International Research Journal of Management and Commerce
ISSN: (2348-9766)
Impact Factor 5.564 Volume 7, Issue 2, February 2020
©Association of Academic Researchers and Faculties (AARF)
www.aarf.asia, **Email** : editor@aarf.asia, editoraarf@gmail.com

A STUDY OF SUSTAINABILITY AND INNOVATIONS IN AGRICULTURE AND RURAL DEVELOPMENT

Prin. Dr. H. M. Jare
Hutatma Rajguiru Mahavidyalaya,
Rajgurunagar, Dist. Pune

Mrs. Alka Sunil Mistri
Research Scholar & Asst. Professor,
MKSSS's Shri. Shioddhivinayak Mahila
Mahavidyalayua, Karvenagar, Pune-52

Introduction:

Sustainability is the ability to exist constantly. Innovation means the action or process of innovating or Innovation means a new method, idea, product, etc. Present research paper explains how innovative practices in agriculture and rural development of our country lead our country towards sustainable development. The paper also focuses on various innovations made in the field of agriculture and rural development. The researcher is of the opinion that there is a strong need of sustainable agriculture and rural development through propper innovations.

Key words: Sustainability, Innovations, Agriculture, Rural Development, environment, start ups, agro industries, ecology, balance

Objectives of the study:

1. To understand the concepts of Sustainability and Innovations
2. To study various innovations done in the field of agriculture and rural development
3. To study the need of sustainable agriculture and rural development through innovations

Research Methodology: Present study is primarily based on secondary data using the sources of web sources, published research papers, reference books.

Significance of the study: Firstly present paper throws light on understanding the concepts of Sustainability and Innovations. Simple innovations or product made by using natural raw materials will not create any environmental pollution. Secondly this paper studies various innovations carried out in the field of agriculture and rural development. So this study will help to get knowledge about these different types of innovations. Thirdly this study points out the need for sustainable agriculture and rural development through innovations. It also points out the dependency of sustainable development on innovations which never harm environment and helps to maintain ecological balance.

Sustainability:

"Sustainability" means renewable fuel sources, reducing carbon emissions, protecting environments and a way of keeping the delicate ecosystems of our planet in balance. In short, sustainability looks to protect our natural environment, human and ecological health, while driving innovation and not compromising our way of life. The definition of "sustainability" is the study of how natural systems function, remain diverse and produce everything it needs for the ecology to remain in balance.

The dictionary meaning of sustainability is: 1. The ability to be maintained certain rate or level, 2. The avoidance of depletion of natural resources in order to maintain an ecological balance.

Sustainability and sustainable development focuses on balancing that fine line between competing needs - our need to move forward technologically and economically, and the needs to protect the environments in which we and others live. Sustainability is not just about the environment it's also about our health as a society in ensuring that no people or areas of life suffer as a result of environmental legislation, and it's also about examining the longer term effects of the actions humanity takes and asking questions about how it may be improved

The Three Pillars of Sustainability

In 2005, the World Summit on Social Development identified three core areas that contribute to the philosophy and social science of sustainable development. These "pillars" are:

1. **Economic Development**

Economic development is about giving people what they want without compromising quality of life, especially in the developing world, and reducing the financial burden and unnecessary official rules and processions of doing the right thing.

2. **Social Development**

Among many facets to this pillar, most important is awareness of and legislation protection of the health of people from pollution and other harmful activities of business and other organizations.

3. **Environmental Protection**

There is a need to protect the environment, by recycling, reducing our power consumption, by switching electronic devices off rather than using standby, by walking short journeys instead of taking the bus. Businesses should prevent pollution and should keep their own carbon emissions low. There are incentives to installing renewable power sources in our homes and businesses. Environmental protection is the third pillar and to many, the primary concern of the future of humanity. It defines how we should study and protect ecosystems, air quality, integrity and sustainability of our resources and focusing on the elements that place stress on the environment

Primary Goals of Sustainability

In 2012, the United Nations Conference on Sustainable Development met to discuss and develop a set of goals:

- To make efforts towards end of poverty and hunger
- To maintain better standards of education and healthcare - particularly as it pertains to water quality and better sanitation
- To achieve gender equality
- To achieve sustainable economic growth while promoting jobs and stronger economies
- All of the above and more while tackling the effects of climate change, pollution and other environmental factors that can harm people's health, livelihoods and lives.
- To achieve sustainability to include health of the land, air and sea

A. Innovations in Indian agriculture:

Brainstorming Ways for Indian Agricultural Innovation

Policy reforms and experiments—from liberalizing input markets to guaranteeing employment for the rural poor—have influenced rural livelihoods and agricultural sector growth potential in many ways.

One third of Indian farmers are rapid adopters of technology, another third of them are slow-going, and the rest are not likely to use modern technology at all.

This insight is courtesy of Mark Kahn, who runs the agri-business fund Omnivore Partners. The company has invested in a number of startups that are innovating for the Indian farmer.

India's Department of Agriculture says the pace of farm mechanization has been poor, seeing only 2% annualized growth in the decade from 2001 to 2010. The need for greater

mechanization and higher productivity is a sorely felt in the sector. Agriculture accounts for only 14% of India's GDP, even though it contributes nearly half of all jobs.

Here aresome notable innovations some startup companies have produced:

1. The Venus flytrap

Kundal Mallareddy, a farmer in Karnataka's Bidar district, uses 50% less pesticide than he did until three months ago, when he switched to pest-control traps produced by Barrix Agro Sciences. Instead of pesticides, the Bangalore-based startup makes traps that use pheromones to attract crop-damaging pests and flies.

BARRIX AGRVishak, another farmer based in Mulbagal district of Karnataka, says that using the fly traps has made it easier to ensure healthy crops during the monsoon. "During the rains the pesticides would get washed off and we would have to apply more and more pesticide. The fly traps work even then, which makes things easier," he says.

2. The Discovery

Sagar Bhansali, a Mumbai-based entrepreneur, set up Anulekh Agrotech, which sells a product called Biosat to farmers in Maharashtra and Gujarat in 50 kg bags. The product, is made using biochar, a soil additive, to improve fertility, thereby reducing reliance on chemical fertilizers. "The product itself is not an innovation. It's more of a discovery. He says that the Amazonians used [this] technique that helped them get better crops and also says that similar products were available elsewhere but they innovated on the side of supply chain and business model to make it more affordable for Indian farmers.

3. Fruits of Innovation

In Maharastra, Nashik-based startup Mitra is improving mechanization at horticulture farms. The company has developed sprayers for vineyards and for pomegranate farms. "Sprayers are used for adding hormones that help the growth of crops amongst other things," says founder Devneet Bajaj, previously a principal at a private equity firm specializing in agribusiness. "Farmers would otherwise have to use a process of manual dipping that needs a lot of labor."

M.I.T.R.A The machines his company has developed are up to 30% cheaper than sprayers available in other parts of the world and take half an hour for an activity that would otherwise require 10 to 12 laborers for a whole day.

4. Crop Control

In 2010, Bangalore software engineer Krishna Kumar set up a farming technology solutions startup called CropIn Technology Solutions. The technology is a cloud-based platform, integrated with a mobile app for Android, that allows large food companies to track

the growth of crops on farms around the country. The software tags what is grown in the fields and the conditions in which the crops are grown at the farm level and enables companies to remotely monitor farms, ensure the farmers adopt better agricultural practices and make every crop traceable.

5. Fishing it out

Eruvaka Technologies, based in the coastal Indian city of Vijayawada in Andhra Pradesh, has also developed technology to track farm conditions remotely, but specifically for aquaculture farmers. "The solution allows farmers to measure the water quality, the levels of dissolved oxygen and the PH level remotely on a Smartphone" explains Sreeram Raavi, founder of Eruvaka Technologies. The device Eruvaka has developed, Floating Sensor Buoy, is placed in the farm and has sensors measuring the parameters that allow the maintenance of a healthy environment for growing fish and shrimp. The device has a battery and solar panel, as well as wireless connectivity through a SIM Card mounted on the buoy, and can alert the farmer of a drop in any parameter through a text or phone call. Raavi's technology also ropes in cloud computing and data analytics to help study the changes in water quality in detail to be able to predict an oncoming problem.

6. Skymet

Skymet is India's largest weather monitoring and agri-risk solutions company. According to their website, they are the experts in measuring, predicting, and limiting climate risk to agriculture, thus reducing losses incurred due to bad weather conditions.

Product:Launched to aid farmers, Skymet's weather website offers services such as weather forecast, crop insurance and agri-risk management. Prediction of weather conditions can help prepare a farmers for a drought or heavy unseasonal rainfall and help them take appropriate preventive measures, they say and claim to accurately measure and predict yield at the village level for any crop.

7. Ekgaon Flickr CC Ananth BS

A Gujarat-based venture started in 2001, Ekgaon Technologies is an IT based network integrator that provides a technology platform and offers a range of services to farmers in rural areas including financial, agricultural inputs and government assistance.

Products:

- Financial: A mobile phone enabled financial services delivery platform, it provides information on microfinance institutions and banks for delivery of door-step services such as credit, savings, remittance, insurance, investment and mortgage.

- Agricultural: Offered in Hindi, Gujarati and Tamil languages, the system uses mobile, voice recognition, interactive voice response system (IVRS) and web technologies to provide information on weather, commodity market prices, soil nutrient management and crop management.
- Citizen: The web and mobile applications help citizens monitor the delivery of government programmes and services entitled to them.

8. Digital Green

Digital Green is a not-for-profit international development organisation that focuses on training farmers to make and show short videos where they record their problems, share solutions and highlight success stories as community engagement to improve lives of rural communities across South Asia and Sub-Saharan Africa.

Products:

- It uses technology-enabled behaviour change communication that is cost-effective, scalable and brings together researchers, development practitioners, and rural communities to produce and share locally relevant information through videe.
- Two social online games Wonder Village and Farmer Book: In the games, players simulate a village economy and relate with actual farmers that Digital Green works with, on the field. The players are placed in a resource-constrained setting in which they have to complete quests such as set up paddy and maize farms and supply raw materials to the farmers' markets.

9. FrontalRain Technologies

The Bangalore-based agri-tech startup seeks to deliver affordable advanced technology solutions for emerging companies and take technology to remote corners of the country.

Product:

The company's offering Rain+, according to their website, is a comprehensive suite of products on the cloud for food and agribusinesses. Rain+ can help companies at every stage of the value chain starting from growing, processing, logistics, wholesale trade, retail trade and exports. This technology, accessible through desktop, tablet and mobile devices, is used by companies dealing with commodities like spices, herbs, basmati rice, seeds, animal feed, sea food, dairy and edible oil.

10. AgroStar

A Pune-based 'direct to farmer' m-commerce platform, Agrostar strives to provide quality agro inputs at the farmers' doorstep.

Product:

AgroStar enables farmers to procure a range of agricultural goods such as seeds, crop nutrition, crop protection and agri-hardware products by simply giving a missed call on the company's 1800 number or through their mobile app to eliminate unavailability of products, substandard products, duplication and adulteration.

B. **Some great innovations for rural India**

1. Eco-Cooleer: It has the ability to reduce indoor temperatures as much as 5 degrees Celsius, which is on par with what an electric centrally installed air conditioning system can do. In some instances the Eco Cooler can reduce indoor temperatures from a sweltering 86F (30C) to a comfortable 77F (25C).

It is reportedly the world's first-ever zero electricity air conditioner, and its inventor wanted to get the concept out there to help as many people as possible.

2. A whirling toy (button spinner) This is a **centrifuge**. A centrifuge is an instrument that makes use of the principle of centrifugal force. Centrifugal force is essentially an outward pushing force that is felt by bodies moving in a circular motion.

This force that is felt by the bodies in circular motion is due to the inertia and inward pushing external force. The centrifugal device makes use of this theory while spinning samples at high speeds.

Applications of a Medical Centrifuge- Blood Sample Separat...

3. **Pomegranate de-seeding device:**

Rupam Talukdar, lives in Numaligarh, Assam,

"Necessity is the mother of invention"

this proverb is justified 100 cents by this great serial innovator , a fellow Assamese, **Uddhab Bharali.**

Not one or two he has a whopping 140 nos. of innovations under his belt.

Buckle up your seat belts for a long answer.(Don't worry I am not going to cover all 140)

One of his monumental inventions is:

- **Pomegranate de-seeding device :** Separates the outer hard skin and the thin inner membrane without damaging the seeds. Using this machine one can easily deseed 50-55 kg of pomegranates in an hour. The machine has been exported to Turkey and the U.S. In 2006.

4. Water wheel

Ashvin Maliya, got Possess Learning License In Farming, invented

Water wheel, a cylindrical drum with capacity over 45 liters.

"Water wheel can be rolled on the ground, eliminating the physical strain of carrying watercontainers"

5. Help Desk: Aarambh, a Mumbai based NGO came up with an idea of portable Study table cum School Bag and that too in a most economical and efficient manner. They collected discarded carton from retailers, corporate houses and retail outlets. Making use of a stencil design, the cartons were then folded to form a portable writing desk, which also doubles up as a school bag. They named this wonder as 'Help Desk', and were able to achieve their 'most economical' target by making it in less than Rs 10 ($20 cents).

6. Gravity Light: Abhishek Kumar Singh, lives in Jabalpur, Madhya Pradesh, India has invented Gravity Light

It is powered by the lift of a weight.

As the weight falls it turns a gear train, driving the motor that powers the LEDs.

GravityLight doesn't need batteries or sunlight and costs nothing to run. It takes seconds to lift the weight that powers GravityLight, creating 20 minutes of light on its descent.

1. Fill the bag with weight (about 12kg)
2. Lift the bag using the orange cord
3. Bag falls slowly creating light (about 20 mins)
4. When the bag reaches the ground it can be lifted again.

Innovative Ideas for Rural Development in India:

1. Utilization of Local Resources: For example: If there are water resources like rivers and tanks near by the villages, in summer itself, arrangements must be made to tap this resource by removing slit in the tanks, constructing new reservoirs, bunds, canals and simultaneously strengthening the existing ones, so that the water cannot go waste. Similarly, if there are any mines like iron, coal and granites, they should be excavated so that local population can be provided employment.

2. Establishment of Rural Industries: All the village industries come under the following broad categories:

a). Agro Based Industries: Sugar industries, Jaggery, Oil processing from oil seeds, Pickles, Fruit juice, Spices, Dairy products etc.

b). Forest Based Industries: Wood products, Bamboo products, Honey, Coir industry, making eating plates from leaves.

c). Mineral based industry: Stone crushing, Cement industries, Red oxide making, wall coating powders etc.

d. Textile Industry: Spinning, Weaving, Colouring and Bleaching

e). Engineering and Services: Tractors and Pump set repairs etc. Small and medium

sized industries to produce agricultural machinery, equipment for usage in rural areas etc.

f). Handicrafts: These include making of wooden or bamboo handicrafts that are local to that area, traditional decorative products, toys and all other forms of handicrafts typical to the region.

3. Services: There are a wide range of services including mobile repair, agriculture machinery servicing, etc which are being undertaken under this category.

4. Startups: They are entrepreneurial ventures, which are newly emerged businesses aims to meet marketplace need, want or problem by developing a viable business model around products, services, processes or platforms. For example: Agriculture, Supply Chain, Trading in Agricultural produce, Processing Agricultural produces, Fisheries -

Both Culture and Trading, Rural Micro Finance, Rural Health - Rural Primary Health Cared and Rural Education etc.

5. Computer & Internet Services: Providing Computer Training and Repairing Services, Internet based business like E-Commerce, Rail & Bus Ticket booking, Digital Marketing Agency – Examples: Social Media Marketing, Email Marketing etc.

6. Encourage Rural Entrepreneurship: They may be of the following types:

a).Individual Entrepreneurship - It is basically single ownership of the enterprise.

b). Group Entrepreneurship - It mainly covers partnership, private limited company and public limited company.

c). Cluster Formation Entrepreneurship - It covers NGOs, VOs, CBOs, SHGs and even networking of these groups. These also cover formal and non-formal association of a group of individuals on the basis of caste, occupation, income, etc.

d).Cooperative Entrepreneurship - It is an autonomous association of persons united

Government Schemes for Rural Entrepreneurship in India:

- Entrepreneurship Development Institution Scheme
- Rajiv Gandhi Udyami Mitra Yojana (RGUMY)
- Performance and Credit Rating Scheme (Implemented through NSIC)
- Product Development, Design Intervention and Packaging (PRODIP)
- Khadi Karigar Janashree Bima Yojana for Khadi Artisans
- Marketing Assistance Scheme
- Provision of Urban Amenities to Rural Areas (PURA)

Conclusion: Rural entrepreneurship plays a vital role in the economic development of India, particularly in the rural economy. It helps in generating employment opportunities in the rural areas with low capital, raising the real income of the people, contributing to the development of agriculture by reducing disguised unemployment, underemployment, unemployment, poverty, migration and economic disparity.. The rural development programs should combine infrastructure development, education, health services, investment in agriculture and the promotion of rural non-farm activities in which women and rural population can engage themselves. Rural development and rural entrepreneurship is the way of converting developing country into developed nation. Promotion of rural entrepreneurship is extremely important in the context of producing gainful employment and reducing the widening disparities between the rural and urban. Monitoring rural development programmes by supplying right information at the right time, providing timely and adequate credit and continuous motivation of bankers, Panchayat union leaders and voluntary service organizations will lead to the development of rural entrepreneurship and in turn rural development.

Suggestions:

- **Labour Intensive Techniques:** As there is disguised unemployment in our agriculture sector, labour intensive techniques should be adopted in rural industrial units.
- **Educate the Rural Entrepreneurs:** Government and NGOs offered various schemes and opportunity to the rural entrepreneurs. But, they are unaware of these schemes and opportunities due to their illiteracy. So they should to be educated by conducting

Workshops and seminars related to their business.

- **Offer finance with low rate of interest:** Financial institutions like ICICI, SIDBI, IDBI, IFCI, and SFC should provide finance to rural entrepreneurs with low rate of interest and limited collateral security with liberal terms and conditions.
- **Government Role:** Government should take steps to provide infrastructure, warehousing facilities, offer assistance to marketing and to export the goods of rural entrepreneurs to foreign countries.
- **Exploitation of Village resources:** For example, where ever there is scope for wind and solar energy, can be fully exploited for rural electrification.
- **Ancillary units:** These are those, which manufacture parts and components to be used by larger industries. Several ancillary units should be established in rural areas which will lead to better productivity of many engineering industries.

- **Micro credit schemes:** Provisions should be made for micro credit system like SHGs to the rural entrepreneurs who will boost up the economic development and employment

  generation of the rural poor. Past experiences and other observations should be considered to develop rural entrepreneurship.
- Awards should be given to those entrepreneurs who demonstrate extraordinary success.

  Entrepreneurship development cell should be established at all the villages level to provide guidance and counseling to motivate the rural entrepreneurs regarding the use of by the Government.
- NRIs and wealthy people of their respective villages should establish/assist rural industries.

References:

- Report of the All India Rural Credit Committee, New Delhi, 2003.
- Narang Ashok (2006), "Indian Rural Problems", Murari Lal and Sons, New Delhi.
- Advantages of rural entrepreneurs (n.d) www.thehindu.com/...entrepreneurs...rural-india/article
- Keyne, J. (2000), "Rural Entrepreneurship Initiative", Kauffman Centre for Entrepreneurial Leadership, September.
- Kumar A. "Rural industrialization in India: a strategy for rural development" Mittal Publications, Delhi, 1989.
- Mehta, A. (2011), "Rural Entrepreneurship – A Conceptual Understanding with Special Reference to Small Business in Rural India", Elixir Marketing, Vol. 36
- Nandanwar Kalpana P. (2011), Role of Rural Entrepreneurship in Rural Development, International Referred Research Journal, ISSN- 0974-2832, Vol. II, ISSUE-26, March.
- Petrin, T. (1994), "Entrepreneurship as an Economic Force in Rural Development", Key Note Paper presented at the 7th FAO / REU International Rural Development Summer School, Herrsching, Germany, 8 – 14 September
- Sharma, Swati and Vyas, Divya (2011), "Entrepreneurship in Rural India – A Need Analysis",
- International Journal of Business Economics and Management Research, Volume 2, Issue 4,