

National Conference on Appropriate Technologies for Rural India (NCAT) 2022

DECEMBER 06 2022 (HYBRID MODE)



ABSTRACTS



CIMP

Organised by

**Centre for Appropriate Technology Management
Chandragupt Institute of Management Patna (CIMP)**

In association with

National Bank for Agriculture and Rural Development (NABARD)

NATIONAL CONFERENCE ON APPROPRIATE TECHNOLOGIES FOR RURAL INDIA (NCAT) 2022

December 06, 2022 (Hybrid Mode)



Organised by:



Chandragupt Institute of Management Patna

In association with

National Bank for Agriculture and Rural Development (NABARD)

Venue:

Chandragupt Institute of Management Patna

Mithapur Institutional Area, Patna -800001

ORGANIZING COMMITTEE

Patron:

Prof. (Dr.) Rana Singh, Director, CIMP

Coordinator:

Prof. (Dr.) Vijaya Bandyopadhyaya, CIMP

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Conference Secretariat:

Kumari Khushboo, CIMP

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MESSAGE FROM PATRON



Prof. (Dr.) Rana Singh
Director, CIMP and Patron, NCAT 2022

I am delighted to note that Centre for Appropriate Technology Management, Chandragupt Institute of Management Patna (CIMP) is organizing the first National Conference on Appropriate Technologies for Rural India (NCAT 2022) in association with National Bank for Agriculture and Rural Development (NABARD) on 6 December 2022 at CIMP.

The objective of the conference (NCAT 2022) is to provide a platform for exchange of ideas on technology that are simple to apply, use local resources and labour, nurture the environment and human health and should not be capital intensive or energy intensive. They should be able to provide small scale, local and sustainable solutions to reduce poverty, promote healthy communities and protect natural resources. Being the Patron of the conference, it gives me immense pleasure in writing this Foreword to the Book of Abstracts which portrays the synopsis of the papers of all the contributors to this conference. The full research papers presented during this conference are on various aspects of appropriate technologies for rural India including Clean Energy for Rural Poor, Innovations in Agriculture, Carbon Trading and Financing, Cyclical and Sustainable Development through Affordable Technology, Policy Initiatives for Adoption of Technology, Green Economy, Innovations, Unnat Bharat Abhiyan for Rural Development through Appropriate Technology, Use of Information Technology for Rural Development and Case studies related to Innovative Technology Adoptions in Rural Context.

I want to thank in advance all our distinguished guests, authors, reviewers, paper presenters, researchers, our faculty members and the conference organizing committee for their commendable efforts. I wish all the internal and external stakeholders happy deliberations at this all-important conference.

Rana Singh

[Prof. (Dr.) Rana Singh]

MESSAGE BY COORDINATOR



Vijaya Bandyopadhyaya
Associate Professor, CIMP and Coordinator,
Centre for Appropriate Technology Management

I am happy to announce the first National Conference on Appropriate Technologies for Rural India (NCAT 2022) organized by Centre for Appropriate Technology Management, Chandragupt Institute of Management Patna (CIMP) in association with National Bank for Agriculture and Rural Development (NABARD) on 6 December 2022 at CIMP.

NCAT 2022 aims to bring together scholars from India and abroad, including senior academicians, researchers, practicing managers and policy makers in the government and in the industry for sharing their knowledge and insights on recent trends and challenges in development and adoption of technology which is appropriate for use by the rural poor in India. I hope the proceedings will provide an excellent reference for both researchers and practitioners and help to stimulate further study and research in the area.

I hope this conference will be an enriching experience for all of us.

Vijaya Bandyopadhyaya

[Vijaya Bandyopadhyaya]

MESSAGE BY CONVENER



Kumod Kumar

Convener, NCAT 2022 and Chief Administrative Officer, CIMP

It is a great pleasure that Centre for Appropriate Technology Management, Chandragupt Institute of Management Patna is organizing a National Conference on “National Conference of Appropriate Technology for Rural India (NCAT-2022)” in association with National Bank for Agriculture & Rural Development (NABARD) on 6th Dec. 2022 at Chandragupt Institute of Management Patna.

The conference aims to be a key national forum for the exchange and dissemination of technical Information on recent trends & challenges in development & adoption of technology which is appropriate for use by the rural India among academicians and practicing managers and policy makers in the Government & in the industry in the domain of interest around the nation.

The theme of conference and wider conclusions on Appropriate Technologies for Rural India related topics are indispensable for human progress in general and country in particular.

My sincere gratitude to the Key Note Speaker of the conference Sri Sunil Kumar, all distinguished guests, members of organizing committee and referees who have put sincere efforts to make this a conference successful. My sincere thanks to participants of this conference whose keen interest in the field of appropriate technology, which I am sure shall help to build a powerful future through technology innovation.

A handwritten signature in black ink on a light purple background. The signature is stylized and appears to read 'Kumod Kumar'.

[Kumod Kumar]

ABOUT CIMP

Chandragupt Institute of Management Patna was inaugurated in 2008 by His Excellency the then Vice-President of India, Md. Hamid Ansari, as the dream-project of Hon'ble Chief Minister of Bihar, Shri Nitish Kumar to resurrect the ancient educational glory of Bihar. It is an autonomous institute of excellence in management education, consultancy and research set up by the Government of Bihar on the lines of Indian Institutes of Management (IIMs). CIMP offers full time AICTE Approved, NBA accredited and AIU recognized Post-Graduate Diploma in Management Programme; full time AICTE approved Fellow Programme in Management (FPM) and Executive Programmes in Management (EXPM) for the officials of Government of Bihar and executives/managers from various industries/ corporates. Apart from this, CIMP also provides short-term Training Programme, Research and Consulting services for various departments, agencies and bodies of the government and the corporate.

CIMP is among the **Top-125 B-schools** in the **National Institutional Ranking Framework (NIRF) India Rankings 2022**. CIMP also stands in top 100 in **Indian Institutional Ranking Framework (IIRF)**.

ABOUT NABARD

National Bank for Agriculture and Rural Development (NABARD) is a unique development financial institution which was established by the Government of India for providing undivided attention, forceful direction and pointed focus to credit related issues linked with rural development.

The formation of NABARD was approved by the Parliament through Act 61 of 1981. NABARD came into existence on 12 July 1982 by transferring the agricultural credit functions of RBI and refinance functions of the then Agricultural Refinance and Development Corporation (ARDC) with an initial capital of Rs. 100 crores. The vision of NABARD is the Development Bank of the Nation for Fostering Rural Prosperity. The mission of NABARD is to promote sustainable and equitable agriculture and rural development through participative financial and non-financial interventions, innovations, technology and institutional development for securing prosperity.

ABOUT CENTRE FOR APPROPRIATE TECHNOLOGY MANAGEMENT

The urge to uplift the conditions of the socially and economically disadvantaged sections of the population of the State of Bihar has been a major focus of Chandragupt Institute of Management Patna (CIMP) since inception. Providing education to poor children and adopting villages and orphanages are some steps in this direction. Such good work has been recognized worldwide and has brought laurels to the Institute.

The need to harness science and technology for transforming rural India has been widely recognized. Translating Gandhiji's concept of Gram Swaraj, the focus of the State has always been on development of self-reliance of local communities to alleviate poverty and improve quality of life of the rural poor. Simultaneously, there is also the need to protect scarce natural resources through use of small-scale technologies and renewable energy.

The Centre for Appropriate Technology Management was conceived in June 2016 at CIMP to help disadvantaged rural communities to find better ways to do things that will improve their quality of life. The Centre aims to work at National level with special focus on Bihar.

The Centre for Appropriate Technology Management aims to promote development, diffusion and transfer of such technologies and processes that are appropriate to the resources and needs of low-income communities in the State.

The vision of the Centre is to create self-reliant local communities, particularly in rural areas, who utilize locally available resources and skills to meet their basic needs like food, water, energy and waste disposal while living in harmony with the environment.

The mission of the Centre is to promote development and use of technologies that are appropriate for the needs of the rural poor in the State.

PROGRAMME SCHEDULE

Sessions	Programme	Time
	Lighting of the Lamp	10:15 – 10:30 AM
	Welcome Address: Prof. (Dr.) Rana Singh, Director, CIMP & Patron, NCAT-2022	10:30 – 10:50 AM
	Keynote Address by Dr. Sunil Kumar, CGM, NABARD	10:50 – 11:25 AM
	Vote of Thanks	11:25 – 11:30 AM
	Tea Break	11:30 – 11:45 AM
Sessions II	Technical Session I	11:45 – 01:15 PM
	Lunch Break	01:15 – 02:30 PM
Sessions III	Technical Session II	02:30 – 04:00 PM
	Tea Break	04:00 – 04:30 PM
Sessions IV	Valedictory Session (Key Takeaways from the conference, Presentation of Certificates;, Best Paper announcement; Vote of Thanks)	04:30 – 05:00 PM
Venue: CIMP- 2nd Floor, MDC Block (Lecture Hall-II)		

DETAILS OF TECHNICAL SESSIONS

Session-III (Technical Session II) - Physical

02:30 PM – 04:00 PM,

Venue CIMP-2nd Floor, MDC Block (Lecture Hall-II)

Chairperson: Prof. (Dr.) Rajesh Kumar, CIMP

Rapporteurs: Pragya Sarvan

Sl. No.	Author (s) & Affiliations	Paper Title
Paper-1	Divyanshu Dwivedi & Aditya Sharma <i>NABARD</i>	Role of Information and Communication Technology in Rural Development
Paper-2	Atul Kumar & Nitish Nigam <i>Jawaharlal Nehru University, New Delhi & Chandragupt Institute of Management Patna</i>	Does Democracy Improve the Quality of Life? A Cross-Country Analysis
Paper-3	Arayana Roy Chandragupt Institute of Management Patna	Sustainable Farming Practice by “Land Craft Agro”: A Potential Solution Challenges
Paper-4	Dr. Jay Dev Banerjee	Appropriate Technologies for Rural India
Paper-5	Vishal Singh & Avi Karan <i>Indian Institute of Technology, Patna & Chandragupt Institute of Management Patna</i>	Exploring Challenges and Opportunities Associated with Tissue Culture Technology based Banana Plantation in Bihar
Paper-6	Monika, Vijaya Bandyopadhyaya & Sriranga Vishnu <i>Chandragupt Institute of Management Patna</i>	Agrifeeder: A One-Stop Solution Provider to Farmers

DETAILS OF TECHNICAL SESSIONS

Session-II (Technical Session I) - Virtual

11:45 AM – 01:15 PM

Venue CIMP- 2nd Floor, MDC Block (Lecture Hall-II)

Chairperson: Prof. (Dr.) G.K. Murthy, CIMP

Rapporteurs: Sakshi Sharma

Sl. No.	Author (s) & Affiliations	Paper Title
Paper-1	Dhayalan V & Sridhar N <i>Hindusthan College of Engineering and Technology, Coimbatore</i>	Building N-Dimensional Soil Nutrients Spectral Library through Insitu Laboratory and Space borne
Paper-2	Bhiravi Bhiravi & Lokesh Jasrai <i>Lovely Professional University, Phagwara, Punjab</i>	Adoption of Precision Agriculture for Sustainable Paddy Crop: Farmers' perspective on Policy Support in Punjab
Paper-3	Pushkar Aditya <i>Tata Institute of Social Sciences, Mumbai</i>	ICT in Indian agriculture: Opportunities and Challenges
Paper-4	V. Gopi Swaminathan <i>National Informatics Centre, Puducherry UT</i>	Artificial Intelligence and Predictive Analytics"- Modern IT Tools for Rural Development
Paper-5	Nisha Malhotra Ranchi University, Ranchi	Green Economy and its Impact
Paper-6	Ashi Rooth Stuart St. John's College, Agra	Use of Cooking Fuel and the Role of Socio-religious Identity

Paper-1

Building N-Dimensional Soil Nutrients Spectral Library through Insitu Laboratory and Space borne Hyperspectral Imagery for Consistence Investigation of Soil Health

Dhayalan V

Department of Agriculture Engineering, Hindusthan College of Engineering and Technology, Coimbatore

&

Sridhar N

Department of Agriculture Engineering, Hindusthan College of Engineering and Technology, Coimbatore

Abstract

Remotely sensed soil information is one of the indispensable techniques for its nutrients assessment and decision making for large scale. The potential of remote sensing is to produce real world soil nutrients with integrated in-situ measurements and hyperspectral data analysis, which is cost-effective and less time consuming than manual soil mapping procedure. Thus the notable advantage of utilizing the remote sensing technique is to acquire soil nutrient information where manual soil sampling is hard. In addition to that, monitoring of soil health during tillage, early crop development stages, variation of transient soil properties in response to temporal changes can be obtained through the remote sensing data products. In this study, Hyperspectral remote sensing allows a sensor to gather emitted radiation from the Earth's surface. This sensor detector consists more than hundreds of refined narrow wavelength spectral bands (5-10 nm). With such detail, the possibilities to detect and identify information on land are greatly enhanced. Hyperspectral remote sensing combines imaging and spectroscopy technology, where spectroscopy has been utilized by chemist and geologist for decades to explore the materials and their characteristics. Hence spectroscopy instrument can be used for cross-validation purpose. Hyperspectral data products can be compared with the field and laboratory spectroradiometer results to refine the soil health information. Nevertheless, statistical analysis was performed to optimize the number of spectral bands and spectral parameter for estimating soil nutrient content for the image's unknown pixels. The Principle Least Square Regression (PLSR) analysis correlates N, P, K contents obtained from both space borne spectra and field spectra. Hyperspectral remote sensing potentials in identifying soil nutrient information at a large scale have not been fully explored. The accuracy will be identified, and statistical prediction models will justify using hyperspectral remote sensing technology alternative to manual soil testing.

Key words: Soil nutrients, Hyperspectral data, Remote sensing, Spectral library

Paper-2

Adoption of Precision Agriculture for Sustainable Paddy Crop: Farmers' perspective on Policy Support in Punjab

Bhiravi Bhiravi

Lovely Professional University, Phagwara, Punjab, India

&

Lokesh Jasrai

Lovely Professional University, Phagwara, Punjab, India

Abstract

Punjab, known as “granary of the country” with a historically coveted status in crop production is facing a dire situation with dwindling agricultural growth rate and declining ecosystem. A contribution of 11% of rice production of the country with only 1.5% of the land has become possible due to tremendous policy support provided under ‘Green Revolution’. An environment of full support to farmers from ‘seeds to sale’ has turned the farmers of Punjab as a progressive lot who take pride in using all sorts of machinery and Agro-chemical support to enhance their production. But the concern is about the sustainability of paddy production which is causing deep impact on resources due to excessive ground water usage, enormous fertilizers and pesticides consumption and fall of profitability due to rising input costs. Also, there is no trend towards adopting sustainable agriculture. A qualitative exploratory research study is undertaken with rice cultivators of Punjab to grasp the reasons towards non-adoption of sustainable methods.

The findings suggest that while farmers have deep trust issues with market forces, yet they have full faith in the government initiatives. There is lack of knowledge and awareness regarding latest technological solutions available besides a lack of proper market infrastructure that credits the merit of sustainable crop. Farmers intend to take up sustainable rice cultivation but only with full government support. The state agricultural university and extension services need to up their game. An institutional support through policy measures can convert the land of Punjab to an ‘Evergreen Revolution state’. The research included scheduled semi-structured interviews with farmers in Punjab using conventional as well as sustainable methods in paddy cultivation. The theoretical base used is decomposed theory of planned behaviour by Taylor and Todd.

Key words: Precision Agriculture, Sustainability, Sustainable Agriculture, Punjab (India), Paddy, Adoption, AI, Sustainable Paddy Crop, Qualitative Analysis, MAXQDA.

Paper-3

ICT in Indian agriculture: Opportunities and challenges

Pushkar Aditya

Tata Institute of social Sciences, Mumbai

Abstract

More than half of the population in India is engaged in agriculture and farming is the most prevalent occupation in India. Significant initiatives have been taken in agriculture sector in India to enhance the use of Information, communication and technology (ICT). Conventional way of doing agriculture has changed and today farmer's can get real time updates about farming practices on their digital devices (Rajput, Gandhi, & Grover, 2021). There has been several initiatives from government and non-government organisations to promote ICT. In this paper flagship schemes like Kisan Call Centers (KCCs) and National Agriculture Market (NAM) has been reviewed. Some of the leading non-government initiatives like Village Knowledge Centre (VKC) are Bhoomi Project, Iksian are discussed.

For farmers who have small land holdings experience issues related to access to available post-harvest provisions. The solution to this is aggregation farmers through Farmer Producer organisations (FPOs). Government initiative of promoting 10,000 FPOs is an important initiative (Beriya, 2021). Although, FPOs are considered an ambitious project but it is yet to be called as a success story.

This paper examines the various applications of ICT in Indian agriculture and also opportunities and challenges associated with it. The approach to this paper is narrative literature review wherein various literature related to the topic has been explored. Various policy documents were reviewed to understand the trajectory of policy making in the sector.

The paper outlines the flagship schemes launched by both government and non-government organizations to boost adoption of ICT initiatives by farmers. The paper highlights the constraints in implementation of ICT. ICT can play a key role in bringing sustainable rural development. ICT can provide farmers information regarding appropriate selection of crops and can give post-harvest advisories which are very critical information for them. The study suggests that current ICT regime in Indian agriculture is government induced and it has some limitations. Some of the limitations are due to digital infrastructure and some are due to overall distress in agriculture sector.

Key words: ICT, Agriculture, Farmer Producer Organization, National Agriculture Market

Paper-4**“Artificial Intelligence and Predictive Analytics”-
Modern IT Tools for Rural Development****V. Gopi Swaminathan**

National Informatics Centre, Puducherry UT

Abstract

India is basically a rural country with two-third of its population living in rural areas. But urban areas have seen a much higher growth rate as compared to rural areas. Despite major population living in rural areas, rural areas contribute to only one-third of the national income. Therefore, reliable monitoring mechanism have to be devised for the sustained growth and development is critical for the rural development. The rural areas require better living standards for sanitation, housing, piped drinking water, and electricity. Better education, health facilities, skills, jobs, and consumption are considered equally crucial for rural population. E-governance is one of the major tool by which the development initiatives at individual and/ or household and/ or community level through e-Governance measures. Digital India Programme of Government of India, harnessing the potential of Information Technology to energise the rural development initiatives. There are several technologies available to support the Government Schemes and programmes catering to the rural areas. The ICT infrastructure of Rural Areas requires digital connectivity with bandwidth, frameworks and tools for monitoring the physical achievements of various visionary programmes, Dashboards for Government to see the results of e-governance systems aiming for economic and social empowerment of people at the Grassroot level.

This paper provides conceptual framework for the application of AI and data analytics with use cases to understand the effectiveness of such technologies. There are already several dashboards which accepts some data relayed through webservices as well as offline updation. But, the rural development requires modern technologies like Artificial Intelligence to enhance the impact of such studies as well as produce actionable points to the rural officers for devising mechanisms to the rural development.

Key words: AI, Rural Development, Digital India Programme, e-Governance (NAM)

Paper-5**Green Economy and its Impact****Nisha Malhotra**

Ranchi University, Ranchi

Abstract

An economy that aims to reduce environmental risks and ecological scarcities and promote sustainable development without harming the environment is known as a green economy. Green Economy basically implies analyzing and addressing driving forces like environmental impacts of subsidies of water, electricity and petrol. It includes analysis of economic impacts of environmental degradation, natural resource depletion as well as identifying economic benefits of environmental management.

The leading environmentalist of United Kingdom prepare a blue print related to development of economy should be least effected to the environment. The term “green economy” first coined by group of leading environmental economist in 1989. It promotes health, wealth, and well-being. It relates to growing our economies in ways that benefit, not sacrifice, social justice and equity as well as the environment. To aim green economy, we should focus decreasing environmental pollution, improve the quality of soil, water and air and also protects environmental.

The Key elements of green economy are efficiency, incentives, transformation, sustainability and inclusion – bringing people and key factors together towards better livelihoods in smarter, cleaner, innovative and more resource efficient economies. Green economy accounts for the environment and the value of natural assets in planning and decision-making, and focuses on the quality and sources of economic growth as opposed to today’s focus on the growth number only. Economic growth is necessary to reduce poverty in low-income countries, but it needs to be socially and environmentally sustainable. There are so many benefits of the Green Economy asimplementing a green economy, which will automatically protect the earth and its animals from destruction to the greatest extent possible, global warming, biodiversity loss, deforestation, desertification, and resource depletion can gradually be halted. A green economy may work to reduce environmental pollution, which would improve the quality of the soil, water, and air while safeguarding the health of the environment. The development of new markets for biofuels and renewable energy sources also contributes to increased economic growth. The creation of new markets has the potential to support competitive advantages internationally if the e markets attract funding through exports and boost domestic sales.

The development of more industries results in more jobs, and more jobs lead to a more stable society because the population will feel secured.

Key words: Sustainability, Green economy, Inclusion, e-markets

Paper-6**Use of Cooking Fuel and the Role of Socio-religious Identity**

Ashi Rooth Stuart
St. John's College, Agra

Abstract

The global health and development agenda includes universal access to improved cooking fuels. The goal was first included in the Millennium Development Goals (MDGs) and then in the Sustainable Development Goals (SDGs). In 2018, approximately 4 billion people (more than half of the world's population) lacked access to modern cooking energy, with 2.75 billion relying on traditional and transitional fuels consisting of wood, charcoal/coal, dung, and crop residues. In India, religious and caste-based identity plays a significant role in determining economic, social, educational, and health outcomes, regardless of income or educational attainment. Therefore, this paper examines the role that social and religious identities play in determining the primary cooking fuels used in Indian households. The research takes place within the larger framework of observing households' progress along the cooking fuel hierarchy. The estimates are based on NFHS-5 (2019-21) data consisting of a sample of 636,699 households. Multinomial probit regression will be used to determine the role of social and religious categories in the choice of cooking fuel.

Key words: Cooking Fuel, Social Category, Religion, Inequality

Paper-7**Role of Information and Communication Technology in Rural Development****Divyanshu Dwivedi**

NABARD

&

Aditya Sharma

NABARD

Abstract

Around two-thirds of the population of our country lives in rural areas, and hence rural development has been a prime concern of the governments and the policy makers over the decades since independence. Farm sector has been central to not just rural development, but entire country's development. The sector is the largest employer of workforce but still faces issues related to agricultural productivity, and low-income levels. ICT can be used to address such issues through providing agricultural extension services, optimizing agriculture supply chains, market linkages, better delivery of government schemes, etc.

The agriculture non-farm sector of the country also contributes substantially to rural income and employment. Yet, the sector faces issues of chronic low productivity, obsolete technology, inadequate resources, inadequate growth, lack of skilled labor force etc. ICT can be used for solving these issues, through skilling of artisans, weavers, informal workers, and providing branding, marketing support, export promotion, etc. Moreover, despite substantial increase in the levels of financial inclusion in the country, majority of the rural population is still reliant on non-institutional sources of credit, which is often on exploitative terms and exorbitant prices. ICT can address this by increasing access to a range of affordable financial services in rural areas for transforming both the farm and the non-farm sector.

This paper tries to enlist such applications of Information and Communication technology primarily in the areas of agriculture and allied sectors, non-farm sector, and financial inclusion for raising the income levels and promoting livelihoods in rural areas. Besides it also covers in brief various applications of ICT in social sectors like health, education, etc., in order to achieve holistic rural development.

Key words: ICT, Rural, Development, Agriculture

Paper-8**Does Democracy Improve the Quality of Life? A Cross-Country Analysis****Atul Kumar**

Jawaharlal Nehru University, New Delhi

&**Nitish Nigam**

Chandragupt Institute of Management Patna

Abstract

The Human Development Report from 2002 places a strong focus on the critical function that institutions and political structures play in the process of fostering human development. It argues that alleviating poverty requires sustained economic growth and necessitates that people have political power. On the other hand, does democratic rule lead to an improvement in the quality of life for the people who live under it? This widely held belief has been called into question by a recent piece of research. Scepticism regarding the role that democracy plays in economic development has been brought about as a result of the dramatic improvement in human development that has taken place in the East Asian countries and the Arab Spring, as well as the persistent wealth disparities and high levels of poverty that exist in democratic nations. In light of this, the purpose of this study is to analyse the connection that has been postulated to exist between democratic political regimes and general human progress around the world. It does so by examining two research questions: (a) Does democracy increase the quality of life for the people living in it? (b) Does the level of human development vary across countries that are located in different regions and have varying levels of income? This study estimates the level of human development by using data from the United Nations Development Program's (UNDP) Inequality-adjusted Human Development Index (IHDI) as well as data from the Economist Intelligence Unit's (EIU) Democracy Index to determine the degree of democracy that is present in each country. The results of the research offer support to the idea that there is a positive link between the levels of the EIU Democracy Index and the IHDI.

Key words: EIU, Human Development, IHDI, Inequality, Institution, Political System

Paper-9**Sustainable Farming Practice by “Land Craft Agro”: A Potential Solution****Arayana Roy**

Chandragupt Institute of Management Patna

Abstract

As the need for sustainable food production grows, conventional farming is being replaced by more creative and sustainable methods in the agriculture industry. The growing issue might be addressed by aquaponics, a mix of hydroponics and aquaculture. This paper intends to give a detailed understanding of the aquaponic system; how it can contribute to sustainable agriculture, what distinguishing features this idea possesses; and what possibilities or options are there that can help uplift the condition of farmers in rural India. The case is based on a company named Land Craft Agro, which has its headquarters in Ichalkaranji, Maharashtra. It was established in 2017 by Mayank Gupta and Lalit Jhwar, both IIT graduates, who shared the desire to work toward sustainable farming solutions with the goal of securing national and international food security. Future food production will be completely changed by Land Craft Agro's innovative sustainable agricultural methods. These techniques create superior organic produce while using few resources. Farming is done in a sustainable setup where fish and plants work in a close relationship to sustain each other. The study analyses data available from articles published on websites, the internet, journals, newspapers, and social media platforms. Proposed findings will illuminate the advantages of sustainable farming over conventional farming and how resources can be used effectively, which would be cost-efficient as well as future-oriented.

Key words: Sustainable agriculture, Aquaponic, Innovations in Agriculture

Paper-10

Appropriate Technologies for Rural India

Dr. Jay Dev Banerjee

Abstract

Nowadays rural India is suffering from various deficiencies like power, water, health facilities, roads etc these are known and recognized. However, the role of technology in rural areas is at best marginal. The so-called digital divide is widely spoken and written about; the technology divide is hardly mentioned. Yet, this disparity is arguably more important, as it has far greater impact. Agriculture is the backbone of rural economy which also provides sustenance to over half the country population. Science and research have played important roles in increasing yields.

The green revolution of the 1970s was in fact, powered by the scientific work in various agricultural research institutions. While some fault the green revolution for excessive exploitation of water and land resources and over- use of fertilisers. It did bring about a wheat surplus and prosperity in certain pockets of the country. Now it is time for technology to play its role in transforming rural India.

The scope to apply technology to both farm and non-farm activities in rural areas is huge, as are the potential benefits. In irrigated areas managing the release and distribution of water is critical for maximizing production. Sophisticated power transmission systems use information and communication technologies to effectively optimize and monitor the distribution of electricity.

Information related to commodity prices, transportation, agricultural practices, weather etc are crucial for the farmer. Technology can now provide this easily and instantaneously at a village.

Power is a key requirement in rural areas for agricultural as well as non-agricultural and domestic uses. Technology is now capable of providing reliable power at comparatively low cost in a decentralized manner. The government of India has provides subsidies on purchasing electric motor, pumping set, tractor etc for cultivation.

Key words: Agriculture, Appropriate Technologies, Information, Power

Paper-11**Exploring Challenges and Opportunities Associated with Tissue Culture Technology****Vishal Singh**

Indian Institute of Technology Patna

&

Avi Karan

Chandragupt Institute of Management Patna

Abstract

Bihar produces approximately 6 percent of banana produced in India and stands at 7th place in overall banana production in India. Bihar has a coverage of 30,000 Hectares (Ha) under banana plantation with approximately 90 million plants of which 70 percent are of sucker type and about 30 percent are of tissue culture type. Total production of banana in Bihar is slightly less than 2 million metric tonnes (MT) per year. Major banana growing region are Bhagalpur and Purnea districts of Eastern Bihar and Vaishali and Muzaffarpur districts of western Bihar. To further enhance the production capacity, several interventions including non-technical and technical services have been employed in the past. However, challenges like non availability of high quality tissue culture plants, non-availability of post-harvest infrastructure, low accessibility to credit providers, underdeveloped markets, diseases and pests, and general knowledge gap still plague banana production in the state. Furthermore, our understanding of the benefits and challenges posed to banana farmers by these interventions is limited.

The purpose of this study is to understand the challenges and opportunities associated with introduction of tissue culture plant intervention in the two blocks, Naugachhia and Thana Bihpur of Bhagalpur district in Bihar. We conducted action research at the community and farm level using appropriate technology (audio-visual inputs using mobile based application) followed by qualitatively exploring farmers' motivations to employ tissue culture interventions and associated smart farming techniques in the future using semi-structured interviews. Based on our study with 40 farmers, we conclude that farmers consider the size of fruit loom of Robusta variety (native fruit) larger than that of tissue culture plants. Also, according to studied farmers' response, the native sucker is less susceptible to diseases like Panama Wilt unlike TC plants. Culture, Robusta, Grand naine

Overall, farmers of the studied region believe that their income per unit area has decreased after usage of TC plants. Thus, it is required to revisit the prior findings of better produce and higher disease resistance from tissue culture seedlings based on quantitative investigation with larger sample in future. Also, influence of other farm based inputs (e.g. drip irrigation, loom cover, crop input

scheduling etc.) along with tissue culture plants is required for technological interventions.

Key words: Banana, Agri-technology, Smart Farming, Tissue Culture, Robusta, Grand naine

Paper-12

Agrifeeder: A one stop solution Provider to Farmers

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Abstract

The case is on a company named 'Agrifeeder'. It is a Bihar-based start-up, located in a Pirpainti village in Bhagalpur District. It was founded in 2017 by two brothers, Raman and Rounak, to provide agricultural assistance and support to farmers. Coming from an agricultural background, both were well known about the complexity farmers face in Bihar. In Bihar, a substantial number of farmers are small and marginal and do not have excess income to invest in improving the standard of living. Their finding showed that farmers are unaware of the government's policies (like crop insurance, MSP, Free seeds, etc.). There is a long chain between the farmer and manufacturer/ end consumer with many mediators pocketing the profits.

The outbreak of the COVID-19 pandemic at the beginning of 2020 radically changed the business landscape. Due to restrictions imposed on the movement of men/ material and the closure of the shops and market, there was a sharp decline in the demand for various herbs being promoted by the Company. After the assessment, the Management team decided to focus on immunity booster herbal tea and launched its first product "Lemongrass tea" in two flavors (ginger and cardamom) in June 2020.

Dilemma: The Company's difficulty is related to building an effective distribution channel. The most decisive aspect of their business was to make product available for customers on time with minimal cost. The start-up had limited capital, so they needed to get the distribution strategies in order to contribute strongly to customer value and create maximum sales quickly.

Key words: Entrepreneurship, Agricultural, Distribution channel, word of mouth, referral.

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