entered use in agriculture, the Federal Aviation Administration (FAA) encouraged farmers to use this new technology to monitor

their fields. However, with the unexpected boom of agricultural drones, the FAA quickly retracted such encouragement, pending new rules and regulations. With incidents such as drones crashing into crop dusters, it was vital for the FAA and the AFBF (American Farm Bureau Federation) to agree on regulations that would allow the beneficial use of such drones in a safe and efficient manner.

In 2016, the FAA published the long-awaited rules for commercial drone operations. Commonly referred to as Part 107, the full citation is: Code of Federal Regulations (CFR), Title 14. Aeronautics and Space, Chapter I. FEDERAL AVIATION ADMINISTRATION, DEPARTMENT OF TRANSPORTATION, Subchapter F. AIR TRAFFIC AND GENERAL OPERATING RULES, Part 107. SMALL UNMANNED AIRCRAFT SYSTEMS. These rules require that commercial drone operators pass a knowledge exam, register their aircraft, and fly in accordance to published restrictions.

Although the American Farm Bureau Federation would like small adjustments to some of the restrictions that have been implemented, they are happy that the agricultural industry can actually use this new machinery without the worry of facing any legal issues.

Many countries like Malaysia, Singapore, Australia have made laws regarding use of drones. The EU is moving towards a common set of drone regulations for all of its members. However, such laws are still non-existent in many countries around the world making it difficult to determine how to provide legal drone services, and 15 countries have outlawed all drone operations.

Other companies might start flying their drones in unregulated areas to survey their competition and get to know the condition of crops and agricultural yield. Such a scenario could lead to compromising vital company secrets. People want to know that they are safe and protected, so the burden doesn’t just fall on the farmer, but on many of those around the farmer, too.

The use of agricultural drones has ethical and social implications. One benefit is that they are able to monitor and control the use of pesticides properly. This allows minimizing the environmental impact of pesticides. However, drones don't need access authority to flying overs someone's property at under 400 feet (130 m) altitude. They may have microphones and cameras attached, and the resulting concern for potential privacy violation has caused some opposition towards drones.

There is a large capacity for growth in the area of agricultural drones. With technology constantly improving, imaging of the crops will need to improve as well. With the data that drones record from the crops the farmers are able to analyze their crops and make educated decisions on how to proceed given the accurate crop information. Software programs for analyzing and correcting crop production have the potential to grow in this market. Farmers will fly a drone over their crops, accurately identify an issue in a specific area, and take the necessary actions to correct the problem. This gives the farmer time to focus on the big picture of production instead of spending time surveying their crops. Additional uses include keeping track of livestock, surveying fences, and monitoring for plant pathogens.

Both the purchase and maintenance costs of modern drones make them too expensive for small farmers in developing nations. Pilot programs in Tanzania are focusing on minimizing those costs, producing agricultural drones simple and rugged enough to be repaired locally.

According to Business Insider, "agricultural drones are no different than other types of drones. The application of the UAV simply changes to fit the needs of the farmer. There are, however, several drones specifically made for agricultural use."

- Agras T16 from DJI
- eBee SQ from senseFly
- PHX Complete System from Sentera
- Drone4Agro V3

Agricultural drones help to achieve and improve what's known as precision agriculture.

This approach to farming management is based on observing, measuring, and taking action based on real-time crop and livestock data. It erases the need for guesswork in modern farming and instead gives farmers the ability to maximize their yields and run more efficient organizations, all while enhancing crop production.

In recent years the cost of agriculture drones has rapidly declined, which has not only led to the explosion of drone use cases in agriculture but has made it a no-brainer investment for modern farmers.

In fact, the agricultural drone market is expected to grow over 38% in coming years. Driven by growing population levels and changing climate patterns, the need for efficient agriculture is only going to become more important.

There are multiple uses for agricultural drones, including:

- Scouting land and crops
- Checking for weeds and spot treating plants
- Monitoring overall crop health

- Managing livestock and monitoring for health issues

- And more

Drones are equipped with technology like propulsion systems, infrared cameras, GPS and navigation systems, programmable controllers, and automated flight planning. Plus, with custom-made data processing software any collected information can instantly be put to use towards better management decisions.

Drone technology can help to accomplish once time-consuming and difficult tasks, all while reducing costs across the board.

You can expect the current uses of drones in agriculture to continue to evolve as the industry matures and new technology is introduced.

Currently, there are six common uses of agricultural drones,

1. **Soil and Field Analysis:**

At the beginning, middle, and end of a crop cycle drones can be used to help obtain useful data surrounding the quality of the existing soil. By obtaining 3D maps of existing soil, you'll be able to see if there are any issues surrounding soil quality, nutrient management, or soil dead zones.

This information can help farmers determine the most effective patterns for planting, managing crops, soil, and more. Ongoing monitoring can help to better utilize water resources, and more effectively manage crop nutrient levels.

2. Seed Planting:

Drone planting is a relatively newer technology and not as widely used, but some companies are experimenting with drone planting. Essentially, manufacturers are experimenting with custom systems that have the ability to shoot seed pods into prepared soil.

Drone startup companies have been instrumental in developing unique drone technologies to assist with a wide range of ecological and agricultural issues. For example, the company DroneSeed is using unmanned aircraft capable of delivering up to 57 pounds of payload in the form of tree seeds, herbicides, fertilizer and water per aircraft per flight to assist reforestation and replanting projects.

This technology helps to minimize the need for on-the-ground planting, which can be costly, time-intensive, and strenuous work.

This same drone technology can be adapted and applied to a wide range of farm types, reducing overall planting times and labor costs across the board.

3. Crop Spraying and Spot Spraying:

Crops require consistent fertilization and spraying in order to maintain high yields. Traditionally this was done manually, with vehicles, or even via airplane. These methods are not only inefficient, and burdensome, but they can be very costly as well.

With approval from the FAA, Drones can be equipped with large reservoirs, which can be filled with fertilizers, herbicides, or pesticides. Using drones for crop spraying is much safer and cost-effective. Drones can even be operated completely autonomously and programmed to run on specific schedules and routes.

For example, if there's a fungus breakout in a certain section of the crops, drones can be used to spot treat the issue. With the speed at which drones can operate, you can diagnose and treat potential crop issues before they become a widespread issue across the entire farm.

Spot spraying of crops used to be incredibly difficult. If you had an issue with weeds or a certain crop, the entire acreage would have to be sprayed.

This is a huge waste of time and resources, as someone will have to walk the entire acreage, plus there are the overall costs of pesticides and the associated environmental cost of chemical usage.

With spot spraying afforded by drones, this same task can be accomplished in less time, with fewer monetary resources, and a reduced environmental cost.

4. Crop Mapping and Surveying:

One of the biggest advantages of using drone technology is the ease and effectiveness of large-scale crop and acreage monitoring. In the past, satellite or plane imagery was used to help get a large scale view of the farm, while helping to spot potential issues.

However, these images were not only expensive but lacked the precision that drones can provide. Today, you can not only obtain real-time footage but also time-based animation which can illuminate crop progression in real-time.

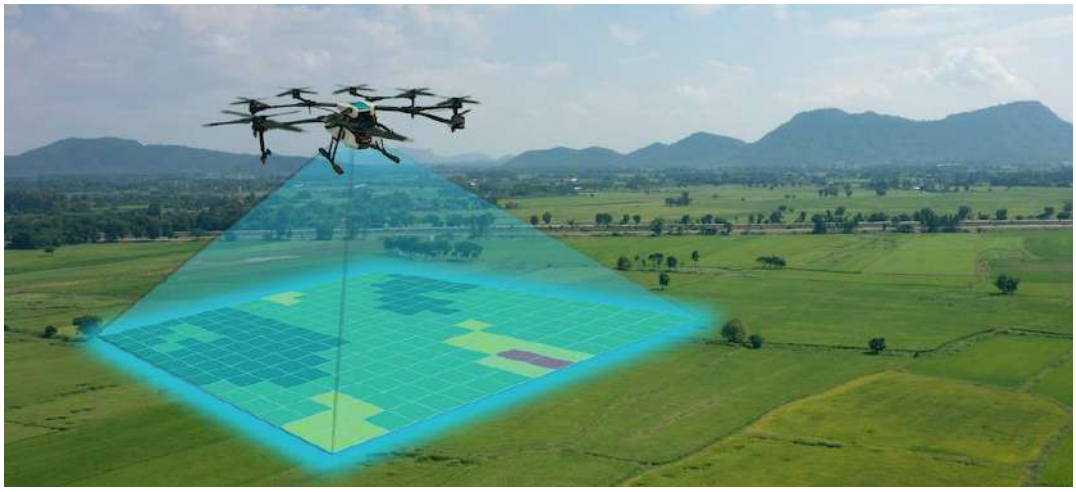
With drone mapping and surveying, technology decisions can now be made based on real-time data, not outdated imagery, or best-practice guesswork.

With near infrared (NIR) drone sensors you can actually determine plant health based upon light absorption, giving you a birds-eye view of the overall farm health. We recently interviewed a drone pilot who used NIR to help vineyard owners determine the health of their grapevines.

With agriculture drones you'll be able to collect information like:

- The overall crop and plant health
- Land distribution based on crop type
- Current crop life cycle
- Detailed GPS maps of current crop area

The end result is simple, drones can help to maximize land and resource usage, and help farmers better determine crop planting locations.



5. Irrigation Monitoring and Management:

Irrigation can be troublesome. With miles and miles of irrigation, issues are bound to arise. Drones that are equipped with thermal cameras can help to spot irrigation issues, or areas that are receiving too little or excessive moisture.With this information, crops can be better laid out to maximize drainage, adhere to natural land runoff, and avoid water pooling, which can damage sensitive crops.Water and irrigation issues are not only costly but can ruin crop yields as well. With drone surveying, these issues can be spotted before they become troublesome.

6. Real-Time Livestock Monitoring:

Some drones are equipped with thermal imaging cameras that enable a single pilot to manage and monitor livestock. This allows farmers to keep track of livestock a much greater frequency, and with less time and staff investment. The drone operator can quickly check in on herd to see if there are any injured or missing livestock, as well as see livestock who are giving birth. Drones are used to keep an eye on the heard at all times, a once costly and time-intensive task.

Plus, thermal imaging will also help to keep an eye out for any livestock predators, which can be a huge advantage for some farm owners.

INNOVATION IN GREEN MARKETING

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Abstract:

Most of the companies are preferring into green marketing because of the following reasons: In India, around 25% of the consumers prefer Eco-friendly products, and around 28% may be considered healthy conscious. Therefore, green marketers have diverse and fairly sizeable segments to outfit. The Surf Excel detergent which saves waters (advertised with the message —" bucket water is enough") and the energy-saving LG consumers durables are examples of green marketing. We also include green buildings which are capable in their use of energy, water and construction materials, and which reduce the contact on human health and the environment through better design, construction, operation, safeguarding and waste disposal. In India, the green building association, spearheaded by the Confederation of Indian industry (CII) - Godrej Green business Center, has gained wonderful impetus over the last few years. From 20,000 sq ft in 2013, India's green building track is now over 25 million sq ft.

Keywords: *Eco-friendly products, Segment, Green marketing, Marketing Mix, Greenness.*

Introduction:

Marketing products that benefit the environment. The conservation properties of products are important in order that companies make ecologically safer products, including recyclable and biodegradable packing.

Social-Responsibility:

Many companies have started realizes that they must behave in an Eco-friendly fashion. They believe both in achieve environmental objectives in addition profit related objectives. The HSBC became the world's first bank to go carbon-neutral last year. Other examples include Coca-Cola, which has invest in a Varity of recycling activities. Walt Disney World in Florida, US, has a wide ranging waste management program and infrastructure in place.

Governmental-Pressure:

Various regulations are framed by the government to guard consumers and the society at large. The Indian government too has developed a framework of legislations to decrease the production of harmful goods and by products. These decrease the industry's manufacture and consumers' consumption of harmful goods, including those detrimental to the environment; for example, the prohibit of plastic bags in Mumbai, prohibition of smoking in public areas, etc.

Competitive-Pressure:

Many companies start green marketing to maintain their competitive edge. The green marketing initiatives by niche companies such as Body Shop and Green & Black have encouraged many mainline competitors to follow suit.

Cost-Reduction:

Reduction of dangers waste may lead to substantial cost savings. Sometimes, many firms develop symbiotic relationship whereby the waste generate by one company is used by another as a cost-effective raw material. For example, the fly ash generate by thermal power plants, which would otherwise contributed to a enormous quantum of solid waste, is used to manufacture fly ash bricks for construction purposes.

Benefits of Green Marketing:

Today's consumers are more aware about the environment and are also becoming socially responsible. Therefore, more companies are responsible to consumers' aspiration for environmentally less damaging or disinterested products. Many companies desire to have an early-mover advantage as they have to ultimately move towards becoming green. Various advantages of the green marketing are,

- It ensures sustained long-term expansion along with profitability.
- It saves money in the lengthy, thought initially the cost is extra.
- It helps companies market their products and services trust the environment aspects in mind.It helps in access the new markets and enjoying competitive benefit.
- Most of the employees also feel overconfident and responsible to be working for an environmentally responsible company.

Problems of Green Marketing:

Many organizations want to turn green, as raising the number of consumers' and to associate themselves with environmental-friendly products. A long side, one also witnesses misunderstanding among the consumers regarding the products. In particular, one often finds doubt regarding the credibility of green products. Therefore, to ensure consumer confidence, marketers of green products want to be much more transparent, and refrain from breaching any law or principles relating to products or business practices.

Paths to Greenness:

Green marketing involves focus on promoting the consumption of green products. Therefore, it becomes the responsibility of the companies to take on creativity and insight, and be dedicated to the development of environment-friendly products. This will help the humanity in the long run.

Companies which embark on green marketing should take on the following philosophy in their path towards greenness.

- Adopt new technology/ Process or modify existing technology/ Process consequently to reduce environmental impact.

- Establish a management control system that will lead to devotion of strict environmental safety norms.

- Explore possibilities of recycling of the used products so that it can be used to offer similar or other reimbursement with less wastage.

- Using more environment-friendly raw materials at the manufacture stage itself.

Green Marketing - New Opportunities and Challenges:

Green marketing prefer to holistic marketing conception wherein the production, marketing consumption an removal of products and services take place in a manner that is less damaging to the environment with growing awareness regarding the implication of global warming, non-biodegradable solid waste, harmful impact of pollutants etc., both marketers and consumers are becoming more and more responsive to the need for switch in to green products and services.

While the shift to "green" may become visible to be expensive in the short term, it will definitely prove to be indispensable and advantageous, cost-wise also, in the long run Green marketing was given importance in the late 1980s and 1990s after the measures of the first workshop on Ecological marketing held in Austin, Texas (US), in 1975. Many organizations would like to turn green, as an rising number of consumers' and to associate themselves with environmental-friendly products.

It is really frightening to read these pieces of information as reported in the Times recently: "Air pollution spoils to people, crops and wildlife in the US totals tens of billions of dollars each year". "More than 12 other studies in the US, Europe , Mexico , Brazil South Korea and Taiwan have established links between air pollutants and low birth weight early birth still birth and newborn death".

Now we see that the majority of the consumers, both individual and industrial, are attractive more concerned about environment-friendly products. The majority of them feel that environment-friendly products are protected to use. Consequently, green marketing has emerge, which aims at marketing sustainable and socially-responsible products and services. Now is the time of recyclable, non-hazardous and environment-friendly goods. This has become the new tune for marketers to satisfy the needs of consumers and make better profits.

Green marketing is the course of action of developing products and services and encourage them to satisfy the customers who favor products of good quality, presentation and convenience at reasonably priced, which at the equal time do not have a harmful impact on the environment.

Marketers are taking the prompt and are going green. Green marketing was given substance in the late 1980s and 1990s after the proceedings of the first workshop on Ecological marketing in custody in Austin, Texas (US), in 1975. Several books on green marketing begin to be published thereafter. According to the Joel makeover green marketing face a lot of challenges because of lack of standards and public compromise to what constitute "Green". The green marketing has evolve over a period of time.

Green marketing is a vital ingredient of the holistic marketing concept. It is mostly applicable to businesses that are straight dependent on the physical environment; for example, industries like fishing, processed foods, and visiting the attractions and adventure sports.Change in the physical environment may create a threat to such industries. Many global players in diverse businesses are now successfully implementing green marketing practices.

1. Marketing Mix Of Green marketing:

Companies approach with new innovations similar to eco friendly products; they can access fresh markets, enhance their market share, and increase profits. Just as we have 4Ps names are product, prices, place and promotion in marketing, we have 4ps in green marketing also, but they are a small piece different. They are buttressed by three additional Ps, namely people, earth and profits.

Green Product:

The products have to be industrial depending on the needs of the customers who prefer environment friendly products. Products can be made from second hand materials or from used goods. Efficient products not only save water, energy and money, but also reduce deleterious effects on the environment.

Green chemistry forms the growing focus of product development. The marketer's responsibility in product management includes providing product designers with market-driven trends and customer requests for green product attribute such as energy saving, organic, green chemicals, local sourcing, etc.,

For example:Nike is the first amongst the shoe company to market itself as green. It is marketing its Air Jordan shoes as environment-friendly, as it has extensively reduced the usage of harmful glue adhesives. It has designed this variety of shoes to emphasize that it has reduced wastage and use environment-friendly materials.

Green Price:

Green pricing takes interested in consideration the people, planet and profit in a way that takes care of the health of employees and community and ensure efficient productivity. Value can be added to it by changing its appearance, functionality and through customization, etc. Wal Mart unveiled its first ecological cloth shopping bag. IKEA started charging consumers when they opt for plastic bags and encouraged people to shop using its "Big Blue Bag".

Green Place:

Green place is about managing logistics to hack down on transportation emissions, thereby in effect aim at reducing the carbon footprint. For example, as a substitute of marketing an imported mango juice in India it can be licensed for local production. These avoid shipping of the product from far away, thus falling shipping cost and more importantly, the consequent carbon emission by the ships and other modes of transport.

Green Promotion:

Green promotion involve configuring the tools of promotion, such as advertising, marketing materials, signage, white papers, web sites, videos and presentation by keeping people, earth and profits in mind. British petroleum (BP) displays gas station which its sunflower design and boast of putting money into solar power. Indian Tobacco Company has introduced environmental-friendly papers and boards, which are free of essential chlorine. Toyota is trying to push gas/electric hybrid technology into much of its product line.

It is also making the single largest R&D investment in the every-elusive hydrogen car and promote itself as the first eco-friendly car company. International business machines Corporation (IBM) has revealed a portfolio of green retail store technologies and services to help retailers improve energy competence in their IT operations.

The center piece of this portfolio is the IBM Sure POS 700, a point-of-sale system that, according to IBM, reduces power consumption by 36% or more. We even see the names of retail

outlets like "Reliance Fresh", Fresh at Namdhari Fresh and Desi, which while selling fresh vegetables and fruits, transmit an innate communication of green marketing.

Golden Rules of Green Marketing:

- Know you're Customer.
- Educating your customers.
- Being Genuine & Transparent.
- Reassure the Buyer.
- Consider Your Pricing.
- Giving your customers an opportunity to participate.
- Leading brands should recognize that consumer expectations have changed.

Reasons for using Green Marketing in Firms:

There are several recommended reasons for firms increased use of Green Marketing. Five possible reasons cite Organizations observe environmental marketing to be an opportunity that can be used to achieve its objectives.

1. Organizations observe environmental marketing to be an opportunity that can be used to achieve its objectives.
2. Organizations consider they have a moral obligation to be more socially responsible.
3. Governmental bodies are forcing firms to become additional responsible.
4. Competitors' environmental activities weight firms to change their environmental marketing activities.
5. Cost factors linked with waste disposal, or reductions in material usage forces firms to modify their behaviour.

Difficulties in Green Marketing:

While public opinion polls taken since the late 1980s have shown again and again that a significant percentage of consumers in the U.S and elsewhere confess a strong willingness to favour environmentally aware products and companies, consumers' efforts to do so in real life have remained sketchy at best.

- Awareness that eco-friendly products are not as good as other products.
- Over use, everyone is rapidly trying to position their company as green and that their products are eco-friendly.
- Lack of standards / public agreement. What is green?
- "Green wash".

Conclusion:

Green salesperson can be a center of attention for customers on the foundation of presentation, money savings, health and convenience, or just simple environmental friendliness, so as to target a broad range of green consumers. Consumer awareness can be created by distribution the message among consumers about the benefits of environmental-friendly goods. Positing of profiles connected to green marketing on social networks creates responsiveness within and across online peer groups. Marketing be able to also directly target the consumers from first to last advertisements for product such as energy saving packed together fluorescent lamps, the battery –powered Reva car, etc.

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INNOVATION IN HUMAN RESOURCE MANAGEMENT

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ABSTRACT:-

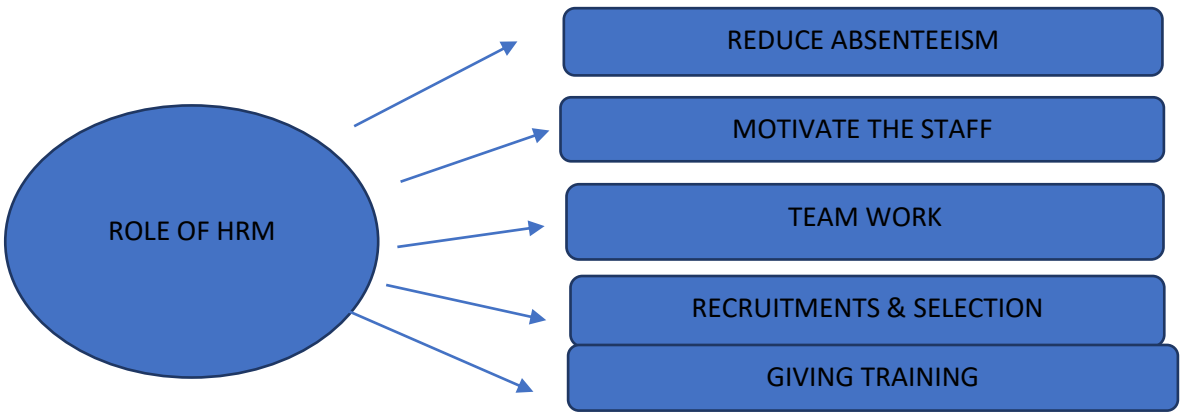
This chapter surveys, organize, and critically discusses the literature on the role of human resource practice for explaining the innovation outcome. We discuss how HR practice influence innovation. More over we discuss various possible moderators and mediators of the HR innovation such as the type of knowledge involve, knowledge sharing social capital and network effect. In our chapter we explain the role of HR in the firm and also we explain the work done by the HR of the firm. We include our new innovative ideas in human resource management.

KEYWORDS:- *HR practice, Role of HR, Innovation performance, Knowledge sharing.*

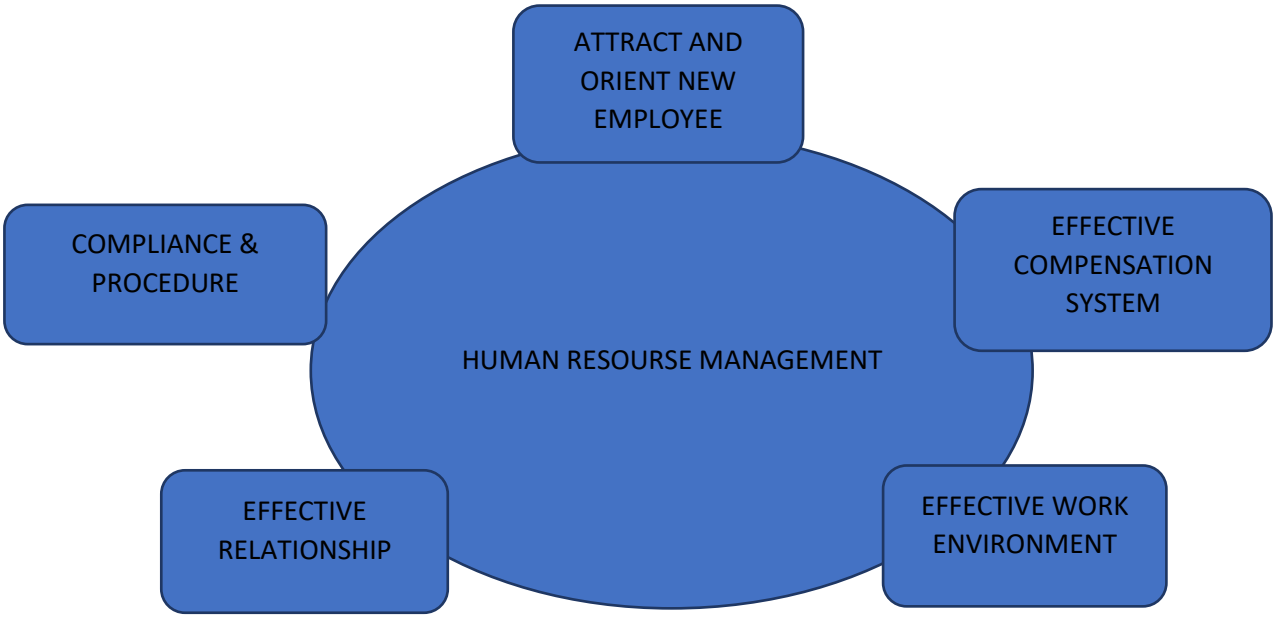
INTRODUCTION:-

- Historically, the HR Department was viewed as administrative overhead.
- HR processed payroll, handled benefits administration, kept personnel files and other records, managed the hiring process, and provided other administrative support to the organization
- The role of Human Resources is changing as fast as technology and the global marketplace.
- The positive result of these changes is that HR professionals have the opportunity to play a more strategic role in the business.
- The challenge for HR managers is to keep up to date with the latest HR innovations - technological, legal, and otherwise.

ROLE OF HUMAN RESOURCE MANAGER



HRM ACTIVITIES



ECONOMIC, POLITICAL AND SOCIAL CHALLENGES IN HUMAN RESOURCE:-

- Now-a-days, people, goods, capital and information are moving around the globe as never before.
- Global competition is making every firm to think in terms of gaining an edge over rivals by producing high quality goods at a very competitive price.
- This is where the people dimension comes into being. Incentives, favorable work climate, team spirit, freedom to think and act independently, and a host of other HR initiatives are needed to keep talent from flying away.

TECHNOLOGICAL CHANGES AND HUMAN RESOURSE MANAGEMENT

- Technology includes tools, machinery, equipment, work procedures and employee knowledge and skills. The impact of technology on HR can be profound, as the following things clearly reveal,
- New skills, knowledge, experience and expertise required to gain the edge over rivals.
- Downsize operations, cut organizational layers and cut the extra fat to survive in a competitive world
- Collaborate and achieve teamwork
- Relocate work from the office to the home
- Internet and intranet revolution.

CHANGES IN THE EMPLOYMENT RELATIONSHIP

- Flexible staffing levels
- Flexible work schedules
- Alternative work arrangements are methods of staffing other than the traditional hiring of full-time staff.
- Independent contractors
- On-call workers
- Temporary workers
- Contract company workers
- From employees' perspective, alternative work arrangements provide some flexibility for balancing work and non-work activities
- The globalization of the world economy and the development of e-commerce have made the notion of a 40-hour workweek obsolete.
- Offering flexible work schedules provide organizations with many benefits

INNOVATION IN HUMAN RESOURCE MANAGEMENT

- Provide Credit card for employees
- Increase period of break time
- Provide latest technical gadgets for our employee
- Create a place for Relaxation such as gym, park, temple inside the organization
- Hire vehicle for transport
- Monthly once tour
- Accept all culture dresses
- Provide rewards based on his performance

LATEST TERMS IN HR

Succession planning

- Succession planning is a process for identifying and developing internal personnel with the potential to fill key or critical organizational positions.

Talent Management

- Talent management is a set of integrated organizational HR processes designed to attract, develop, motivate, and retain productive, engaged employees

Competency Mapping

- Compentency mapping is a process which identifies key competencies for an organization and/or a job and incorporating.those competencies throughout the various processes (.e. job evaluation, training, recruitment) of the organization

EVOLUTION OF AN EMPLOYEE:-

PAST	FUTURE
Work 9 to 5	Work anytime
Work in an office	Work anywhere and from anywhere
Use company equipment	Use your own modern gadgets and requirements
Focused on inputs	Focused on outputs
Climb the corporate ladder	Create your own ladder for career
Pre-defined work	Customized work
Hoards information	Share information
No voice	Can become a leader
Focused on knowledge	Focused on adaptive learning

OUR NEW INNOVATIVE IDEAS:-

- Provide Credit card for employees
- Increase period of break time
- Provide latest technical gadgets for our employee
- Create a place for Relaxation such as gym, park, temple inside the organization
- Hire vehicle for transport
- Monthly once tour
- Accept all culture dresses
- Provide rewards based on his performance

CONCLUSION

- Due to the new trends in HR, in a nutshell the HR manager should treat people as resources, reward them equitably, and integrate their aspirations with corporate goals through suitable HR policies.
- It is a key element in the success or failure of monitoring programmers to meet their objectives.
- without an adequate strategy to develop the human resource available and attract high caliber staff, monitoring programs rapidly stagnate

INNOVATION IN RURAL MARKETING

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ABSTRACT:

In recent years, rural markets have acquired significance, as the overall growth of the economy has resulted into substantial increase in the purchasing power of the rural community .On account of green revolution; the rural areas are consuming a large quantity of industrial and urban manufactured products. In this context, a special marketing strategy, namely, rural marketing has emerged. But often, rural marketing is confused with agricultural marketing - the latter denotes marketing of produce of the rural areas to the urban consumers or industrial consumers, whereas rural marketing involves delivering manufactured or processed inputs or services to rural producers or consumers.

KEYWORDS: *Rural marketing, Services, Innovations, etc.,*

INTRODUCTION:I

To promote brands in rural markets requires the special dealings. Due to the social and backward condition the personal selling efforts become a challenging role to play. The word of mouth is an important message carrier in rural areas. Infect the opinion leaders are the most influencing part of promotion strategy of rural promotion efforts. The experience of agricultural input industry can act as a guideline for the marketing efforts of consumer durable and non-durable companies. Relevance of Mass Media is also a very important factor. The Indian established Industries have the advantages, which MNC don't enjoy in this regard. The strong Indian brands have strong brand equity, consumer demand-pull and efficient and dedicated dealer network which have been created over a period of time. The rural market has a grip of strong country shops, which affect the sale of various products in rural

Challenges in Indian Rural market:

Rural markets, as part of any economy, have untouched potential. There are several difficulties confronting the effort to fully explore rural markets. The concept of rural markets in India is still in evolving shape, and the sector poses a variety of challenges. Distribution costs and non-availability of retail outlets are major problems faced by the marketers. The success of a brand in the Indian rural market is as unpredictable as rain. Many brands, which should have been successful, have failed miserably. This is because most firms try to extend marketing plans that they use in urban areas to the rural markets. The unique consumption patterns, tastes and needs of the rural consumers should be analysed at the product planning stage so that they match the needs of the rural People. Strategies for Rural Marketing Rural markets, as part of any economy, have untapped potential. There are several difficulties confronting the effort to fully explore rural markets. The concept of rural markets in India is still in evolving shape, and the sector poses a variety of challenges. Distribution costs and non availability of retail outlets are major problems faced by the marketers. The success of a brand in the Indian rural market is as unpredictable as rain. Many brands, which

should have been successful, have failed miserably. This is because, most firms try to extend marketing plans that they use in urban areas to the rural markets. The unique consumption patterns, tastes, and needs of the rural consumers should be analyzed at the product planning stage so that they match the needs of the rural people. Therefore, marketers need to understand the social dynamics and attitude variations within each village though nationally it follows a consistent pattern.

The main problems in rural marketing are:

* Understanding the Rural Consumer

* Poor Infrastructure

* Physical Distribution

* Channel Management

* Promotion and Marketing Communication

Dynamics of rural markets differ from other market types, and similarly, rural marketing strategies are also significantly different from the marketing strategies aimed at an urban or industrial consumer. Strategies to be followed in Indian Rural Market-

a) Marketing Strategy: Marketers need to understand the psychology of the rural consumers and then act consequently. Rural marketing involves more exhaustive personal selling efforts compared to urban marketing. Firms should abstain from designing goods for the urban markets and subsequently pushing them in the rural areas. To effectively tap the rural market, a brand must associate it with the same things the rural folks do. This can be done by utilizing the various rural folk media to reach them in their own language and in large numbers so that the brand can be associated with the myriad rituals, celebrations, festivals, "melas and other activities where they assemble.
b) Distribution strategy:one of the ways could be using company delivery van which can serve two purposes it can take the products to the customers in every nook and corner of the market.
c) Promotional strategy:marketers must be very carefull while choosing the mediums to be used for communication .only 16% of the rural population has access to a newspaper. The rich traditional media forms like folk dance,puppet shows etc,with which the rural consumers are familiar and comfortable.

Rural Marketing-Challenges and Opportunities:

There is a great opportunity for the marketers in the rural areas. Two-thirds of countries consumers live in rural area. Naturally the rural markets form an important part of the total market of India. Our nation have around 450 districts, and approximately 630000 villages with different parameters such as literacy levels, accessibility, income levels, distances from nearest towns, etc. Around 700 million people, or 70% of India's population, live in villages in rural areas. 90% of the rural population is concentrated in villages with a population of less than 2000.

How much worth the rural market is can be well explained from the Coca-Cola case. Coca-Cola India doubled the number of outlets in rural areas from 80,000 in 2001 to 160,000 in

2003, which increased market penetration from 13 per cent to 25 per cent. It brought down the average price of its products from Rs 10 to Rs 5, thereby bridging the gap between soft drinks and other local options like tea, butter milk or
lemon water. It also tapped local forms of entertainment like annual haats and fairs and made huge investments in infrastructure for distribution and marketing.

Promotion marketing in rural areas for increasing the sales.

The rural market accounts for 80 per cent of new Coke drinkers and 30 per cent of its volumes. The rural market for Coca-Cola grew at 37 per cent over the last year, against a 24 per cent growth in urban areas. Per capita consumption in rural areas has doubled in the last two years. The success of a brand in the Indian rural market is unpredictable also it is very difficult to measure the rural market. While the rural market certainly offers a big attraction to marketers, then why not any company can easily enter the market and come out with sizable share. This is mainly because of the reason that the rural market is covered with variety of problems. The main problems in rural marketing are: Physical Distribution Channel Management Promotion and Marketing Communication

The problems of physical distribution and channel management adversely affect the service as well as the cost aspect. But the biggest of all the problems is how to communicate and reach these 700 million people.

How to do religious marketing to reach the consumers of the rural area:

For that the marketer can concentrate on any of the religious events of places. Within a very short span of time the company will be able to communicate to a huge no of potential customers about the product and the services and can build brand awareness. Kumbhmela, where about 30 million people, mostly from rural areas, were expected to come over the span of a month. The companies can provide 'touch and feel' demonstrations and distribute free samples. This proved to be extremely effective in advertising to the rural market. Another potential way of creating brand awareness among the rural customer is to provide free services. Godrej Consumer Products Ltd is present at the KumbhMela, with a kiosk and a team of about five people, adding more people on the main bathing days. These activities are focused mainly on raising awareness of, and inducing sampling for its toilet soaps. British tour operator Cox & Kings had played an important initiative by providing assistants to the foreign visitors to visit the KumbhMela. Other potential event and places where a marketer can concentrate are Vaishno Devi where the average no of visitors is approximately 40 lakh a day, Haridwar, where approximately 50,000 people visit every day, Jagannath Temple where on an average 30,000 people visit every day etc. Another important point is that if a company provide free services to the people it will not only help in awareness and advertising but also these activities can be shown as corporate social responsibility. In addition to the above the marketing manager should always keep in mind that while promoting his product he should not hurt the religious sentiments of the community otherwise that could adversely affect his product. As was the example in case of the movie Passion of Christ where the movie was being banned from display as it was supposed to hurt the particular community and it affected the movie in a very big way.

Why Rural Market?

The Indian rural market has a huge demand base and offers great opportunities to marketers. Two-thirds of Indian consumers live in rural areas and almost half of the national income is generated here. The reasons for heading into the rural areas are fairly clear. The urban consumer durable market for products like colour TVs, washing machines, refrigerators and air conditioners is growing annually at between 7 per cent and 10 per cent. The rural market is zooming ahead at around 25 per cent annually. "The rural market is growing faster than urban India now," says VenugopalDhoot, chairman of the Rs 989 – crore (Rs billion) Videocon Appliances. "The urban market is a replacement and up gradation market today," adds Samsung's director, marketing, RavinderZutshi.

Reasons for improvement of business in rural area:

 Socio-economic changes (lifestyle, habits and tastes, economic status) Literacy level (25% before independence – more than 65% in 2001) Infrastructure facilities (roads, electricity, media) Increase in income Increase in expectations

MART, the specialist rural marketing and rural development consultancy has found that 53 per cent of FMCG sales lie in the rural areas, as do 59 per cent of consumer durable sales, said its head Pradeep Kashyap at the seminar. Of two million BSNL mobile connections, 50 per cent went to small towns and villages, of 20 million Rediffmail subscriptions, 60 per cent came from small towns, so did half the transactions on Rediff's shopping site.

Special features of rural market: Unlike urban markets, rural markets are difficult to predict and possess special characteristics. The featured population is predominantly illiterate, have low income, characterized by irregular income, lack of monthly income and flow of income fluctuating with the monsoon winds. Rural markets face the critical issues of Distribution, Understanding the rural consumer, Communication and Poor infrastructure. The marketer has to strengthen the distribution and pricing strategies. The rural

[(CPUH-Research Journal: 2016, 1(1), 40-46) Innovative Strategy in Rural Marketing: Challenges and Opportunities] consumer expects value for money and owing to has unsteady and meager status of weekly income; increasing the household income and improving distribution are the viable strategies that have to be adapted to tap the immense potential of the market.

Media reach is a strong reason for the penetration of goods like cosmetics, mobile phones, etc., which are only used by the urban people. Increasing awareness and knowledge on different products and brands accelerate the demand. The rural audience are however critical of glamorous ads on TV, and depend on the opinion leaders who introduce the product by using it and recommending it.

Opinion leaders play a key role in popularizing products and influence in rural market. Nowadays educated youth of rural also influences the rural consumers. Rural consumers are influenced by the life style they watch on television sets. Their less exposure to outside world makes them innocent and fascinated to novelties. The reach of mass television media, especially television has influenced the buying behavior greatly.

Creating brands for rural India:

Rural markets are delicately powerful. Certain adaptations are required to cater to the rural masses; they have unique expectation and warrant changes in all four parameters of product, price, promotion and distribution.

A lot is already emphasized on adapting the product and price in terms of packaging, flavoring, etc and in sachets, priced to suit the economic status of the rural India in sizes like Rs.5 packs and Re.1 packs that are perceived to be of value for money. This is a typical penetration strategy, which promises to convert the first time customers to repeated customers.

The promotion strategies and distribution strategies are of paramount importance. Ad makers have learnt to leverage the benefits of improved infrastructure and media reach. The television airs advertisements to lure rural masses, and they are sure it reaches the target audience, because majority of rural India possesses and is glued to TV sets! Distributing small and medium sized packets thro poor roads, over long distances, into deep pockets of rural India and getting the stockiest to trust the mobility is a Herculean task. Giving the confidence those advertisements will support. Sales force is being trained to win the confidence of opinion leaders. Opinion leaders play an important role in popularizing the brand. They sometimes play the role of entry barriers for new products. The method of promotion needs to be tailored to suit the expectations of the market. Techniques that have proved to be successful are Van campaigns, edutainment films, generating word of mouth publicity through opinion lead

ers, colorful wall paintings. The Wide reach of television has exposed the otherwise conservative audience to westernization. Panchayat televisions in Tamilnadu carries message that are well received and contribute to community development.

Dynamics of rural markets differ from other market types, and similarly rural marketing strategies are also significantly different from the marketing strategies aimed at an urban or industrial consumer.

CONCLUSION:

Thus looking at the challenges and the opportunities which rural markets offer to the marketers it can be said that the future is very promising for those who can understand the dynamics of rural markets and exploit them to their best advantage. A radical change in attitudes of marketers towards the vibrant and burgeoning rural markets is called for, so they can successfully impress on the 230 million rural consumers spread over approximately six hundred thousands of villages in rural India.

INNOVATION IN SOCIAL MEDIA MARKETING

Prepare by..,
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Abstract:

The latest developments in the field of marketing, communication and information are leading to new innovative business and consumption models, in which users are gaining a leading role and are increasingly important. Social Media is rapidly emerging as the next big frontier for customer engagement and interactions. There are millions of customer interactions taking place every day on Social Media sites such as Face book, Twitter, YouTube, etc. as well as a vast number of customer support forums and online communities. Social Media emerged and continues to be as a cultural phenomenon. It is also quickly becoming a business phenomenon. Increasingly, current and prospective customers are using Social Media to communicate about the products and services they buy or intend to buy. Social Media are new innovative tools that collect millions of users all around the globe.

Keyword: *Social media, Facebook, Innovationv etc.,*

INTRODUCTION

Social media, which relates to the sharing of information, experiences, and perspectives throughout community-oriented websites, is becoming increasingly significant in our online world. Thanks to social media, the geographic walls that divide individuals are crumbling, and new online communities are emerging and growing. Some examples of social media include blogs, forums, message boards, picture- and video-sharing sites, user-generated sites, wikis, and podcasts. Each of these tools helps facilitate communication about ideas that users are passionate about, and connects like-minded individuals throughout the world.

According to the Universal McCann's Wave 3 report, released in mid-2008,[1] social media is rising and does not seem to be stopping anytime soon. Among all Internet users between the ages of 16 and 54 globally, the Wave 3 report suggests the following:

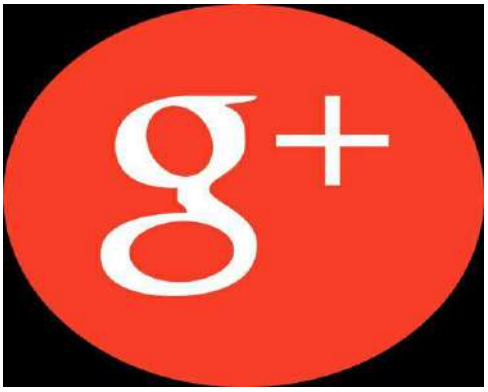
- 394 million users watch video clips online
- 346 million users read blogs
- 321 million users read personal blogs
- 307 million users visit friends' social network profile pages
- 303 million users share video clips
- 202 million users manage profiles on social networks
- 248 million users upload photos

CONTENT
Social media doesn't talk at you, it talks with you. This is the flow that this medium naturally takes.

Your social media activity cannot represent advertising for this reason. It must be about the audience. Your posts must genuinely engage with the audience, build community, and feel organic.

- Google +
- Pinterest
- Twitter
- LinkedIn
- YouTube

Using Google+ for Social Media Marketing



Google+ entered the scene as a Facebook competitor, but it now serves a more niche audience. It won't work for everybody, but some communities are very active on Google+.
On Google+ you can upload and share photos, videos, links, and view all your +1s. Also take advantage of Google+ circles, which allow you to segment your followers into smaller groups, enabling you to share information with some followers while barring others.
For example, you might try creating a "super-fan" circle, and share special discounts and exclusive offers only with that group.

Using Pinterest for Social Media Marketing

Pinterest is one of the fastest growing social media marketing trends. Pinterest's image-centered platform is ideal for retail, but anyone can benefit from using Pinterest for social media purposes or sales-driving ads.
Pinterest allows businesses to showcase their product offerings while also developing brand personality with eye-catching, unique pinboards.
Whendeveloping your Pinterest strategy, remember that the social network's primary audience is female. If that's your demographic, you need a presence on Pinterest!

Using Twitter for Social Media Marketing

Twitter is the social media marketing tool that lets you broadcast your updates across the web. Follow tweeters in your industry or related fields, and you should gain a steady stream of followers in return.
Mix up your official tweets about specials, discounts, and news with fun, brand-building tweets. Be sure to retweet when a customer has something nice to say about you, and don't forget to answer people's questions when possible. Using Twitter as a social media marketing tool revolves around dialog and communication, so be sure to interact as much as possible to nurture and build your following.

Using LinkedIn for Social Media Marketing

LinkedIn is one of the more professional social media marketing sites. LinkedIn Groups is a great venue for entering into a professional dialog with people in similar industries and provides a place to share content with like-minded individuals. It's also great for posting jobs and general employee networking.
Encourage customers or clients to give your business a recommendation on your LinkedIn profile. Recommendations make your business appear more credible and reliable for new customers.
Also browse the Questions section of LinkedIn; providing answers helps you get established as a thought leader and earns trust.

Using YouTube for Social Media Marketing

YouTube is the number one place for creating and sharing video content, and it can also be an incredibly powerful social media marketing tool.
Many businesses try to create video content with the aim of having their video "go viral," but in reality those chances are pretty slim. Instead, focus on creating useful, instructive "how-to" videos.
These how-to videos also have the added benefit of ranking on the video search results of Google, so don't under-estimate the power of video content!

INNOVATIONS

- **Use generated contents**
- **Chatbots**
- **Use high resolution photos**
- **Save time by using a photo editor**
- **Provide free downloadable files**

User-generated content

UGC is all the rage at the moment, as companies encourage their followers to submit their images, videos, and reviews on social media. This strategy is extremely powerful when it comes to boosting customer engagement while being relatively cost-efficient. Needless to say, the fact that your social media channels are full of content provided by your followers will make your Facebook page or Instagram profile much more credible by adding that much-needed human touch. Still, your customers won't simply start creating UGC on their own and they need a little encouragement on your part. So, you can give them a nudge by running a contest, teaming up with industry influencers, or simply by asking your followers to submit their stories.

Live video

Video is the most popular engaging type of content, and the fact that one-third of all online activity is spent watching video perfectly illustrates this statement. But there's another trend which is even more popular on social media – live video. Live stream options on Facebook and Instagram allow you to connect with your customers in real time and offer them unique, interactive content. The trick to succeeding is coming up with something really creative and entertaining to share with them.

Chatbots

The chatbot technology has significantly advanced, and it's estimated that very soon it will be hard to tell whether you're chatting to a bot or a real person. By using chatbots, both on your website and on Facebook, you can automate and speed up your customer service as well as boost productivity, but it's important not to get carried away and completely dehumanize your approach. The best way is to find balance and use chatbots only to deal with some common issues, while still preserving a human touch. In other words, they should be used to collect customer information, offer some guidance, and even take orders, while more complex issues should be left to your sales reps or social media team to deal with.

Use High-Resolution Photos

To ensure that you improve your Social Media strategy, use photos that are clear, of good value and not common. These high-resolution photos can build your website's credibility. If you are using a low-quality image, your audience may think that you have snatched the photo from elsewhere and made it your own .

Provide Free Downloadable Files on Your Site

Nothing catches the attention of audience better than the word FREE, especially when it comes to downloadable files. Offer free PDFs, ebooks or songs which can be downloaded off your website. This feature creates an added value which makes your target audience appreciate your brand even more.

CONCLUSION

In the world with over 70% of internet users active on social networks, who spend at least one hour a day on average on those social networks, we have to conclude that social networks have become a sort of reality in which people communicate, interact, and obviously trust. We also have to be aware that over 60% of those users access social networks via mobile devices, with strong indicators that this percent will only increase in the future years. In such world, we have to admit that social networks are a new dimension of reality that has become a part of the business world as well. Over 90% marketers report they are or will be using social networks for business, while over 60% of them claim to have acquired new customers over social networks.

Innovation on solar energy in India

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INTRODUCTION :

Solar power in India is a fast developing industry. The country's solar installed capacity was 36.9 GW as of 30 November 2020.

The Indian government had an initial target of 20 GW capacity for 2022, which was achieved four years ahead of schedule. In 2015 the target was raised to 100 GW of solar capacity (including 40 GW from rooftop solar) by 2022, targeting an investment of US$100 billion. India has established nearly 42 solar parks to make land available to the promoters of solar plants.

Rooftop solar power accounts for 2.1 GW, of which 70% is industrial or commercial. In addition to its large-scale grid-connected solar photovoltaic (PV) initiative, India is developing off-grid solar power for local energy needs. Solar products have increasingly helped to meet rural needs; by the end of 2015 just under one million solar lanterns were sold in the country, reducing the need for kerosene. That year, 118,700 solar home lighting systems were installed and 46,655 solar street lighting installations were provided under a national program; just over 1.4 million solar cookers were distributed in India.

The International Solar Alliance (ISA), proposed by India as a founder member, is headquartered in India. India has also put forward the concept of "One Sun One World one Grid" and "World Solar Bank" to harness abundant solar power on global scale.

Delhi

Delhi being the Capital and a city state in India, has limitation in installing ground mounted solar power plants. However it is leading in rooftop solar PV installations by adopting fully flexible net metering system.[34] The installed solar power capacity is 106 MW as on 30 September 2018. Delhi government has announced that the Rajghat thermal power plant will be officially shut at the 45 acre plant site and turned into a 5 MW solar power PV plant.

Tamil Nadu

Tamil Nadu has the 5th highest operating solar-power capacity in India in May 2018. The total operating capacity in Tamil Nadu is 1.8 GW. On 1 July 2017, Solar power tariff in Tamil Nadu has hit an all-time low of Rs 3.47 per unit when bidding for 1500 MW capacity was held.

The 648-MW Kamuthi Solar Power Project is the biggest operating project in the state. On 1 January 2018, NLC India Limited (NLCIL) commissioned a new 130 MW solar power project in Neyveli.

Solar photovoltaic growth forecasts:

In August 2016, the forecast for solar photovoltaic installations was about 4.8 GW for the calendar year. About 2.8 GW was installed in the first eight months of 2016, more than all 2015 solar installations. India's solar projects stood at about 21 GW, with about 14 GW under construction and about 7 GW to be auctioned. The country's solar capacity reached 19.7 GW by the end of 2017, making it the third-largest global solar market.

In mid-2018 the Indian power minister RK Singh flagged a tender for a 100GW solar plant at an event in Delhi, while discussing a 10GW tender due to be issued in July that year (at the time, a world record). He also increased the government target for installed renewable energy by 2022 to 227GW.

Solar thermal power:

The installed capacity of commercial solar thermal power plants (non storage type) in India is 227.5 MW with 50 MW in Andhra Pradesh and 177.5 MW in Rajasthan. The existing solar thermal power plants (non-storage type) in India, which are generating costly intermittent power on a daily basis, can be converted into storage type solar thermal plants to generate 3 to 4 times more base load power at cheaper cost and not depend on government subsidies.In March 2020, SECI called for 5000 MW tenders which can be combination of solar PV with battery storage, solar thermal with thermal energy storage (including biomass firing as supplementary fuel) and coal based power (minimum 51% from renewable sources) to supply round the clock power at minimum 80% yearly availability.

Hybrid solar plants:

Solar power, generated mainly during the daytime in the non-monsoon period, complements wind which generate power during the monsoon months in India. Solar panels can be located in the space between the towers of wind-power plants. It also complements hydroelectricity, generated primarily during India's monsoon months. Solar-power plants can be installed near existing hydropower and pumped-storage hydroelectricity, utilizing the existing power transmission infrastructure and storing the surplus secondary power generated by the solar PV plants. Floating solar plants on the reservoirs of pumped-storage hydroelectric plants are complementary to each other. Solar PV plants clubbed with pumped-storage hydroelectric plants are also under construction to supply peaking power.

During the daytime, the additional auxiliary power consumption of a solar thermal storage power plant is nearly 10% of its rated capacity for the process of extracting solar energy in the form of thermal energy.This auxiliary power requirement can be made available from cheaper solar PV plant by envisaging hybrid solar plant with a mix of solar thermal and solar PV plants at a site. Also to optimise the cost of power, generation can be from the cheaper solar PV plant (33% generation) during the daylight whereas the rest of the time in a day is from the solar thermal storage plant (67% generation from Solar power tower and parabolic trough types) for meeting 24 hours baseload power. When solar thermal storage plant is forced to idle due to lack of sunlight locally during cloudy days in monsoon season, it is also possible to consume (similar to a lesser efficient, huge capacity and low cost battery storage system) the cheap excess grid power when the grid frequency is above 50 hz for heating the hot molten salt to higher temperature for converting stored thermal energy in to electricity during the peak demand hours when the electricity sale price is profitable.

Solar heating:

Generating hot water or air or steam using concentrated solar reflectors, is increasing rapidly. Presently concentrated solar thermal installation base for heating applications is about 20 MW_{th} in India and expected to grow rapidly. Cogeneration of steam and power round the clock is also feasible with solar thermal CHP plants with thermal storage capacity.

Bengaluru has the largest deployment of roof-top solar water heaters in India, generating an energy equivalent of 200 MW. It is India's first city to provide a rebate of ₹50 (70¢ US) on monthly electricity bills for residents using roof-top thermal systems, which are now mandatory in all new structures. Pune has also made solar water heaters mandatory in new buildings.Photovoltaic thermal (PVT) panels produce simultaneously the required warm water/air along with electricity under sunlight.

Rural electrification:

The lack of an electricity infrastructure is a hurdle to rural India's development. India's power grid is under-developed, with large groups of people still living off the grid.In 2004, about 80,000 of the nation's villages still did not have electricity, 18,000 out of them could not be electrified by extending the conventional grid due to inconvenience. A target of electrifying 5,000 such villages was set for the 2002–2007 Five-Year Plan. By 2004 more than 2,700 villages and hamlets were electrified, primarily with solar photovoltaic systems.The development of inexpensive solar technology is considered a potential alternative, providing an electricity infrastructure consisting of a network of local-grid clusters with distributed electricity generation.It could bypass (or relieve) expensive, long-distance, centralized power-delivery systems, bringing inexpensive

electricity to large groups of people.In Rajasthan during Financial Year 2016–17, 91 villages have been electrified with a solar standalone system and over 6,200 households have received a 100W solar home-lighting system.

India has sold or distributed about 1.2 million solar home-lighting systems and 3.2 million solar lanterns, and has been ranked the top Asian market for solar off-grid products.

Lamps and lighting:

By 2012, a total of 4,600,000 solar lanterns and 861,654 solar-powered home lights were installed. Typically replacing kerosene lamps, they can be purchased for the cost of a few months' worth of kerosene with a small loan. The Ministry of New and Renewable Energy is offering a 30- to 40-percent subsidy of the cost of lanterns, home lights and small systems (up to 210 W_p). Twenty million solar lamps are expected by 2022.

Agricultural support:

Solar photovoltaic water-pumping systems are used for irrigation and drinking water.Most pumps are fitted with a 200–3,000 W (0.27–4.02 hp) motor powered with a 1,800 W_p PV array which can deliver about 140,000 litres (37,000 US gal) of water per day from a total hydraulic head of 10 m (33 ft). By 31 October 2019 a total of 181,521 solar photovoltaic water pumping systems were installed and total solar photovoltaic water pumping systems would reach 3.5 million by the year 2022 under PM KUSUM scheme. During hot sunny daytime when the water needs are more for watering the fields, solar pumps performance can be improved by maintaining pumped water flowing/sliding over the solar panels to keep them cooler and clean. Agro photovoltaics is the electricity generation without losing agriculture production by using the same land.Solar driers are used to dry harvests for storage.[Low cost solar powered bicycles are also available to ply between fields and village for agricultural activity, etc.

Rainwater harvesting:

In addition to solar energy, rainwater is a major renewable resource of any area. In India, large areas are being covered by solar PV panels every year. Solar panels can also be used for harvesting most of the rainwater falling on them and drinking or breweries water quality, free from bacteria and suspended matter, can be generated by simple filtration and disinfection processes, as rainwater is very low in salinity. Good quality water resources, closer to populated areas, are becoming a scarcity and increasingly costly for consumers. Exploitation of rainwater for value-added products like bottled drinking water makes solar PV power plants profitable even in high rainfall and cloudy areas by the increased income from drinking water generation.

Refrigeration and air conditioning:

Thin-film solar cell panels offer better performance than crystalline silica solar panels in tropical hot and dusty places like India; there is less deterioration in conversion efficiency with increased ambient temperature, and no partial shading effect. These factors enhance the performance and reliability (fire safety) of thin-film panels. Maximum solar-electricity generation during the hot hours of the day can be used for meeting residential air-conditioning requirements regardless of other load requirements, such as refrigeration, lighting, cooking and water pumping. Power generation of photovoltaic modules can be increased by 17 to 20 percent by equipping them with a tracking system.

Residential electricity consumers who are paying higher slab rates more than ₹5 (7.0¢ US) per unit, can form in to local groups to install collectively rooftop off-grid solar power units (without much battery storage) and replace the costly power used from the grid with the solar power as and when produced. Hence power draw from the grid which is an assured power supply without much power cuts nowadays, serves as cheaper back up source when grid power consumption is limited to lower slab rate by using solar power during the day time. The maximum power generation of solar panels during the sunny daytime is complementary with the enhanced residential electricity consumption during the hot/summer days due to higher use of cooling appliances such as fans, refrigerators, air conditioners, desert coolers, etc. It would discourage the Discoms to extract higher electricity charges selectively from its consumers. There is no need of any permission from Discoms similar to DG power sets installation. Cheaper discarded batteries of electric vehicle can also be used economically to store the excess solar power generated in the daylight.

Grid stabilization:

Solar-power plants equipped with battery storage systems where net energy metering is used can feed stored electricity into the power grid when its frequency is below the rated parameter (50 Hz) and draw excess power from the grid when its frequency is above the rated parameter. Excursions above and below the rated grid frequency occur about 100 times daily. The solar-plant owner would receive nearly double the price for electricity sent into the grid compared to that consumed from the grid if a frequency-based tariff is offered to rooftop solar plants or plants dedicated to a distribution substation. A power-purchase agreement (PPA) is not needed for solar plants with a battery storage systems to serve ancillary-service operations and transmit generated electricity for captive consumption using an open-access facility. Battery storage is popular in India, with more than 10 million households using battery backup during load shedding. Battery storage systems are also used to

improve the power factor. Solar PV or wind paired with four-hour battery storage systems is already cost competitive, without subsidy and power purchase agreement by selling peak power in Indian Energy Exchange, as a source of dispatchable generation compared with new coal and new gas plants in India".

Battery storage is also used economically to reduce daily/monthly peak power demand for minimising the monthly demand charges from the utility to the commercial and industrial establishments. Construction power tariffs are very high in India. Construction power needs of long gestation mega projects can be economically met by installing solar PV plants for permanent service in the project premises with or without battery storage for minimising use of Standby generator sets or costly grid power.

Challenges and opportunities:

The land price is costly for acquisition in India. Dedication of land for the installation of solar arrays must compete with other needs. The amount of land required for utility-scale solar power plants is about 1 km^2 (250 acres) for every 40–60 MW generated. One alternative is to use the water-surface area on canals, lakes, reservoirs, farm ponds and the sea for large solar-power plants. Due to better cooling of the solar panels and the sun tracking system, the output of solar panels is enhanced substantially. These water bodies can also provide water to clean the solar panels. Floating solar plants installation cost has reduced steeply by 2018. In January 2019, Indian Railways announced the plan to install 4 GW capacity along its tracks. Highways and railways may also avoid the cost of land nearer to load centres, minimising transmission-line costs by having solar plants about 10 meters above the roads or rail tracks. Solar power generated by road areas may also be used for in-motion charging of electric vehicles, reducing fuel costs. Highways would avoid damage from rain and summer heat, increasing comfort for commuters.

The architecture best suited to most of India would be a set of rooftop power-generation systems connected via a local grid. Not only the roof top area but also outer surface area of tall buildings can be used for solar PV power generation by installing PV modules in vertical position in place of glass panels to cover facade area.[185] Such an infrastructure, which does not have the economy of scale of mass, utility-scale solar-panel deployment, needs a lower deployment price to attract individuals and family-sized households. The cost of high efficiency and compact mono PERC modules and battery storage systems have reduced to make roof top solar PV more economical and feasible in a microgrid

Greenpeace recommends that India adopt a policy of developing solar power as a dominant component of its renewable-energy mix, since its identity as a densely-

populated country in the tropical belt of the subcontinent has an ideal combination of high insolation and a large potential consumer base. In one scenario India could make renewable resources the backbone of its economy by 2030, curtailing carbon emissions without compromising its economic-growth potential. A study suggested that 100 GW of solar power could be generated through a mix of utility-scale and rooftop solar, with the realizable potential for rooftop solar between 57 and 76 GW by 2024.

During the 2015-16 fiscal year NTPC, with 110 MW solar power installations, generated 160.8 million kWh at a capacity utilisation of 16.64 percent (1,458 kWh per kW)—more than 20 percent below the claimed norms of the solar-power industry.The annual net peak solar power generation is around 20,000 MW only (nearly 60% of name plate DC rating of 34,000 MW) after accounting the applicable derating factors and system losses before feeding in to the high voltage power grid since the name plate capacity of solar PV plants is actually the gross DC capacity of the installed PV modules.

It is considered prudent to encourage solar-plant installations up to a threshold (such as 7,000 MW) by offering incentives.Otherwise, substandard equipment with overrated nameplate capacity may tarnish the industry. The purchaser, transmission agency and financial institution should require capacity utilisation and long-term performance guarantees for the equipment backed by insurance coverage in the event that the original equipment manufacturer ceases to exist. Alarmed by the low quality of equipment, India issued draft quality guide lines in May 2017 to be followed by the solar plant equipment suppliers conforming to Indian standards.

Government support:

Fifty-one solar radiation resource assessment stations have been installed across India by the Ministry of New and Renewable Energy (MNRE) to create a database of solar-energy potential. Data is collected and reported to the Centre for Wind Energy Technology (C-WET) to create a solar atlas. In June 2015, India began a ₹40 crore (US$5.6 million) project to measure solar radiation with a spatial resolution of 3 by 3 kilometres (1.9 mi × 1.9 mi). This solar-radiation measuring network will provide the basis for the Indian solar-radiation atlas. According to National Institute of Wind Energy officials, the Solar Radiation Resource Assessment wing (121 ground stations) would measure solar radiation's three parameters—Global Horizontal Irradiance (GHI), Direct Normal Irradiance (DNI) and Diffuse Horizontal Irradiance (DHI)—to accurately measure a region's solar radiation.

The Indian government announced an allocation of ₹1,000 crore (US$140 million) for the National Solar Mission and a clean-energy fund for the

2010-11 fiscal year, an increase of ₹380 crore (US$53 million) from the previous budget. The budget encouraged private solar companies by reducing the import duty on solar panels by five percent. This is expected to reduce the cost of a rooftop solar-panel installation by 15 to 20 percent.

Incentives:

At the end of July 2015, the chief incentives were:

1. Viability Gap Funding: Under the reverse bidding process, bidders who need least viability gap funding at the reference tariff (RS 4.93 per unit in 2016) is selected.Funding was Rs 1 Crore/MW for open projects on average in 2016.
2. Depreciation: For profit-making enterprises installing rooftop solar systems, 40 percent of the total investment could be claimed as depreciation in the first year (decreasing taxes).
3. Liberal external commercial borrowing facility for the solar power plants.
4. To protect the local solar panel manufacturers, 25% safe guard duty is imposed for two years period from August 2018 on the imports from China & Malaysia who are suspected of dumping solar panels in to India.
5. Capital subsidies were applicable to rooftop solar-power plants up to a maximum of 500 kW. The 30-percent subsidy was reduced to 15 percent.
6. Renewable Energy Certificates (RECs): Tradeable certificates providing financial incentives for every unit of green power generated.
7. Net metering incentives depend on whether a net meter is installed and the utility's incentive policy. If so, financial incentives are available for the power generated.
8. Assured Power Purchase Agreement (PPA): The power-distribution and -purchase companies owned by state and central governments guarantee the purchase of solar PV power when produced only during daylight. The PPAs offer fair market determined tariff for the solar power which is a secondary power or negative load and an intermittent energy source on a daily basis.
9. Interstate transmission system (ISTS) charges and losses are not levied during the period of PPA for the projects commissioned before 31 March 2022.
10. Union government offers 70% and 30% subsidy for the hill states and other states respectively for the installation of rooftop solar units. Additional incentives are offered to rooftop solar power plants from various state governments.

Indian initiative of International solar alliance:

In January 2016, Prime Minister Narendra Modi and French President François Hollande laid the foundation stone for the headquarters of the International Solar Alliance (ISA) in Gwal Pahari, Gurgaon. The ISA will focus on promoting and developing solar energy and solar products for countries lying wholly or partially

between the Tropic of Cancer and the Tropic of Capricorn. The alliance of over 120 countries was announced at the Paris COP21 climate summit. One hope of the ISA is that wider deployment will reduce production and development costs, facilitating the increased deployment of solar technologies to poor and remote regions.

Solar-panel manufacturing in India:

The 2018 manufacturing capacity of solar cells and solar modules in India was 1,590 MW and 5,620 MW, respectively. Except for crystalline silicon wafers or cadmium telluride photovoltaics or Float-zone silicon, nearly 80 percent of solar-panel weight is flat glass. 100-150 tons of flat glass is used to manufacture a MW of solar panels. Low-iron flat or float glass is manufactured from soda ash and iron-free silica. Soda-ash manufacturing from common salt is an energy-intensive process if it is not extracted from soda lakes or glasswort cultivation in alkali soil. To increase installation of photovoltaic solar-power plants, the production of flat glass and its raw materials must expand commensurately to eliminate supply constraints or future imports.

The Ministry of New and Renewable Energy (MNRE), India, has issued a memorandum to ensure the quality of solar cells and solar modules. Compliance with the requisite specifications will grant manufacturers and their specific products an entry in the ALMM (Approved List of Models and Manufacturers.) Indian manufacturers are gradually enhancing the production capacity of monocrystalline silicon PERC cells to supply better performing and enduring solar cells to local market.

For utility scale solar projects, top solar module suppliers in 2016-17 were: Waaree energy ltd, Trina Solar, JA Solar, Canadian Solar, Risen, and Hanwha.

Conclusion :

In the times of global warming and climate change as a result of the pollution of the atmosphere through the emission of smoke from the burning of fossil fuels, it is very important that alternative sources of energy that are renewable are gotten. Solar energy is one energy source that does not negatively affect the environment and cannot be exhausted.

When we develop solar energy and its technologies that are clean, inexhaustible and affordable, we are bound to enjof benefits that are huge and in long-term. All of these advantages on solar energy are global.

INNOVATIVE APPROACHES TO UNDERSTAND CONSUMER PSYCHOLOGY

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ABSTRACT

Consumer behaviour involves the psychological process that consumer goes to recognize a needs ,finding ways to solve these names ,making purchase decision.

Consumer psychology is a complex,dynamic,multidimensional process and all marketing decisions are based on assumption about consumer psychology.

Keywords: consumer Psychology, Innovatives, etc.,

INTRODUCTION:

This article is now nearly 20 years old but remains one of the most heavily accessed on the Prospectory site. Over that time, I have become painfully aware how material consumption and the energy involved in making consumer products is a leading factor in climate change and depletion of the planet's limited resources. Sadly, the major technological advances we are making are not enough to outweigh these effects and won't ever be. It is now clear that consumption levels have to change.

The encouraging aspect of this article is that our fundamental psychological drives which have shaped and driven product consumption are actually independent of it. Each can be met in other ways and somehow we need to find and develop satisficers for our biological, hedonic and eudonomic needs which facilitate healthy, happy and fulfilled lives for all people whilst protecting the only planet we have.

I haven't edited my original article below which was based on research I did in the late 1990's but please read it with a view to how we can satisfy these fundamental human drives in new, creative, zero carbon ways. That is the huge challenge of our age and psychology has a vital role to play.

Consumer psychology

Psychology is the scientific study of human behaviour, for example:

- How people think, learn, remember, plan, form attitudes, make decisions, create ideas, solve problems, interpret events and use language.
- How people behave – with different people (on their own, with their family or a group of strangers), in different contexts, (at home, at work, in the pub, at the supermarket, in hospital or at a rugby match).
- How people feel – happy, sad, angry, worried, frightened, guilty, proud, humiliated, stressed, relaxed bored or motivated.

Psychology seeks to explain how and why people think, feel and act in the ways they do, for example:

- Which parts of the brain are responsible for which behaviours,
- How the mechanisms of language, memory and thought processes work
- How blood chemistry and emotions are related
- What evolutionary functions underlie different behaviours like language development, memory, the formation of social groups or the means of selecting sexual partners.
- The nature of consciousness.
- How and why we develop and maintain an identity
- How and why individuals, genders and age groups differ in the ways they think, feel and act.

How can psychology help consumer businesses innovate?

In our experience, psychology can be used in five ways either to help consumer businesses improve their current products and/or develop new ones:-

1. By understanding the fundamental human drives which underpin consumer behaviour.

2. By understanding the different ways in which consumers value products and services.

3. By understanding the ordinary everyday lives and activities of consumers.

4. By understanding how different types of consumers (e.g. men versus women) think, feel and act.

5. By designing experiments to test product concepts and enable consumers themselves to innovate.

I will explore each of these in turn.

UNDERSTANDING FUNDAMENTAL HUMAN DRIVES:

People buy products to satisfy the needs and drives they have. A human drive arises from a discrepancy between an actual and desired state. Psychology research shows that there are 7 fundamental human drives or needs which products or services can be designed to meet:-

1. Biological – the drive to eat, drink, sleep, keep warm and reduce pain.

Product examples: food, drink, clothes, electricity, beds, medicinal drugs.

2. Sexual – the drive to attract sexual partners and gratify sexual desires.

Product examples: perfume, make up, fashion clothes, jewelry, mobile `phones, hairdressing, dating agencies, cosmetic surgery, some types of car.

3. Security – the drive to keep ourselves and loved ones safe and provided for and reduce the risk of accidents or other environmental or societal threats.
Product examples: burglar alarms, children's car seats, locks, helmets, banking, insurance policies.

4. Control – the drive to be in control of our lives, other people, events, objects, time and the environment.
Product examples: diaries, watches, mobile phones, answer `phones, personal organisers, computers, private cars (rather than using public transport).

5. Social – the drive to form relationships, experience intimacy and love, feel we belong.
Product examples: `phones, gifts, greetings cards, photographs, newspapers, clubs.

6. Individuality – the drive to establish and express a unique identity and to develop our individual and creative potential.
Product examples: clothes, music, art and furnishings, mobile `phone covers, certain car types, hobby tools and kits, evening classes.

7. Stimulation – the drive for sensory, cognitive or physical stimulation.
Product examples: chocolate, wines, restaurant meals, Jacuzzis, films, music, books, TV, toys, games, snowboards, holidays.

In practice, human behaviour is usually motivated by a complex mix of these drives. For example, when someone is worrying about what to cook for tonight's dinner party, then they are driven by the need to know that everyone will be adequately fed (biological), that people will enjoy the combination of tastes and textures (stimulation), that they have the ingredients and know the recipe (control), that the meal is different from the one served at someone else's dinner party (individuality) and that it will create an enjoyable dinner party (social).

Similarly, a single product can simultaneously address more than one of the 7 drives. For example, mobile `phones are used to chat to friends (social), to keep tabs on the children (security), to make business arrangements (control), to impress the girls (sexual), to express your identity via the covers and ring tones (individuality) and to play games on (stimulation). If only they were edible, they'd satisfy every single human drive! It's little wonder they've been so successful. Only the car comes close to achieving as many.

UNDERSTANDING THESE FUNDAMENTAL HUMAN DRIVES AND HOW PRODUCTS SATISFY THEM CAN HELP A COMPANY

Understand which combination of drives their product actually satisfies (beyond the obvious ones) and what different opportunities this opens up.

Improve how their current product satisfies a drive.

Market the current product more effectively.

Generate ideas for new products or features which satisfy the same or a different drive, e.g. the introduction of customized covers for mobile phones (individuality) or Mars' introduction of the `Celebration' box of chocolates which is designed to share with your friends more easily (social).

Understanding how consumers value products and services

Psychology research shows that there are 3 dimensions along which consumers value any product or service:-

1. Utility – i.e. what uses they find for the product, e.g. staying in touch with their friends, cleaning the kitchen floor, travelling to the office, keeping the children out of their hair, etc.

2. Experience – i.e. what it feels like to use this particular product, e.g. it makes them feel stimulated, frustrated, inspired, bored, fulfilled, amused, relaxed, etc.

3. Symbolism – i.e. what this product says about them, e.g. that they are cool, sexy, popular, sophisticated, technical, important, unusual, talented, etc.

One might assume that `utility' is the most important dimension of a product. In fact research shows that `experience' is the dominant dimension of value when people are quizzed about the everyday objects they choose or value. This is often because the utility of a product has become standardised; for example, all cars will transport you from A to B but cars vary enormously in terms of the driving experience they offer. Compare for example, a Porsche and a People Carrier. All beers slake your thirst but they vary enormously in taste, texture and `drinking experience'. Dedicated drinkers actually hate the taste of "the wrong beer".

Makes of cars, beers, clothes etc also vary enormously (and deliberately) in terms of their symbolism, i.e. what they are perceived as saying about their owners or consumers. Sometimes this meaning is deliberately manipulated by the manufacturers through the medium of advertisements and role models (e.g. Marks and Spencer's recent use of David Beckham). Sometimes this meaning is created by the consumers themselves as they evolve a particular type of car or drink or a brand of clothing into a `cult item' strongly associated with a particular lifestyle or social group (e.g. 2CV cars, Barbour raincoats, Chardonnay wine). Smart manufacturers pick up on this social trend and seek to reinforce it.

Understanding these different dimensions of value for a product can help a company:-

1. Compete more effectively on the experience which using their product offers.

2. Explore new experiential dimensions which a commodity product could offer and charge a premium for. This is what Starbucks did with coffee, McDonalds did with hamburgers, Apple did with personal computers and Barnes and Noble did with bookstores (introducing a coffee shop as part of the store).

3. Transform the symbolism associated with their product so it says something different about its consumer.

4. Discover surprising new uses for their product which they hadn't thought of.

Understanding consumers' ordinary everyday lives and activities

Psychologists know how to observe, record and explain the detailed patterns of human behaviour. With reference to a business or product, it is useful to study the following behaviours:-

1. How the product is selected and bought in a retail or other context.

This can give insights into what constraints and considerations are operating when people choose your product (or not), over a competitor's, what barriers they encounter and how you might want to position or market your product differently to address these.

2. People actually using or consuming the product.

This can give insights into: how your product might be better designed, problems it is creating or failing to solve and ways it gets used of which you were not aware. This can stimulate ideas for a new or improved product. An entire branch of applied psychology, `Human Factors' focuses on this use of psychology as a means to improve the usability of technical products.

3. People engaging in other `closely-associated' activities but which don't directly involve the current product.

This helps the supplier see potentially new product opportunities which are related to but outside of their current product remit. The best insights will come from asking why people behave the

y microwave oven owners `discovered' the use of this device as a quick reheater of food running counter to the vision of the manufacturers who were positioning it as a general cooking device competing with the conventional oven. Teenagers pioneered the use of text messaging on

mobile `phones, inventing a whole new language in the process. This confounded manufacturers who predicted that texting would be a minor feature because it was so awkward to accomplish compared to talking. way they do and, particularly, how they might behave differently if certain constraints were removed or they were enabled to achieve their goals another way, etc.

Understanding how different consumers think, feel and act

Psychology studies the way in which individuals or social groups differ in the way they think, feel and act. Psychology offers a plethora of tools which (more or less effectively) profile `different kinds of people' in terms of their personality, attitudes, decision making and self image or behaviour patterns. Successfully designing, marketing and selling a product can all benefit from understanding these basic differences and how they can vary with context.

For example, psychology research has shown up significant differences between men and women in the ways they use technology products and the symbolism they associate with them. Women are more interested in what the technology can enable them to do than in the technology per se and men are the opposite. Women also do not tend to tie their sense of identity to owning or operating technology in the ways in which men commonly do.

Designing experiments to test product concepts and enable consumers themselves to innovate Up to 80% of new products fail at the point of consumer acceptance. This is equally true for brand new (i.e. discontinuous) products as well as incremental variations on existing products. It is also true for services as well as goods.

Psychologists are skilled at designing early tests of a new product or product concept. This will significantly reduce the risk of a new product introduction. One of the biggest lessons learned from this kind of research is the importance of testing the concept in context, if at all possible, because people's behaviour is more strongly determined by context than by their personality or attitudes.

Psychology research has also shown that it is often the consumers themselves, rather than the manufacturers, who find the important uses for a new product. For example, early telephone users pioneered the use of the telephone for social communication in the face of direct opposition from the telephone operators who tried to limit its use to business purposes only. Earl

`psychological' activities:-

1. Taking frequent opportunities to talk (or more importantly listen to) customers.

This might be through a formal mechanism like focus groups or it might be through more informal, everyday encounters with individual customers.

Encourage them to tell you stories about how they use the product, what works well for them and what doesn't, what they would like to see improved or changed.

Listen to the stories with an ear for picking up how they think about the product, what's important or valuable to them about it and whether there are surprising or unusual ways in which they employ it.

Make sure your engineers and designers hear the stories and meet the customers rather than simply your marketing staff or sales people.

Ask customers how they like using the product, how it makes them feel and how they think owning or using it reflects on them.

2. Creating opportunities to watch customers using your product in their normal everyday context, i.e. at home, on the street, in the office, etc.

For example, Ford regularly have their design engineers and marketing staff ride for a day with a Ford customer in their car – witnessing them driving it, loading shopping, managing small children, negotiating rush hour traffic, operating the controls in the dark, parking in tight spots, towing a trailer, etc. Many innovative ideas for new car designs and features have come from these observations. Similarly, Unilever arrange for their senior managers to visit consumers' homes from time to time and watch their branded cleaning products being used. They also film people (volunteers!) in the shower using their soap and shampoo products.

If you run a retail outlet which has close circuit TV for security reasons, then you may be able to learn a lot about the service you provide and the behaviour of your customers by watching the security videos. For example, you can see which family member is leading and motivating the search for an item and how the attention of different family members is engaged or lost.

3. Creating an `early adopter' or customer advisory panel.

When you encounter customers who are particularly insightful about your product designs or innovative in adopting or adapting new products, invite them to join a panel. You can then use this group of people to consult on new designs or ask to try out new product concepts. Make sure that the panel includes a good cross-section of your customer population. Nike now use a regular panel of children and teenagers to help them track fashions and to generate innovative products features and ideas. 3M have a `customer innovations centre' where they invite groups of customers in to explore with them innovative applications for their 3M adhesive, reflective and adhesive technologies.

4. Collecting and analysing customer feedback

Record all customer problems, criticisms and suggestions and analyse these regularly to look for common patterns. Publicise the data in a form which is interesting and accessible to all your staff. Encourage them to think of innovative ways to solve these problems.

5. Devising ways to run multiple small, low-cost, low-risk experiments on new product concepts, features and extensions

CONCLUSION

Consumer buying behaviours is very important in the industry because consumer will make buying decision everyday.It is a challenge for the organizations to ensure the client or provided with the best quality service.Consumer psychology therioes and concepts are the most importants to sales people or the marketers.

INNOVATIVE ORGANIC FARMING IN INDIA

BY,

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INTRODUCTION:

Organic farming, evolved on the basic theoretical expositions of Rodale in the United States, Lady Balfour in England and Sir Albert Howard in India in the 1940s, has progressed to cover about 23 million hectares of land all over the world. Howard's magnum opus, 'An Agricultural Testament' has a special significance to us in India as it is based on an analysis of the environment friendly farming practiced here for centuries. However, it is another matter that we lag behind a majority of agriculture based countries in the world in the practice of organic farming in spite of the fact that we have been one of the sufferers of the conventional farming system. The relatively high success of organic farming in some countries are due to the high awareness of the health problems caused by the consumption of contaminated food products, the ill effects of environment degradation, appropriate supports by the government and organisations like the European Union and International Federation of Organic Agriculture Movements (IFOAM).

The financial support for organic farming extended by various national and provincial governments in these countries is very substantial to push up the spread of organic methods. Strong marketing networks linking the farms, processing and distribution and the organisation of production unde r the NGOs with stringent certification programmes were other fa6ts, which contributed to the growth of organic farming. The growth rate of market values of organic products is about 20 per cent per annum in some of thes e countries. The conventional farming had helped India not only to produce enough food for own consumption but also generated surpluses for exports. However, the increasing population and income will lead to further increases in demand for food and also for raw materials for industry. The modern system of farming, it is increasingly felt, is becoming unsustainabl e as evidenced by declining crop productivities, damage to environment, chemical contaminations, etc. The necessity of having an alternative agriculture method which can function in a friendly eco-system while sustaining and increasing the crop productivity is realized now. Organic farming is recognized as the best known alternative to the conventional agriculture.

An appropriate national agriculture policy, giving a prominent place to organic farming addressing the issues related to its coverage, financial support

during the conversion period, creation of linkages among the farmers, processors, traders and consumers, inspection and certification of organic products and increasing the public awareness of the benefits of organic agriculture along with the ill effects of the conventional system, should be designed. This must be followed by concrete action on the ground if we do not want to miss the far reaching changes all over the world heralded by the organic farming movement.

ORGANIC FARMING:

Sustainable development has caught the imagination and action all over the world for more than a decade. Sustainable agriculture is necessary to attain the goal of sustainable development. According to the Food and Agriculture Organization (FAO), sustainable agriculture "is the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of environment and conserving natural resources". All definitions of sustainable agriculture lay great emphasis on maintaining an agriculture growth rate, which can meet the demand for food of all living things without draining the basic resources.

Organic farming is one of the several approaches found to meet the objectives of sustainable agriculture. Many techniques used in organic farming like inter-cropping, mulching and integration of crops and livestock are not alien to various agriculture systems including the traditional agriculture practiced in old countries like India. However, organic farming is based on various laws and certification programmes, which prohibit the use of almost all synthetic inputs, and health of the soil is recognised as the central theme of the method.

Organic farming is one of the widely used methods, which is thought of as the best alternative to avoid the ill effects of chemical farming. There are several definitions of organic farming and the one given by the US Department of Agriculture (USDA) is considered the most coherent and stringent. It is defined as 'a system that is designed and maintained to produce agricultural products by the use of methods and substances that maintain the integrity of organic agricultural products until they reach the consumer. This is accomplished by using substances, to fulfill any specific fluctuation within the system so as to maintain long term soil

biological activity, ensure effective peak management, recycle wastes to return nutrients to the land, provide attentive care for farrn animals and handle the agricultural products without the use of extraneous synthetic additives or processing in accordance with the act and the regulations in this part'. The origin of organic farming goes back, in its recent history, to 1940s. During this period, the path breaking literature on the subject published by J.I. Rodale in the United States, Lady Balfour in England and Sir Albert Howard in India contributed to the cause of organic farming.

The farming being practiced for the last three decades in India has increasingly been found non-sustainable. The system is oriented towards high production without much concern for ecology and the very existence of man himself.

GROWTH OF ORGANIC FARMING

Organic farming has spread to about 100 countries around the world (Annexure - 1). An estimate in 2004 puts about an area of 24 million hectares under oi'ganic farming worldwide. Australia with its 10.5 million hectares leads the countries. However, much of this area is pastoral land for grazing. Argentina with 3.19 million hectares, Italy with 1.83 million hectares and USA with 0.95 million hectares follow suit. The importance of organic farming is growing in many countries. Austria and Switzerland have about 10 per cent of their food system under organic agriculture. The annual growth of organic farming is estimated to be about 20 per cent in USA, France, Japan and Singapore.

NEED FOR ORGANIC FARMING IN INDIA

The need for organic farming in India arises from the unsustainability of agriculture production and the damage caused to ecology through the conventional farming practices. The present system of agriculture which we call 'conventional' and practiced the world over evolved in the western nations as a product of their socio-economic environment which promoted an over riding quest for accumulation of wealth. This method of farming adopted by other countries is inherently self destructive and unsustainable. The modern farming is highly perfected by the Americans who dispossessed the natives of their farms right from the early period of the new settlers in US (Wadia, 1996). The large farms

appropriated by the immigrants required machines to do the large scale cultural operations. These machines needed large amount of fossil fuels besides forcing the farmers to raise the same crops again and again, in order to utilize these machines to their optimum capacities. The result was the reduction of bio-diversity and labour. The high cost of the machines necessitated high profits, which in turn put pressure to raise productivity. Then, only those crops with high productivity were cultivated which needed increased quantities of fertilizers and pesticides. Increasing use of pesticides resulted in the damage to environment and increased resistance of insects to them. Pesticides harmed useful organisms in the soil.

The monoculture of high yielding seeds required external inputs of chemical fertilizers. The fertilizers also destroy soil organisms. They damage the rhizobia that fix nitrogen and other micro organisms that make phosphates available to plants (Wadia, 1996). The long term effect was reduction of crop yields. The damaged soil was easily eroded by wind and water. The eroding soil needed use of continuously increasing quantities of fertilizers, much of which was washed/leached into surface and underground water sources.

The theme of consumer welfare has become central in the economic activities in the developed countries in the world. Sustainable agriculture based on technologies that combine increased production with improved environmental protection has been accepted as absolutely essential for the maximization of the consumer welfare. The consumers are increasingly concerned about the quality of the products they consume and food safety has become a crucial requirement. Safety, quality and hygienic standards are increasingly being made strict. The mad cow disease and the question of genetically modified food production are the recent instances, which made the countries to tighten the laws. Mycotoxln contamination, unacceptable levels of pesticide residues and environment degradation are the problems on which the attention is centred. Keeping the interests of the consumers, the European Union has taken tough measures including criminal prosecution to ensure food safety. Another area to increase the consumer welfare is promotion of the eco-friendly methods in agriculture. No-till, or conservation agriculture, lower input approaches of integrated pest or nutrient management and organic farming are some of them.

The Indian agriculture switched over to the conventional system of production on the advent of the green revolution in the 1970s. The change was in the national interest which suffered set backs because of the country's over dependence on the foreign food sources. The national determination was so intense that all the attention was focused on the increase in agriculture production.

The agriculture and allied sectors in India provide employment to 65 per cent of the workers and accounts for 30 per cent of the national income. The growth of population and the increase in income will lead to a rise in demand for foodgrains as also for the agricultural raw materials for industry in the future. The area under cultivation, obviously, cannot be increased and the present 140 million hectares will have to meet the future increases in such demands. There is a strong reason for even a decline in the cultivated area because of the urbanization and industrialization, which in turn will exert much pressure on the existing, cropped area.

Science and technology have helped man to increase agricultural production from the natural resources like land. But the realization that this has been achieved at the cost of the nature and environment, which support the human life itself, is becoming clear. It has been fully evident that the present pattern of economic development, which ignores the ecology and environment, cannot sustain the achievement of man without substantial erosion of the factors that support the life system of all living things on the Earth. The evidence of the ill effects of development is well documented. As said earlier, we in India have to be concerned much more than any other nation of the world as agriculture is the source of livelihood of more than 6-7 million of our people and it is the foundation of the economic development of the country.

Another turn of the events has been the blame game for ecological problems stated at the Earth Summit and other international conferences. The developed countries, it is true, are to a great extent instrumental to degrade the environment. However, the poorer countries of the world including India cannot delay or ignore the need for remedial measures, which are to be effectively implemented. We cannot gloss over the fact that we have also contributed to the degradation of ecology; look at the droughts and floods, disappearance of forests, high noise level and air pollution in the cities which are our own creations.

Organically cultivated soils are relatively better attuned to withstand water stress and nutrient loss. Their potential to counter soil degradation is high and several experiments in arid areas reveal that organic farming may help to combat desertification (Alam and Wani, 2003). It is reported that about 70 hectares of desert in Egypt could be converted into fertile soil supporting livestock through organic and biodynamic practices. India, which has some areas of semi-arid and arid nature, can benefit from the experiment.

The organic agriculture movement in India received inspiration and assistance from IFOAM which has about 600 organizational members from 120 countries. All India Federation of Organic Farming (AIFOF) is a member of IFOAM and consists of a number of NGOs, farmers' organisations, promotional bodies and institutions. The national productivity of many of the cereal crops, millets, oilseeds, pulses and horticultural crops continues to be one of the lowest in the world in spite of the green revolution. The fertilizer and pesticide consumption has increased manifold; but this trend has not been reflected in the crop productivity to that extent.

The country's farming sector has started showing indications of reversing the rising productivity as against the increasing trend of input use. The unsustainability of Indian agriculture is caused by the modern farming methods which have badly affected/damaged production resources and the environment.

AFFECTS OF MODERN FARMING TECHNOLOGY

The role of agriculture in economic development in an agrarian country like India is a pre-dominant one. Agriculture provides food for more than 1 billion people and yields raw materials for agrobased industries. Agricultural exports earn foreign exchange. Modernization of Indian agriculture began during the mid-sixties which resulted in the green revolution making the country a foodgrain surplus nation from a deficit one depending on food imports. Modern agriculture is based on the use of high yielding varieties of seeds, chemical fertilizers, irrigation water, pesticides, etc., and also on the adoption of multiple cropping systems with the extension of area under cultivation. But it also put severe pressure on natural resources like, land and water. However, given the continuous growth of modern technology along with the intensive use of natural resources, many of them of non

renewable, it is felt that agriculture cannot be sustainable in future because of the adverse changes being caused to the environment and the ecosystem. The environmental non-degradable nature of the agricultural development and its ecological balance have been studied in relation to the modem Indian farming system by experts which shows exploitation of land and water for agriculture, and the excessive use of chemicals.

BENEFITS OF ORGANIC FARMING

Organic agricultural practices are based on a maximum harmonious relationship with nature aiming at the non-destruction of the environment. The developed nations of the world are concerned about the spreading contamination of poisonous chemicals in food, feed, fodder and fibre. Naturally, organic farming system is looked upon as one of the means to remedy these maladies there. However, the major problem in India is the poor productivity of our soils because of the low level content of the organic matter.

The efficiency of the organic inputs in the promotion of productivity depends on the organic contents of the soil. There were many resemblances of organic farming principles in the traditional agriculture of India. But the former gives a more open and verifiable scientific foundation than the latter.

HEALTHY FOODS

A study conducted in USA on the nutritional values of both organic and conventional foods found that consumption of the former is healthier. Apples, pears, potatoes, corn, wheat and baby foods were analyzed to find out 'bad' elements such as aluminum, cadimum, lead and mercury and also 'good' elements like boron, calcium, iron, magnesium sellenium and zinc. The organic food, in general, had more than 20 per cent less of the bad elements and about 100 per cent more of the good elements.

IMPROVEMENT IN SOIL QUALITY

Soil quality is the foundation on which organic farming is based. Efforts are directed to build and maintain the soil fertility through the farming practices. Multicropping, crop rotations, organic manures and pesticides, and minimum tillage are the methods employed for the purpose. Natural plant nutrients from

green manures, farmyard manures, composts and plant residues build organic content in the soil. It is reported that soil under organic farming conditions had lower bulk density, higher water holding capacity, higher microbial biomass carbon and nitrogen and higher soil respiration activities compared to the conventional farms (Sharma, 2003). This indicates that sufficiently higher amounts of nutrients are made available to the crops due to enhanced microbial activity under organic farming.

EMPLOYMENT OPPORTUNITIES

According to many studies, organic farming requires more labour input than the conventional farming system. Thus, India which has a very large amount of labour unemployment and under employment will find organic farming an attraction. Moreover, the problem of periodical unemployment will also get mitigated because of the diversification of the crops with their different planting and harvesting schedules resulting in the requirement of a relatively high labour input.

INDIRECT BENEFITS

Several indirect benefits from organic farming are available to both the farmers and consumers. While the consumers get healthy foods with better palatability and taste and nutritive values, the farmers are indirectly benefited from healthy soils and farm production environment. Eco-tourism is increasingly becoming popular and organic farms have turned into such favourite spots in countries like Italy. Protection of the ecosystem, flora, fauna and increased biodiversity and the resulting benefits to all human and living things are great advantages of organic farming which are yet to be properly accounted for.

PROJECTS AND INITIATIVES

Several projects and initiatives to promote organic farming in the country have begun at the behest of individuals and institutions. The following are only a few of such efforts the details which could be available.

A project aided by the World Bank to empower the rural communities in the country to grow organic products for exports had come up in 2002. The programme aims at the improvement and promotion of organic production of

spices, certification and export of black pepper, white pepper, ginger, turmeric, cardamom, clove, nutmeg and herbals like rosemary, thyme, oregano and parsley. The implementation of the progamme is done by the NGOs, and Idukki and Waynad districts of Kerala, Nilgiri district of Tamil Nadu and Kandhamal district of Orissa are the areas selected for the purpose. Imparting training to both the JNTGOs and the farmers on organic production methods, basic standards required, documentation, inspection and certification is a major objective of the programme. The assistance to NGOs includes among others computer hardware and software especially for market promotion of their produces.

Tamil Nadu plans to encourage organic farming in horticulture and plantation crops to increase the income of the farmers of the state. The state government also wants to promote organic cultivation of fruits, vegetables and tea. The Tamil Nadu Agricultural University has established a model organic farm on a 2.5 hectare area in the campus. The National Bank for Agriculture and Rural Development (NABARD) has decided to promote organic cultivation of horticultural crops in the mango producing areas of southern Tamil Nadu districts. Theni and Dindigul are major mango growing areas and the fact that the state government has decided to promote an agri export zone for mangoes in these districts will quicken the efforts for organic farming. The aim is to take the benefits of the premium prices for organic products in the developed countries through exports of mangoes. NABARD has funded a farmer in Theni district to the tune of Rs 3.5 crores for organic mango cultivation on a 252 acre area. Identification of land for organic cultivation was a difficult process and it took one year for the farmer to do so and another three years to convince the banks. Search for the ideal planting materials took several months and he incurred an annual cost of Rs 46000 for certification.

PROBLEMS AND CONSTRAINTS

The most important constraint felt in the progress of organic farming is the inability of the government policy making level to take a firm decision to promote organic agriculture. Unless such a clear and unambiguous direction is available in terms of both financial and technical supports, from the Centre to the Panchayath levels, mere regulation making will amount to nothing. The following are found to be the major problem areas for the growth of organic farming in the country

MARKETING PROBLEMS OF ORGANIC INPUTS

Bio-fertilizers and bio-pesticides are yet to become popular in the country. There is a lack of marketing and distribution network for them because the retailers are not interested to deal in these products, as the demand is low. The erratic supplies and the low level of awareness of the cultivators also add to the problem. Higher margins of profit for chemical fertilizers and pesticides for retailing, heavy advertisement campaigns by the manufacturers and dealers are other major problems affecting the markets for organic inputs in India.

LOW YIELDS

In many cases the farmers experience some loss in yields on discarding synthetic inputs on conversion of their farming method from conventional to organic. Restoration of full biological activity in terms of growth of beneficial insect populations, nitrogen fixation from legumes, pest suppression and fertility problems will take some time and the reduction in the yield rates is the result in the interregnum. It may also be possible that it will take years to make organic production possible on the farm. Small and marginal farmers cannot take the risk of low jaelds for the initial 2-3 years on the conversion to organic farming. The price premiums on the organic products will not be much of help, as they will disappear once significant quantities of organic farm products are made available.

CONCLUSION

The ill effects of the conventional farming system are felt in India in terms of the unsustainablity of agricultural production, environmental degradation, health and sanitation problems, etc. Organic agriculture is gaining momentum as an alternative method to the modern system. Many countries have been able to convert 2-10 per cent of their cultivated areas into organic farming. The demand for organic products is growing fast (at the rate of 20 per cent per annum in the major developed countries).It appears that India is lagging far behind in the adoption of organic farming.

CRUELTY-FREE LAB GROWN MEAT

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INTRODUCTION

Lately, the consumption of meat has come under a lot of scrutiny and has become subject to a lot of discussions and deliberations. Animal activists, vegetarians, vegans, and now even health experts, are all against the killing of animals to make meat, and now scientists all over the world are obliging by upcoming with a highly advanced solution to the so called 'meat problem'. Lab grown meat or cultured meat or may be the future of meat and may negate the killing of animals and lead to a more sustainable and environmentally friendly non – vegetarian society.

WHAT IS LAB-GROWN MEAT ?

We've always taken it for granted that meat comes from animals, but science has recently found a way to change this. It's now possible to grow meat in lab, entirely outside of an animal's body. This is known as lab-grown meat, or cultured meat or 'franken meat'. Take a cow for example. Scientists will use a cow's stem cells, the building blocks of muscle and other organs, to begin the process of creating the cultured meat. The cells are placed in petri dishes with amino acids and carbohydrates to help the muscle cells multiply and grow. Once enough muscle fibres have grown, the result is a meat that resembles grown beef.

WHY NEED OF LAB-GROWN MEAT ?

There's increasing concern about the impact of meat consumption on the planet. Around a quarter of the greenhouse gas emissions that are driving up temperatures are estimated to have come from agriculture.Beef production is considered the worst offender with cattle emitting methane and nitrous oxide from their manures, but also from their digestive processes.There are also additional gases from fertilizer application to land, from the conversion of land for pasture or feed production.

Because of these impacts on the climate and because of a range of other concerns about issues such as welfare and sustainability, scientists have in recent years sought to develop meat that can be grown from animal cells in factories or laboratories.One perceived advantage would be much lower greenhouse gas emissions, especially methane.

100% CLEAN MEAT IN INDIA

Lab-Grown meat research and development has been underway in western countries for several years now. And now it has piqued the curiosity of Indian scientists who have now started working on producing plant-based lab-grown meat. The Economic Times has reported that the well-known animal rights andwelfare organisation, Humane Society International have joined forces with the Centre for Cellular and Molecular Biology in Hyderabad to develop lab-grown meat in India.

AlokparnaSengupta, Deputy Director at HIS India reported that " Internationally, clean meat is predicted to hit the market by the end of 2018. In India, we expect it to be available by 2025."“The taste will be the same because clean meat is meat. However, instead of slaughtering an entire animal for the different part of its body, the technology in clean meat can develop those parts based on biopsy taken from different parts of the animal's body," Sengupta said.

Managing Director of Humane Society International, N G Jayasimha told The Economic Times, " Clean meat technology is taking the world by storm with

even the biggest meat producers investing in companies developing clean meat."

WILL INDIA ADOPT LAB-GROWN MEAT ?

For Indian biotechnology and foodtech startups, research in these areas can be the dawn of a brave new world of innovation in the food sector. In fact, startups need to look at leveraging such research and bringing it to market with their business acumen. There's not much private innovation happening in this space among Indian startups as the research itself is highly cost-intensive. Which is why the need of the hour for startups looking to disrupt this space is to tie-up with academia and public-sector research labs to find ways to bring new-age food to the market.

The meat industry is under immense pressure to change the age-old animal husbandry practices especially as population spirals out of control and the environmental impact of meat farming contributes to global warming and is known to treat animals in an extremely cruel way, and billions of animals are killed each year to keep up with the pressure of food requirements for the growing population.

Moreover, according to media reports, around 4,000 litres of water are required to produce one kilogram of chicken, while the requirement is even higher in case of bigger animals — more than 8,000 litres of water are required to produce one kilogram of mutton.

The damage doesn't end here. The livestock industry is responsible for wasting potable water, unchecked emission of greenhouse gases such as methane and carbon dioxide, and it is estimated that its carbon footprint is wider than all of the world's transportation combined.

Plus, there's the economic factor as well. Rearing livestock is an expensive proposition, whereas manufacturing of lab-grown meat would be akin to mass production. DrMandal said that lab-grown meat will be immensely beneficial in the Indian context, as it can be produced in bulk at a reasonable cost, and is also nutritious at the same time.

IIT-GUWAHATI

Researchers at IIT-Guwahati have recently developed lab-grown meat as an alternative to traditional meat. Apart from being environmental-friendly and cruelty-free, lab-grown meat such as the ones produced at the IIT are also totally customisable since they are bred using tissue culture.

Alternatives to conventional animal-based protein have become all the rage around the worldwide the likes of Impossible Foods and Beyond Meat. This particular variety was developed in the biomaterial and tissue engineering laboratory at the institute.

Dr. Biman B Mandal of IIT-Guwahati said: "Usage of external chemicals like hormones, animal serum, growth factors or antibiotics have been restricted in this preparation, hence it is safe on ethical concerns."

Dr. Mandal explained that muscle progenitor cells, which were taken from animals via small biopses, were grown on an edible material substrate or base. And this novel technique has been patented by the team. "Daily edible components are being used to make the support matrix in order to increase the nutrient content of the meat product," added the researcher. The ultimate goal is to have bioreactors produce this product at a much larger scale, according to Dr. Mandal.

LAB-GROWN MEAT TO GO ON SALE IN SINGAPORE

Lab-grown chicken meat made a historic debut in Singapore. Demand for sustainable meat alternatives is rising. This is due to growing concerns about the environment & animal welfare.Meat consumption is projected to increase more than 70% by 2050 and these meat alternatives play an important role in ensuring a secure food supply.

The Singapore Food Agency (SFA) approved this week the sale of a lab-grown meat product. This is the first time cultured meat has been cleared for sale anywhere in the world. The product approved by the SFA is cultured chicken, produced by US-based East Just. The company has announced the

product will be manufactured with local partners under its new brand GOOD Meat.

This provides an opportunity to the alternative meat industry. According to a Nielsen report from May this year, the sale of plant-based meats, which have been available in retail outlets and restaurants since 2018, grew by 264% in the US over a nine-week period that ended May 2. The market for alternative proteins was growing even before the pandemic: in a 2019 report, Barclays predicted that alternative meat could capture 10% of the $1.4-trillion global meat market over the next decade. But while plant-based meats were finding more and more favour, commercial availability of lab-grown meat (or cultured meat) was still many years in the future.

PROS AND CONS OF LAB GROWN MEAT

PROS

- From an environmental standpoint this means less water is used to produce meat, less methane gas is put into the atmosphere, and its overall a much cleaner solution than factory farming and hence more sustainable.
- It is true that you can create cultured meat from an animal that does not end up going to slaughter. Hence animals suffer less or not at all.
- Since cultured meat or for this purpose we will call it clean meat, is grown in a sterile environment, there is little bacteria that is produced when producing the meat. This means that we will be free of many potential diseases.

CONS

- We are many years from producing large quantities.
- Very expensive to produce and might be expensive for consumers too.
- We don’t know how to regulate it.

According to the Good Food Institute (GFI)'s 2019 State of the Industry Report on cultivated meats, compared to conventional beef, cultivated beef could reduce land use by more than 95%, climate change emissions by 74-87% and nutrient pollution by 94%.

The report adds that since cultivated meat is created in clean facilities, the risk of contamination by pathogens such as salmonella and E coli, which may be present in traditional slaughterhouses and meat-packing factories, is significantly reduced. It does not require antibiotics either, unlike animals raised for meat, thereby reducing the threat posed to public health by growing antibiotic resistance.

CULTURED MEAT IN OTHER COUNTRIES

According to the GFI report, by the end of 2019, 55 companies were focused on cultivated meat products, including Future Meat Technologies (chicken, lamb, beef) in Israel, Biftek (beef) in Turkey, Cubiq Foods (chicken fat) in Spain, Netherlands-based Meatable (pork, beef), French company Gourmet (foiegras) and US-based Memphis Meats (beef, chicken, duck). Also among these is Delhi-based Clear Meat, which is developing cultured chicken.

CONCLUSION

There are still significant hurdles to be overcome before cultured meat is widely available. Apart from ensuring that the products are affordable — currently still a challenge — and dealing with consumer mistrust, producers of alternative meats will face resistance from traditional meat producers.The world's largest meat companies, such as Nestlé, Tyson Foods and Perdue Farms, have already jumped on the fast-moving plant-based meat bandwagon. But production of cultured meat is difficult to scale up at present.

NUCLEIC ACID EXTRACTION WITHOUT CENTRIFUGE

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Abstract:

Nucleic acid extraction is very essential for modern life. At present, extraction of nucleic acid is essential to carry out biomedical applications. Over many decades, the extraction methods for nucleic acids are evolved. Currently, solid phase extraction is used. Spin column based nucleic acid purification, one of the solid phase method which has silica as solid phase. Silica is positively charged particle and so under certain conditions nucleic acid which is negatively charged binds to silica bed. Each step in spin column is carried out by centrifuge and binding of silica membrane and nucleic acid is also occurs by it. In this study, the binding of silica and nucleic acid occurred by applying pressure.

Introduction:

Extraction of nucleic acid (DNA, RNA) and protein from any biological sources are the major and vital part in life sciences for several downstream purposes such as diagnosis, experimental research, etc.

Nucleic acid extraction can be roughly divided into four steps, which can be modulated depending on the sample and downstream applications: (i) cell disruption; (ii) removal of membrane lipids, proteins, and other nucleic acids, (iii) nucleic acid purification/binding from bulk; and (iv) nucleic acid concentration

Solid-phase extraction is one of the most efficient extraction techniques available in the market. The solid phase may be silica, magnetic beads, etc. It was found that silicates have high binding affinity for DNA under alkaline conditions and increased salt concentration. Based on this principle nucleic acid is extracted and purified in spin column based nucleic acid purification.

Evolution of extraction methods:

The process of extraction and purification of nucleic acid **(manual method)**became complicated in past due to the labor-intensive and time consuming. As manual method rely on multiple chemical compounds, it adds multiple separation and purification steps. Conventional method is too difficult to use on regular basis.

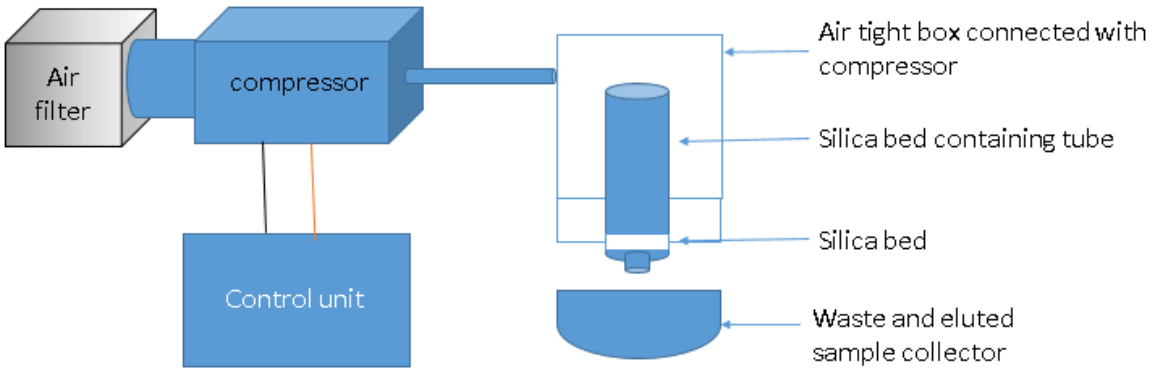
Then, extraction made simplified by the development of solid phase nucleic acid purification. It is available as commercial extraction kit in market. It is a semi-automated method. Automation is by using spin column or centrifuges. Different substances such as silica matrices, glass particles, magnetic beads, anion-exchange resin are used for nucleic acid purification.

The mechanism involved in spin column technique is the affinity between negatively charged Nucleic Acid and positively charged silica material, resulting in selective binding of nucleic acids to the silica matrices, while the rest of the cell components and other chemicals are washed out. Silica surface is covered by positive ions, which enhances the binding of negatively charged DNA.

Conclusion:

Over the past years, many modifications made for extracting nucleic acid from manual method to semi-automated method such as solid phase extraction. Many automated systems (such as BioChain'sAnaPrep extraction system which uses a magnetic-bead based system to extract the highest quality and yield of nucleic acids which are used mostly in large research laboratories) also launched. But still centrifugation is a significant step involved in extracting the nucleic acid for settling the components based on their size or density. Centrifugation works on centrifugal force. It takes some time to increase and decrease rpm during centrifuge. In spin column based nucleic acid extraction, DNA binds to silica bed

Nucleic acid extraction using compressor (one sample)



by centrifugal force or spinning in centrifuge. This can be replaced by applying pressure. While applying pressure the nucleic acid binds to the silica bed and eluted. The pressure level and the efficacy of nucleic acid binding to silica bed to be optimized. And also the quality of nucleic acid to be checked. If it is possible to extract nucleic acid without centrifuge, i.e. pressure can be used instead of centrifuge, then it becomes than easier and simple to extract DNA at low cost.

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The Outcome of ignited Imagination (Innovation)

Introduction :-

> "The true sign of intelligence is not knowledge but IMAGINATION"
>
> - Albert Einstein.

* Everythings in this planet is either created or destroyed. For both things to happen, imagination serves as an irreplacable platform. The universal laws has always been the Alauddin's genie to the existing humans. The span of universal existence is solely dependent on few very powerful vibrations. The human thoughts are the birth place of these magical vibrations.

* It is widely researched and concluded that everything that a human eye witness, every situation that any humans undergo are were only mere perceptions that he had in his mind earlier. Famous Greek writers Plato, Socrates have stated that anything that is found in reality was once imagined. In the upcoming paragraph one such imaginative outcome - innovation is discussed.

Innovation - an imaginative outcome

* This word "innovation" is found to have innumerable definitions owing to multiple fields. English grammar demarcates this word under noun. The definition can be simply told as "something new". Innovation is actually not only inventing but also updating and making it meet its purpose.

* When speaking from an organisation point of view, the steps are - planning, constructing, establishing and running. Innovation will have its role in each and every above mentioned steps. Innovative planning will make the organisation unique, innovative construction will include features never seen before. Moreover the main part of innovation is required to run an organisation.

* People tend to get attracted to updation, salient features, advancements and new ideas. It is the psychology of human mind to "give it a try" rather than "bring okay with it". This motto of humans always has been welcoming to new innovations. Any organisation that understood this would always remain in the topmost position in ranking and promisingly would never cease.

* Innovation has become a new normal and mantra of soo many victories today. This world, like the number line is always a source of never ending ideas. Therefore the point where any idea becomes an ambition or plan that point is noted as "Innovation".

* Our universe is a place of infinite possibili-ties. Whenever there was a period (full stop) marked there was ~~for~~ a "yet to be continued" phrase left following it. "Nothing marks an end. But every ending marks the beginning of something new" and innovation makes it possible.

> "There's a way to do it better - find it"
>
> Thomas Alwa Edison.

* From times immemorial, the world has undergone a series of evolution, progress and changes. The world was created by God. Yet humans have created many things in this world. The ultimate fact that makes a human idea making a creator' is innovation. By innovations we humans tend to become God (creator).

Conclusion :-

Innovation also says that "life has to move on". Everything in this world tends to move but in different pace. The Earth itself is moving around the sun. Life cannot be lived being stagnant. Life is lived in moving, updating, uprooting, replanting on favourable conditions. Hence it provides a philosophy for life and also aids in providing a suffocated one.

> "See what everybody has seen
> Think what nobody has thought
> That makes an innovation"

RICE CULTIVATION IN OCEANS(ocean agriculture)

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ASTRACT

Ocean agriculture appear to be a form of food production which is budding. It is an innovation to produce salt tolerant rice and floating ocean farm. The one crop taking to the sea is rice. This is the process to grow rice in ocean using gene-editing, which amplify the expression of genes already found in rice that control salt-tolerance.

INTRODUCTION

Rice is consumed world wide range in the substantial aspects. Rice is grown over 100 countries, where 700 million tons are produced each year, 3.5 billion people rely on rice everyday. Rice is a water insensitive crop. On average, about 2,500 litres of water need to be supplied to a rice field to produce 1 kg of rough rice. Earth surface contain 96.5% of water within the oceans as salt water remaining 3.5% is fresh water. This innovation of ocean floating farms is to develop salt tolerant rice crop to meet up the world hunger in an alternative way.

SALT TOLERANT RICE VARIETY

Pokkali is a rice variety that is grown in the coastal areas of kerala state that has high salt tolerance. IR 64 is a transgenic rice plant developed to withstand and grow in high salinity.

AGRISEA

Arisea is a startup that is determined on establishing oceanic salt-tolerant cropsto eradicate hunger and upgrade the permanence of our food system.This innovation is completely based on identifying genes in salt tolerant organisms such as mangroves and seagrass and this technology is used to develop seeds to grow staple crops in oceanic salt conditions instead of fresh waters.Agrisea's methane free and salt water tolerant seeds and farming method could speed up the change necessary to fight food insecurity.The farm would be a, add on for bioremediation to fight algal blooms caused by fertilizer. It would also act as a ocean filter.

CONCLUSION

Marine farming is to be emerged with coming years due to the vast salt water availability in the planetand the ocean filter mechanism which would be a advantage for ocean recovery and crop production at the same time which is a double benefit. With coming years it is also believed that it would be common to notice floating crop islands off the coasts, growing variety of crop suitable for the marine environment.

Increasing the seed germination rate through priming and externally increasing the enzyme concentration

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ABSTRACT:

The germination time for seed germination for the present generation is considered a long time process . Thus to study about the Mung bean (Vigina Radiata) seed germination, and to experiment the seed germination rate under various parameters with external addition of sources like enzymes, priming which is expected to result in increased seed germination rate.

INTRODUCTION:

The seed germination is the process in which embryo found in seed is developed into plumule and radicle . During this process , seeds absorb water , this makes the inactive tissues swell and start cell division.

The seed protiens are catalysed by enzymes protease which leads to break down of amino acids and peptides . Other enzymes like amylase , lipase , etc are used for providing energy to the growth of the embryo.

Amino acids are further utilized by biosynthesis of enzymes , hormones, proteins , pyrimidine , purine bases.

The method of treating the seeds external with various factors like hormones , enzymes , osmotic solutions , acids etc is called priming. This improves the rate of germination.

Studies related to seed germination activities:

Older study on activity of seed germination by *Young and Varner* reveals that the application of protein synthesis inhibitors to germinating seeds observed rise in enzyme activity was depressed thus indicating enzyme synthesis during germination.

Experiment carried by *Awatif S . Ali* and *Alaaeldin A . Elozeiri* on priming treatment showed result as follows : controls seed hydration, shortens hydration period , improved germination rate. Priming is the process of soaking seed in osmotic solutions or salt solutions , hormone priming , etc. Priming with H2O2 , improved role of biosynthesis of protein . Priming with auxins , gibberilins , cytokinins etc increases seed germination in pigeon peas.

Study by *Magdalena Simlat , Agnieszk et al*., shows that Melatonin a plant growth regulator and also bio stimulator under different concentration has promising potential to improve *Stevia* seed germination under lower salinity condition . Evidences from this study says that lower concentration of exogenous melatonin improves seed germination and seedling rate under salinity.

CONCLUSION:

With these studies as base to improve the germination rate , the idea of experimenting with mung beans (green grams) by priming along with external addition of enzymes that are involved in stimulation of biosynthesis of protiens is expected to improve the seed germination rate.

INNOVATION.

Innovation:-

Innovation is commonly defined as the "carrying out of new combinations" that include "the Introduction of new goods... new methods of Production... the conquest a new Sources of Supply... and the Carrying out of a new organization

It's Provision of more-effective Product Processes, Services, Technologies, art work[2] or business models that innovators make available to markets, governments and Society.

Process and Demand:-

In economics, managment Science, and other field of Practice and analysis, innovation is generlly considered to be the result of a Process that brings together. Various novel ideas in Such a way that they affect Society.

Sources of innovation:-

Innovation may occur as a result of a focus effort by a range of different agents, by chance, or as a result of a major System failure. According to peter F. Drucker, the general Sources of innovations are different changes in industry structure, in market structure, in local and global demographics in human perception, mood and meaning, in the amount of already availble Scientific knowledge, etc.[15].

UV tolerance from the fluorescence emitted by eutardigrade *Paramacrobiotus* sp. : A possible natural sunscreen

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ABSTRACT

Tardigrades or water bears or moss piglets are microscopic animals with eight legs and hands with four to eight claws on each. These organisms are known to be indestructible creatures due to their ability to tolerate extreme conditions. One of which is their ability to tolerate UV radiation by exhibiting natural fluorescence. Particularly eutardigrades belonging to the Paramacrobiotus genus exhibit this property. This phenomenon can be applied in sunscreens to limit the entry of harmful UV radiation. UV radiations are rich sources of vitamin D, but overexposure can cause severe health issues like skin cancer. The common sunscreen ingredient like Oxybenzone is said to cause coral bleaching and has restrained in some countries. So the application of natural components is gaining importance to ensure safety to both environment and the consumer.

Keywords: Paramacrobiotus species, Tardigrades, UV radiations, sunscreen.

INTRODUCTION

In 1773, Johann August Ephraim Goeze discovered Tardigrades and named them "Tardigrada" meaning "slow stepper" (Bradford A,2017). Tardigrades belong to the kingdom of Animalia, phylum Tardigrada, and superphylum Ecdysozoa. Phylum Tardigrada is classified into Eutardigrada (freshwater or terrestrial species with flexible cuticle and no plates) and Heterotardigrada (marine or terrestrial species covered with cuticle producing different types of plates) (Nelson et al. 2015). More than 1000 species of Tardigrades are known, according to ITIS(Integrated Taxonomic Information System) report.

These invertebrates can grow up to 2.1 mm in length and are found in extreme environments (Weronika, E., and Łukasz, K. 2017). Certain species of Tardigrades (Ramazzottius varieornatus) could be in an anhydrobiotic condition to survive

complete dehydration, ionic radiation, osmotic pressure, and extreme temperature (Carrero, D et al., 2019). Research has found that tardigrades can resist temperature as low as -328 degrees Fahrenheit or as high as 300 degrees F. They can also survive after exposure to space vacuum and solar radiation (Jönsson K. Ingemar et al.,2008).

REVIEW OF LITERATURE

There has been a significant rise in skin cancer cases over the past years and is greatly correlated with overexposure to UV rays. According to WHO, 4 out of 5 cases of skin cancer could be avoided by acquiring protection from harmful sun rays. The skin is the largest organ of the human body and it covers the whole body, protecting internal structures from external invasions (Andres S J, 2013). Overexposure to UV rays can show the effects immediately or after many years ranging from sunburns (shown within a few hours) to skin cancer (seen after several years from exposure) and is known to be the key environmental cause of skin melanoma (Suryanarayan D,2014). Recent studies show that UV radiation can cause conjunctival melanoma in our eyes, reminding us that it can not only affect the skin but other parts of our body too (India Education Diary,2020). This shows how significant it is to protect our body from UV light in everyday life.

Various precautions have been told by WHO to be followed, including the usage of sunscreens of SPF (Sun Protection Factor)15+. But some of the widely used ingredients in sunscreens like avobenzone and benzophenone are said to be hormone disrupters and just a single application of these sunscreens raises the blood levels of these ingredients exceeding the FDA's threshold (Goodman B, 2020). Another common ingredient oxybenzone is said to affect breast development, infant birth weight, and sperm function and has also been shown to contribute to coral reefs destruction which resulted in the ban of the sale of sunscreen containing oxybenzone and octinoxate from 2021 in Hawaii (Siller A et al., 2019).

Recent experimental studies were done by Suma H R et al.,2020 showing that the fluorescent extract taken from Paramacrobiotus sp. could preserve the UV-sensitive tardigrade Hypsibius exemplaris and nematode Caenorhabditis elegans from germicidal UV radiation. Therefore this fluorescence acts as a shield against UV radiation and they also showed that this ability could be transferred to other living organisms too.

CONCLUSION

In conclusion, this extraordinary ability of Tardigrades to tolerate extreme environments can be of use to us. We might be able to use this mechanism in sunscreens by isolating this particular compound responsible for protecting from high UV radiations and adding this natural compound as a substituent for these harmful chemicals like benzophenone or oxybenzone. This might be a permanent solution for the side effects caused by sunscreens but further studies are required for confirming its use on human beings.

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