Mobile Journalism

For Extension Professionals

Edition 2024

Edited by

V. K. Jayaraghavendra Rao, Srinivasacharyulu Attaluri

N R Sharma

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ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru

&

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This e-book is a compilation of resource text obtained from various subject experts for Collaborative Online Training Programme of ICAR-Indian Institute of Horticultural Research, Bengaluru & MANAGE, Hyderabad entitled “Mobile Journalism” from 04-06 December, 2024. This e-book is designed to educate extension workers, students, research scholars, academicians related to horticulture and extension methodologies for promotion of mobile journalism, for value addition and doubling farmer’s income. Neither the publisher nor contributors, authors and editors assume any liability for any damage or injury to persons or property from any use of methods, instructions, nor ideas contained in an e-book. No part of this publication may be reproduced or transmitted without prior permission of the publisher/editor/authors. Publisher and editor don’t give warranty for any error or omissions regarding the materials in this e-book.

Published for Director General, National Institute of Agricultural Extension Management (MANAGE), Hyderabad, India by Dr. Srinivasacharyulu Attaluri, Deputy Director, MANAGE and printed at MANAGE, Hyderabad as e-publication.

MESSAGE FROM DIRECTOR

National Institute of Agricultural Extension Management (MANAGE), Hyderabad, is an autonomous organization under the Ministry of Agriculture & Farmers Welfare, Government of India. The policies of liberalization and globalization of the economy, coupled with increasingly sophisticated and complex agricultural technologies, necessitated major initiatives to reorient and modernize the agricultural extension system. MANAGE was established in response to this imperative need to evolve effective ways of managing the extension system and enabling extension organizations to transform the existing setup through professional guidance and training of critical manpower.

Agricultural extension, to be effective, demands sound technological knowledge among extension functionaries. Therefore, MANAGE has focused on organizing training programs on technological aspects in collaboration with ICAR institutions and State Agriculture/Horticulture Universities, which have the expertise and facilities to conduct technical training programs for extension functionaries of the State Horticulture Department.

In India, the horticulture sector significantly contributes to the nutritional security of farmers and ensures a steady income. Additionally, the export earnings from horticulture products and their value addition contribute substantially to the national income. Farm women have played a pivotal role in expanding the agricultural sector through their involvement in farming, post-harvest management, horticultural crop production, livestock management, fisheries, natural resource management, and homestead resources. However, persistent gender disparity in resource access and control remains a significant issue, hindering inclusive and sustainable growth while trapping women in cycles of poor productivity.

In this context, India has implemented the National e-Governance Plan in Agriculture (NeGP-A) across the country, aiming to provide farmers with free information on seeds and other agricultural inputs. Moreover, a draft National Policy for Farmers was prepared under the leadership of Prof. M.S. Swaminathan, Chairman of the National Commission of Farmers (NCF). It is a pleasure to note that, Indian Institute of Horticultural Research, Bengaluru and MANAGE, Hyderabad is organizing a collaborative training program entitled “Mobile Journalism” from 04-06 December, 2024 and coming up a joint publication as e- book as immediate outcome of the training program.

I wish the program to be purposeful and meaningful to its participants, and I hope the e-book proves beneficial to stakeholders across the country. I extend my best wishes for the success of the program and wish the Indian Institute of Horticultural Research, Bengaluru, many more glorious years of service to Indian agriculture and allied sectors, ultimately benefiting farmers. I would also like to compliment the efforts of the Program Coordinators of MANAGE, Hyderabad, and ICAR-IIHR, Bengaluru, for this valuable publication.

Dr. Saravanan Raj
Director (Agril. Extension), MANAGE

FOREWORD

India is one of the fastest growing economies in the world. Agriculture though contributes less than one sixth to the national economy, agriculture employs about half of the population directly or indirectly. Horticulture expansion can make a significant contribution to agricultural growth. To enhance the farmer's income, ensure nutritional security, and reduce the post-harvest losses of horticultural produce, mainly fruits, and vegetables, it is essential to promote horticulture based entrepreneurial development. Horticulture presents numerous avenues available for entrepreneurship activities. In this regard ICAR-Indian Institute of Horticultural Research, Hessaraghatta, Bengaluru has commercialised more than 300 technologies through technology transfer, horti-preneurship, development of value-added products for domestic and export through training, business incubation and acceleration.

Digital agriculture/horticulture uses various technologies along the agricultural value chain. The goal is to leverage Information and Communication Technologies (ICT) along with data ecosystems to provide timely, targeted information and services for profitable and sustainable farming, ensuring the production of safe, nutritious, and affordable food. In this context, mobile journalism plays a crucial role in creating, collecting, editing, and customizing multimedia content for stakeholders with minimal literacy levels and tacit knowledge. Digital agriculture aims to institutionalize farming with technologies like sensors, drones, GPS, and machine learning. ICAR-IIHR, Bengaluru, introduced ARKA BAGWANI and web applications & ARKA VYAPAR for data-driven, digital agriculture. Challenges include content development and mobile accessibility, requiring a strategic action plan.

Developing a mobile journalism workforce is crucial for effective knowledge transfer. MANAGE and ICAR-IIHR's training benefits participants across the country. Congratulations to them and the course leaders for advancing digital agriculture's benefits for farmers and horticulture stakeholders.

Tushar Kanti Behera
Director, ICAR-IIHR, Bengaluru

PREFACE

This e-book is an outcome of collaborative training program on “Mobile Journalism” from 04-06th 2024. The editors’ main aim is to provide insights to all extension workers, faculties, researchers and students about developing Mobile Journalism concept, process, methodology, framework for effective and efficient delivery through various platforms and networks, including 5G. In India with 6, 48, 000 villages spread over a large area, spreading technology is a challenge, as physical contact through various technological processes is costly and time consuming, in this direction Mobile Journalism, protocols and processes comes as a panacea. To establish this new procedure the book helps Mobile Journalism practitioners to get a gainful insight and exposure to perform this technologically advanced task

The editors felt that all the experience of resource persons of this training should be integrated together for the unique proposition on Mobile journalism. Horticultural science has technologies which have different magnitudes, scale and direction coordinating both subjects from a common point was indeed a challenging job. The experts and resource persons in Mobile Journalism contributed immensely and tirelessly to develop various chapters of this e-book in very short span of time. They all deserve applaud. The editors extend their sincere thanks to all the experts who have contributed valuable time and put sincere efforts to produce this e-book.]

The editors also thank MANAGE, Hyderabad for the financial support to the training program. The editor’s expresses the gratitude towards the Director, ICAR-IIHR for the constant encouragement for this training and e-book creation for the participants. The editors hope that this e-book will help participants as well as other extension people across the country to gain valuable information on Mobile journalism process, methods and standard protocols.

V.K. Jayaraghavendra Rao
Srinivasacharyulu Attaluri
N R Sharma

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Chapter-1

Mobile Journalism – Foundations for Digital Agriculture

[1]Dr. V. K. Jayaraghavendra Rao

Introduction

Mobile Journalism (MoJo) is a form of digital reporting where trained journalists use mobile devices to gather news. A mobile device refers to a Smart phone or a Tablet with iOS or Android operating systems. Reporters use mobile devices as tools to shoot, edit and broad cast then ews contents. Media persons have become more mobile and independent in executing their assignments using Smart phones. It is gradually gaining popularity among reporters and news organisations as it helps the organisations to spend less on hiring crew and on expensive equipment.

MoJo is cost-effective as smart phones are more convenient compared to the traditional cameras that are heavy and require additional manpower to operate. Sometimes, it is not possible to send Outside Broadcast Vans (OBV) to cover news-breaks at several spots at the same time. It is during such situations that smart phones come handy for timely coverage of news occurrences. As smart phones are thoroughly equipped within-built audio video settings with different MoJo apps, reporters can easily shoot, edit and upload their news contents on the web or to their organisation.

Digital agriculture scheme in India

India is implementing **National e-Governance Plan in Agriculture (NeGP-A)** in the entire country aiming to provide information to farmers free of cost on seeds, 1 A draft National Policy for farmers was prepared by Chairman of National Commission of Farmers (NCF), Prof. M.S. Swaminathan.

Role of Mobile Journalism in Digital Agriculture

Digital agriculture encompasses a wide range of technologies, most of which have multiple applications along the agricultural value chain. These technologies include, but are not limited to: Cloud computing/big data analysis tools. Artificial intelligence. Machine learning.

Digital Agriculture is “ICT (Information and Communication Technologies) and data ecosystems to support the development and delivery of timely, targeted information and services to make farming profitable and sustainable while delivering safe nutritious and affordable food for all., it is here that mobile journalism plays an important role in creating, gathering, collating, editing and customizing multimedia rich content to be streamed on mobiles to stake holders whose literacy levels are minimum, and those who have tacit knowledge and not explicit knowledge, nevertheless who are consumers of this information through mobile platforms to sustain the evergreen revolution through improved knowledge management.

Therefore, Digital Agriculture aims at institutionalizing Digital farming as an approach to farming that uses digital technologies, such as sensors, drones, GPS mapping, and machine

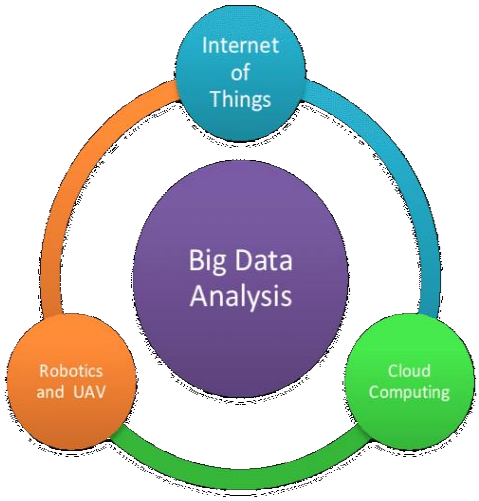
learning to optimize agricultural production. Already IFFCO Kisan has come out with the KRISHI DEV GYAN app for data driven, digital agriculture and provides information service and support through this app.

Impact of digitalization in agriculture

AI currently helps farmers increase yield by assisting them in choosing better crops, hybrid seeds, and resource-efficient farming techniques. It is also utilized to improve farming productivity and accuracy to assist farmers in creating seasonal forecasting models.

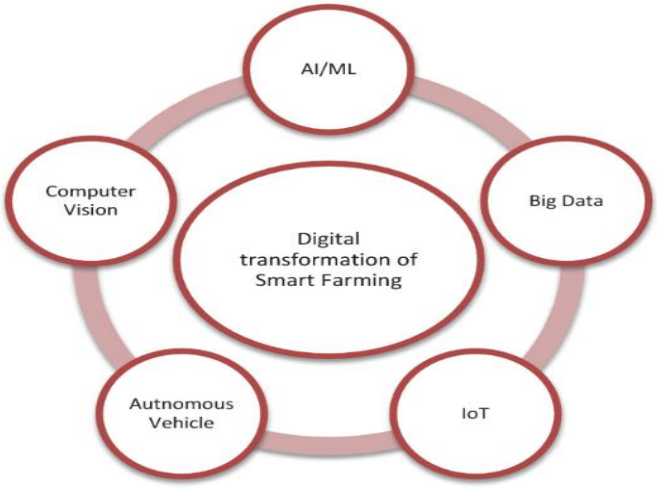
Components of digital agriculture

Agriculture 4.0 technologies like the internet of things, machine learning, unmanned aerial vehicles, big data analytics, robotics, and artificial intelligence can benefit all stages and processes of the agricultural production chain.



Internet of Things in digital agriculture

IOT TECHNOLOGIES IN AGRICULTURE. IoT smart agriculture products are designed to help monitor crop fields using sensors and by automating irrigation systems. As a result, farmers and associated brands can easily monitor the field conditions from anywhere without any hassle. E.g., ***KRISHI DEV GYAN*** app of IFFCO



How AI help agriculture

The growth of the global population, which is projected to reach 10 billion by 2050, is placing significant pressure on the agricultural sector to increase crop production and maximize yields. To address looming food shortages, two potential approaches have emerged: expanding land use and adopting large-scale farming, or embracing innovative practices and leveraging technological advancements to enhance productivity on existing farmland

Pushed by many obstacles to achieving desired farming productivity — limited land holdings, labour shortages, climate change, environmental issues, and diminishing soil fertility, to name a few, — the modern agricultural landscape is evolving, branching out in various innovative directions. Farming has certainly come a long way since hand plows or horse-drawn machinery. Each season brings new technologies designed to improve efficiency and capitalize on the harvest. However, both individual farmers and global agribusinesses often miss out on the opportunities that artificial intelligence in agriculture can offer to their farming methods.

MOJO has been successfully implementing real-life technological solutions. With focus on developing innovative systems for quality control, traceability, compliance practices, and more. Now, we will dive deeper into how new technologies can help your farming business move forward.

Until recently, using the words AI and agriculture in the same sentence may have seemed like a strange combination. After all, agriculture has been the backbone of human civilization for millennia, providing sustenance as well as contributing to economic development, while even the most primitive AI only emerged several decades ago. Nevertheless, innovative ideas are being introduced in every industry, and agriculture is no exception. In recent years, the world has witnessed rapid advancements in agricultural technology, revolutionizing farming practices. These innovations are becoming increasingly essential as global challenges such as climate change, population growth together with resource scarcity threaten the sustainability of our food system. Introducing AI solves many challenges and helps to diminish many disadvantages of traditional farming.

Data-based decisions

The modern world is all about data. Organizations in the agricultural sector use data to obtain meticulous insights into every detail of the farming process, from understanding each acre of a field to monitoring the entire produce supply chain to gaining deep inputs on yields generation process. AI-powered predictive analytics is already paving the way into agribusinesses. Farmers can gather, then process more data in less time with AI. Additionally, AI can analyse market demand, forecast prices as well as determine optimal times for sowing and harvesting.

Artificial intelligence in agriculture can help explore the soil health to collect insights, monitor weather conditions, and recommend the application of fertilizer and pesticides. Farm management software boosts production together with profitability, enabling farmers to make better decisions at every stage of the crop cultivation process.

Cost savings

Improving farm yields is a constant goal for farmers. Combined with AI, precision agriculture can help farmers grow more crops with fewer resources. AI in farming combines the best soil management practices, variable rate technology, and the most effective data management practices to maximize yields while minimizing minimize spending.

Application of AI in agriculture provides farmers with real-time crop insights, helping them to identify which areas need irrigation, fertilization, or pesticide treatment. Innovative farming practices such as vertical agriculture can also increase food production while minimizing resource usage. Resulting in reduced use of herbicides, better harvest quality, higher profits alongside significant cost savings.

Automation impact

Agricultural work is hard, so labour shortages are nothing new. Thankfully, automation provides a solution without the need to hire more people. While mechanization transformed agricultural activities that demanded super-human sweat and draft animal labour into jobs that took just a few hours, a new wave of digital automation is once more revolutionizing the sector.

Automated farm machinery like driverless tractors, smart irrigation, fertilization systems, IoT-powered agricultural drones, smart spraying, vertical farming software, and AI-based greenhouse robots for harvesting are just some examples. Compared with any human farm worker, AI-driven tools are far more efficient and accurate.

Applications of artificial intelligence in agriculture

The AI in agriculture market is expected to grow from USD 1.7 billion in 2023 to USD 4.7 billion by 2028, according to Markets and Markets.

Traditional farming involves various manual processes. Implementing AI models can have many advantages in this respect. By complementing already adopted technologies, an intelligent agriculture system can facilitate many tasks. AI can collect and process big data, while determining and initiating the best course of action. Here are some common use cases for AI in agriculture:

Optimizing automated irrigation systems

AI algorithms enable autonomous crop management. When combined with IoT (Internet of Things) sensors that monitor soil moisture levels and weather conditions, algorithms can decide in real-time how much water to provide to crops. An autonomous crop irrigation system is designed to conserve water while promoting sustainable farming practices.

Detecting leaks or damage to irrigation systems

AI plays a crucial role in detecting leaks in irrigation systems. By analysing data, algorithms can identify patterns and anomalies that indicate potential leaks. Machine learning (ML) models can be trained to recognize specific signatures of leaks, such as changes in water flow or pressure. Real-time monitoring and analysis enable early detection, preventing water waste together with potential crop damage.

AI also incorporates weather data alongside crop water requirements to identify areas with excessive water usage. By automating leak detection and providing alerts, AI technology enhances water efficiency helping farmers conserve resources.

Crop and soil monitoring

The wrong combination of nutrients in soil can seriously affect the health and growth of crops. Identifying these nutrients and determining their effects on crop yield with AI allows farmers to easily make the necessary adjustments.

While human observation is limited in its accuracy, computer vision models can monitor soil conditions to gather accurate data. This plant science data is then used to determine crop health, predict yields while flagging flag any particular issues.

In practice, AI has been able to accurately track the stages of wheat growth and the ripeness of tomatoes with a degree of speed and accuracy no human can match.

Detecting disease and pests

As well as detecting soil quality and crop growth, computer vision can detect the presence of pests or diseases. This works by using AI to scan images to find mold (fungal), rot, insects, or other threats to crop health. In conjunction with alert systems, this helps farmers to act quickly in order to exterminate pests or isolate crops to prevent the spread of disease.

AI has been used to detect apple black rot with an accuracy of over 90%. It can also identify insects like flies, bees, moths, etc., with the same degree of accuracy. However, researchers first needed to collect images of these insects to have the necessary size of the training data set to train the algorithm with.

Monitoring livestock health

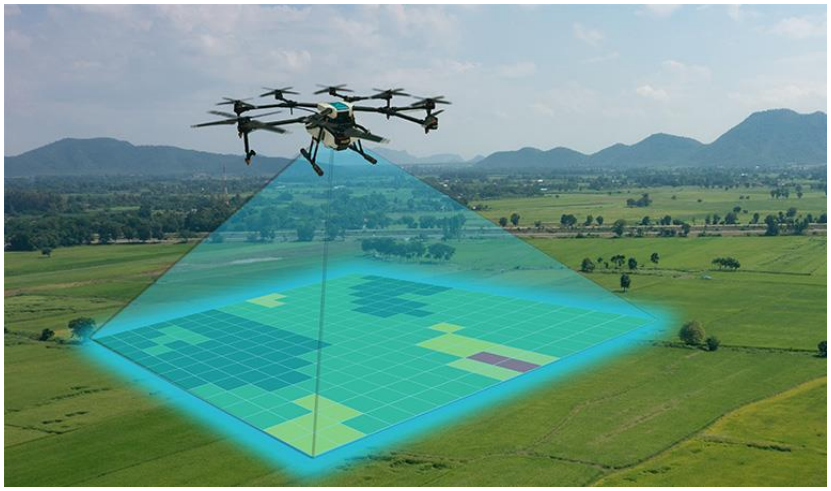
It may seem easier to detect health problems in livestock than in crops, in fact, it's particularly challenging. Thankfully, AI can help with this. For example, a company called Cattle Eye has developed a solution that uses drones, cameras together with computer vision to monitor cattle health remotely. It detects atypical cattle behaviour and identifies activities such as birthing.

Cattle Eye uses AI and ML solutions to determine the impact of diet alongside environmental conditions on livestock and provide valuable insights. This knowledge can help farmers improve the well-being of cattle to increase milk production.

Intelligent pesticide application

By now, farmers are well aware that the application of pesticides is ripe for optimization. Unfortunately, both manual and automated application processes have notable limitations. Applying pesticides manually offers increased precision in targeting specific areas, though it might be slow and difficult work. Automated pesticide spraying is quicker and less labour-intensive, but often lacks accuracy leading to environment contamination.

AI-powered drones provide the best advantages of each approach while avoiding their drawbacks. Drones use computer vision to determine the amount of pesticide to be sprayed on each area. While still in infancy, this technology is rapidly becoming more precise.



Yield mapping and predictive analytics

Yield mapping uses ML algorithms to analyse large datasets in real time. This helps farmers understand the patterns and characteristics of their crops, allowing for better planning. By combining techniques like 3D mapping, data from sensors and drones, farmers can predict soil yields for specific crops. Data is collected on multiple drone flights, enabling increasingly precise analysis with the use of algorithms.

These methods permit the accurate prediction of future yields for specific crops, helping farmers know where and when to sow seeds as well as how to allocate resources for the best return on investment.

Automatic weeding and harvesting

Similar to how computer vision can detect pests and diseases, it can also be used to detect weeds and invasive plant species. When combined with machine learning, computer vision analyses the size, shape, and colour of leaves to distinguish weeds from crops. Such solutions can be used to program robots that carry out robotic process automation (RPA) tasks, such as automatic weeding. In fact, such a robot has already been used effectively. As these technologies become more accessible, both weeding and harvesting crops could be carried out entirely by smart bots.

Sorting harvested produce

AI is not only useful for identifying potential issues with crops while they're growing. It also has a role to play after produce has been harvested. Most sorting processes are traditionally carried out manually however AI can sort produce more accurately.

Computer vision can detect pests as well as disease in harvested crops. What's more, it can grade produce based on its shape, size, and colour. This enables farmers to quickly separate produce into categories — for example, to sell to different customers at different prices. In

comparison, traditional manual sorting methods can be painstakingly labour-intensive. One of the IIHR incubated companies Zentron who works on sensor based screening of Alphonso mangoes for fruit fly has become a UNICORN

Surveillance

Security is an important part of farm management. Farms are common targets for burglars, as it's hard for farmers to monitor their fields around the clock. Animals are another threat — whether its foxes breaking into the chicken coop or a farmer's own livestock damaging crops or equipment. When combined with video surveillance systems, computer vision and ML can quickly identify security breaches. Some systems are even advanced enough to distinguish employees from unauthorized visitors.

Role of AI in the agriculture information management cycle

Managing agricultural data with AI can be beneficial in many ways:

Risk management
Predictive analytics reduces errors in farming processes.

Plant breeding AI utilized plant growth data to further advice on crops that are more resilient to extreme weather, disease or harmful pests.

Soil and crop health analysis
AI algorithms can analyse the chemical composition of soil samples to determine which nutrients may be lacking. AI can also identify or even predict crop diseases.

Crop feeding
AI in irrigation is useful for identifying optimal patterns and nutrient application times, while predicting the optimal mix of agronomic products.

Harvesting
AI is useful for enhancing crop yields and can even predict the best time to harvest crops.

Optimizing AI for agriculture and agricultural processes

While the benefits of AI in agriculture are vivid, it can't function without other digital technologies already in place such as big data, sensors, and software. Likewise, other technologies need AI for them to work properly. In the case of big data, the data itself is not particularly useful. What matters is how it's processed and implemented.

Big data for informed decision-making
Combining AI with big data analytics allows farmers to get recommendations based on accurate, real-time information, thereby increasing productivity hence reducing costs.

IoT sensors for capturing and analysing data
IoT sensors together with other supporting technologies (AI drones, GIS, and other tools) can monitor, measure, and store training data on various metrics in real time. By combining these devices with AI, farmers can obtain accurate information quickly.

Intelligent automation and robotics for minimizing manual work
AI combined with autonomous tractors and IoT helps to solve the common problem of labour shortages. Robotics are also important — agricultural robots are already being used for manual tasks like produce picking. Robots are more advantageous for farm work purposes due to their ability to work longer hours, enhanced precision on top of reduced susceptibility to errors.

Challenges of AI in agriculture

Stake holders perceive AI as something that applies only to the digital world, with no relevance to physical farming tasks. This assumption is usually based on a lack of understanding of AI tools. Most people don't fully understand how AI works, especially those in non-tech-related sectors, leading to slow AI adoption across the agricultural sector. Although agriculture has seen countless developments in its long history, many farmers are more familiar with traditional methods. A vast majority of farmers are unlikely to have worked on projects that involved AI technology.

Also, AgTech providers often fail to clearly explain the benefits of new technologies and how to implement them. A huge amount of work must be done by technology providers to help people understand the application of AI in agriculture. Considering the benefits of artificial intelligence for sustainable farming, implementing this technology may look like a logical step for every farmer. However, there are still some challenges to overcome.

Large upfront costs

While AI solutions can be cost-effective in the medium-to-long-term, there's no escaping the fact that the initial investment can be very expensive. With many farms and agribusinesses struggling financially, adopting AI may be impossible for the time being, especially in the cases of small-scale farmers and those in developing countries. However, the cost of implementing AI may drop as technologies develop. Businesses also have the opportunity to explore funding resources such as government grants or private investment.

Reluctance to embrace new technologies and processes

Unfamiliarity often makes people hesitant to adopt new technologies creating difficulties farmers to fully embrace AI, even when it offers undeniable benefits. Resistance to innovation alongside some reluctance to take a chance on new processes hold back the farming methods development as well as the sector's profitability in general. Farmers need to understand that AI is only a more advanced version of simpler technologies for field data processing. To convince agricultural workers to embrace AI, the public and private sectors should provide motivation, resources, and training. Governments must also develop the regulations needed to assure workers that the technology is not a threat.

Lack of practical experience with new technologies

Aspects of the agricultural industry differ in their technological advancement around the world. Some regions could leverage all the benefits AI, though there are some hurdles in countries where next-gen agricultural technology is uncommon. Technology companies hoping to do business in regions with emerging agricultural economies may need to take a proactive approach. In addition to providing their products, they must offer training and ongoing support for farmers and agribusiness owners who are ready to take on innovative solutions.

A lengthy technology adoption process

In addition to a lack of understanding and experience, the agricultural sector generally lacks the infrastructure needed for AI to work. Even farms that already have some technology in place may find it difficult to move forward. Infrastructure is also a challenge for AgTech providers and software companies. One of the main ways to overcome this is by approaching farmers gradually: for instance, offering the use of simpler technology first, such as an agricultural trading platform. Once farmers get used to a less complicated solution, providers can add additional tools and features.

Technological limitations

As AI is still developing, the technology will have constraints. Accurate models depend on diverse, high-quality data, which can be scarce in agriculture. For robots with sensors, limitations can make adapting to changing farming environments difficult. Overcoming these limitations requires ongoing research and analysis of data. Farmers should also remain involved with decision-making rather than entirely handing control over to AI. Monitoring AI decisions manually is likely to be useful during the early stages of adoption.

Privacy and security issues

There is still a general lack of regulations relating to the use of AI across all industries. Particularly, implementing AI in precision agriculture and smart farming raises various legal questions. For example, security threats like cyber-attacks and data leaks may cause farmers serious problems. It's even conceivable that AI-based farming systems could be targeted by hackers with the aim of disrupting food supplies.

Role of AI software development, ChatGPT or MOJO for content development?

The implementation of AI in agriculture opens up quite a lot of business opportunities for the industry in general and for individual farmers in particular. The technology requires deep understanding together with a well-crafted approach, though. There is no need to stay alone on the way to transformation. MOJO helps agricultural businesses and AgTech start-ups like Zentron a unicorn mentored by IIHR in screening fruit fly affected Alphonso mangoes for screening, create complete technology ecosystems around their agribusinesses. We leverage our accumulated expertise in various industries to enhance our agricultural technology advisory and software development services, enabling us to collaboratively create scalable customer-oriented digital products with our clients.

Digital Agriculture makes innovation tangible from idea validation through proof of concept to market feedback. By applying data analytics, cloud services, AI automation tools as well as location intelligence, we ensure that AgTech products improve not just ROI but also the agricultural practices and lives of farmers.

Pooling experiences enables Digital Agriculture and MOJO to tailor custom solutions to meet the unique requirements to take your business to the next level. Agricultural technologies and domain experts will help MOJO build custom farm management systems, indoor vertical farming solutions, as well as precision agriculture aerial drone analytics systems. For livestock farming, technology solutions for livestock management, behaviour monitoring, and health tracking are key issues in digital agriculture

Crop management software for sustainable farming

Digital Agriculture collaborations is to develop a crop management software platform that helps growers comply with GAP certifications. MOJO tries to bridge this gap through developing relevant content.

The resulting solution includes a soil health management application for risk assessment and analysis, so that farmers can evaluate field conditions and mitigate risks. It also helps crop chemical manufacturers assess and control the impact of their operations.

Unified farm management system

Another AI project, MOJO helps revamp the record-keeping software. For a comprehensive farm management platform.

This platform included tools for crop rotation, weather analysis, disease management, satellite imagery analysis, drill/soil mapping together with operations planning, resulting in a solution that empowers farmers to monitor and optimize their operations, enhance yields hence make informed decisions for sustainable farming. Although the cost of implementing AI can vary widely depending on the scope of the project, it is likely to turn into a profitable investment.

Future of AI through MOJO in agriculture?

AI through MOJO is sure to play an increasingly large role in agriculture and food sustainability over the coming years. Technology has always been at the forefront of agriculture, from primitive tools to irrigation to tractors to AI. Each development has increased efficiency while reducing the challenges of farming.

More importantly, the benefits of AI in agriculture are undeniable. Smart farming tools, intelligent automation, and AI-powered products perform repetitive time-consuming tasks so workers can use their time for more strategic operations that require human judgment. Increasingly affordable computer vision alongside agricultural robotics have the potential to accelerate AI advancement in farming.

AI has the tools to address the challenges posed by climate change, environmental concerns, and an increasing demand for food. It will revolutionize modern agriculture by improving efficiency, sustainability, resource allocation on top of real-time monitoring for healthier and higher-quality produce.

However, you can't just buy AI and start using it. AI is not something tangible — it's a set of technologies that are automated through programming. In essence, an AI algorithm mimics the way people think — it learns first, then solves problems based on data. AI-driven transformation of agriculture will require changes in the industry. Farmers need to be educated and trained in how to use AI-powered solutions.

What does this mean for workers in the agricultural industry? AI is likely to change the role of farmers from manual workers to the planners and overseers of smart agricultural systems. An understanding of IT solutions and agribusiness intelligence will potentially become more useful than the ability to use conventional tools or carry out physical labour.

Despite AI and machine learning having the potential to radically transform farming, they need other technologies to work in sync. To reap all the benefits of AI, farmers first need a technology infrastructure. It could take years to develop that infrastructure, but doing so could result in a robust, future proof technology ecosystem. Understanding how AI works and how best to integrate technical knowledge into real-life processes is vital for maximizing its benefits. That's why partnering with an expert software development team is an excellent first step. Providers of AgTech solutions have an important role to play. Each must consider how they can improve their tools, address challenges, and clearly convey the measurable benefits

of AI and machine learning. If this can be achieved, the future of AI in agriculture is bound to be fruitful.

The success of human society is essentially dependent on the optimization of its agricultural systems. Traditional farming methods are becoming outdated, need for advanced technological solutions. Worldwide, the impact of automation on industries has always been considerable. Digital technology is now playing a huge role in transforming agriculture, and the impact of artificial intelligence in agriculture is set to be vast.

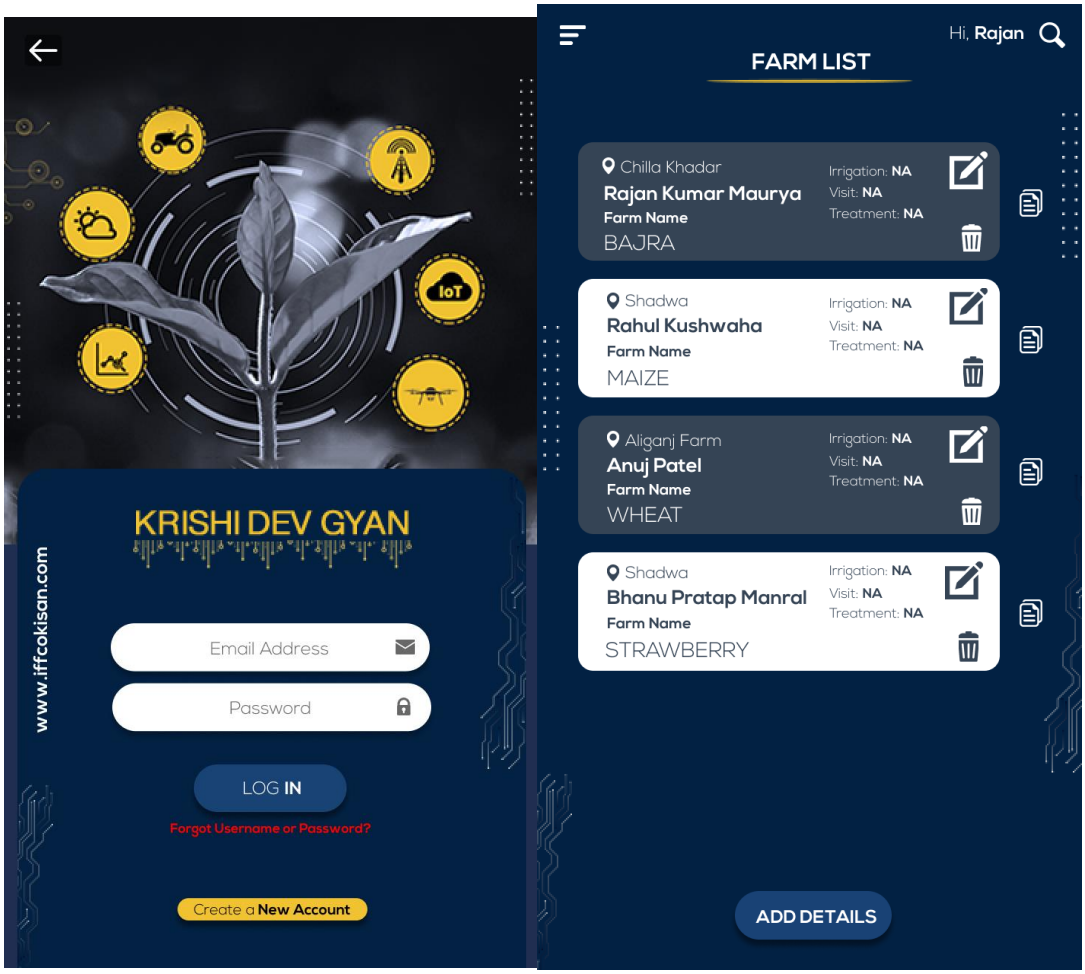
Looking for ways to implement AI in your farming operations? Let's discuss. Get in touch with our agricultural experts and take the next big step towards a sustainable future.

With a deep understanding of business processes as well as agile and waterfall methodologies, Dmytro is able to adjust workflows in agricultural projects and can quickly grasp business requirements to apply the right technology.

Monitoring Technologies to Save Crops from adverse Weather

The three main technologies that contribute to the development of intelligent weather monitoring for agriculture are **smart IoT sensors to collect and analyse data, satellites and weather stations, and AI and machine learning systems for weather predictions e.g., Krishi dev Gyan app of IFFCO**


Sensors mapping
Sensors data
GPS data
Crops forecasting models
BI dashboard
Weather precision data
AI algorithms
Satellite data
Input from open communities
Aerial images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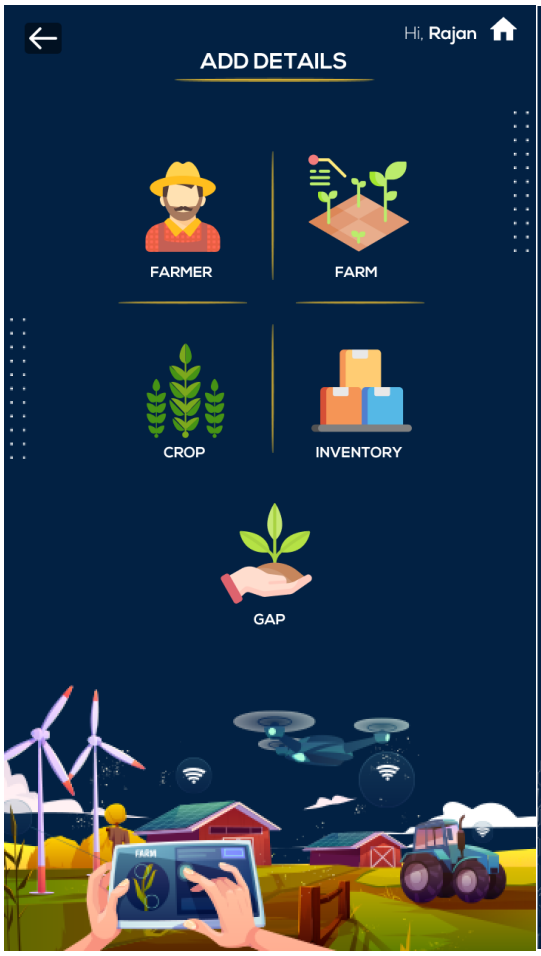
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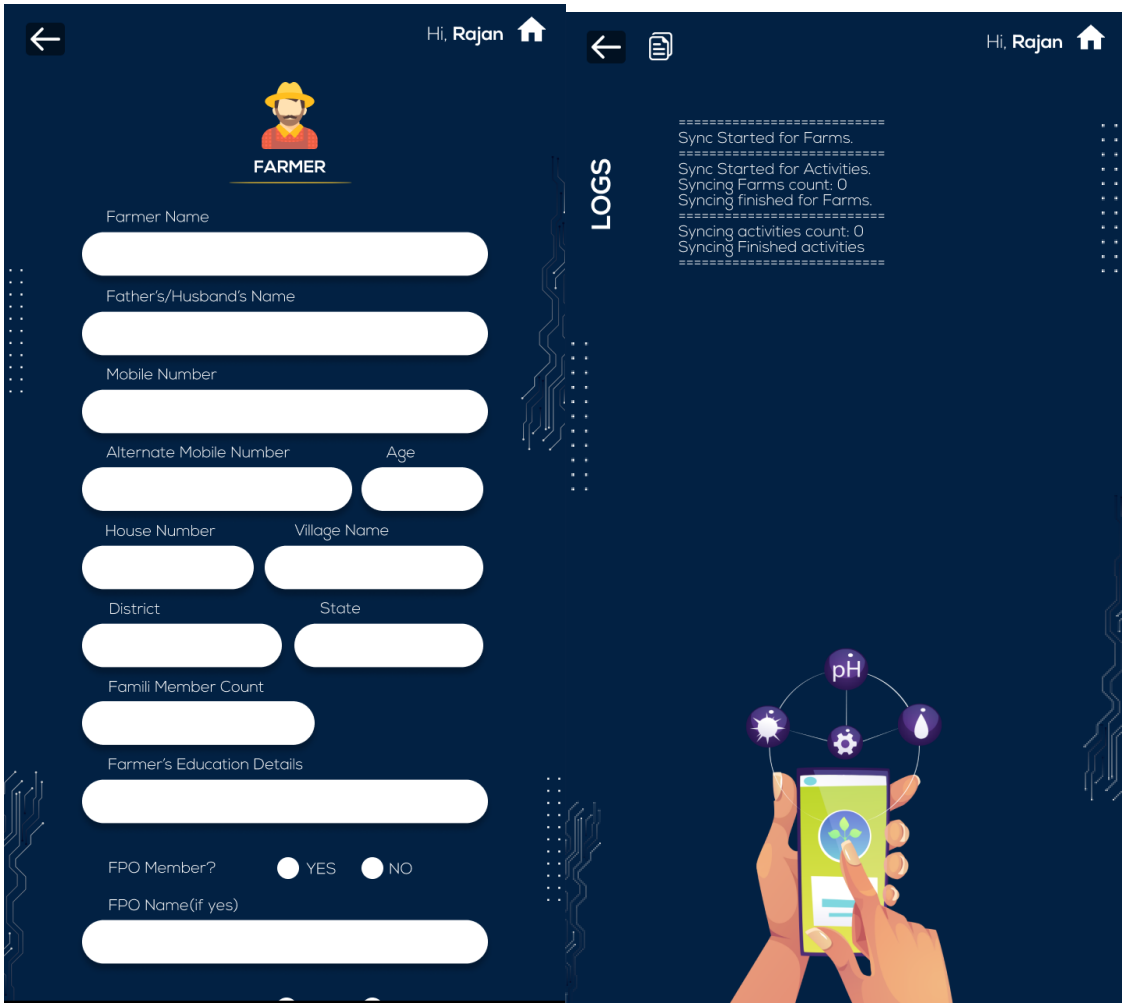
CROP
INVENTORY
GAP


Hi, Rajan
Add Farm Activities
IRRIGATION
CHEMICAL TREATMENT
FERTILIZER TREATMENT
ORGANIC TREATMENT



Smart Irrigation in Agriculture: How IoT Takes Ag Tech to the Next Level

These systems **use sensors placed in fields to accurately read the level of moisture in the soil**. Connected irrigation equipment can then use this data to precisely water crops, conserving water while ensuring that plants receive the right amount of moisture at the right time

Vertical Agriculture Roadmap: From Concept to Profit using MOJO

MOJO makes a vertical agriculture business profitable; you should consider several factors that influence ROI: the market size, crop variety, indoor system scalability, and level of implemented technologies. Similar to herbs, leafy greens are always good choices for profitable vertical farming. Leafy greens are easy to grow and there is consistent demand all year round. Lettuce is the most popular choice among all leafy greens. Broccoli, English cucumber and Capsicum which has year round demand in cities, use MOJO to link the stake holders, produce and market them. You need to make sure your production cost is low. So, the first step to ensure this is to pick the right crops. The aspiring vertical farmer needs to do a feasibility study and develop a profitable and sustainable plan. Determining the daily nutrients and lighting use required by each crop is very important.

Mobile Journalism and Citizen Journalists

The term 'Citizen Journalist' has become exceedingly popular in recent times. Newsrooms all over India, in fact, the world, have opened their doors for citizens to report civic, social, political and, other reader-interest issues. Citizen Journalism has also helped establish vital

links between the government and farmers as they offer suggestions to the government through various media platforms. Since it is not humanly possible for reporters to be present at each and every news location whenever a news event occurs, it is the citizens who send reports of the event using their mobile phones. Television news channels have acknowledged the use of footage sent by citizen journalists in many cases, attributing the source.

From company executives to the rickshaw puller, vegetable vendor, daily- wage labourer, everybody can own a smartphone these days. In fact, owning a smartphone has now days has empowered the common people with the ability to express more openly than ever before. This increased access to mobile phones has facilitated citizen journalists enormously to perform their job promptly. They can instantly record the news event and upload it to the web outfits, or news media establishments. However, it is important to be responsible before uploading videos and audios as truth and credibility are essential features of objective and ethical journalism and the same is expected from Mobile journalists too. It is also important to verify, check and recheck the facts under coverage before uploading.

Prospects of Mobile Journalism

It soften said that owning a smart phone is like carrying a portable newsroom. There are several occasions, where breaking news has been flashed using mobile phones and exclusive news stories uploaded on the web from all over the world.

MoJo is gradually becoming popular with journalists, media, and news broadcast organisations because of its various benefits. The work of a journalist has become much easier and faster, thanks to smart phones. The benefits of mobile journalism are that, it is prompt; helps reporters beat deadlines; and is affordable. Also, smart phones are easier to carry, and trained reporters can broadcast breaking news or events from unlikely locations, where broadcast crew find it hard to reach on time.

MoJos have been able to capture shocking incidents and sights while happening and have drawn international attention. Accidents and disasters happen without warning and in such cases smart phones capture the authentic moments of the story. There are numerous opportunities for mobile journalism where videos can capture some historic moments and the same are instantly transmitted to the web. You may recall videos of people or cattle marooned in floods in different parts of the country or landslides taking places in the hills of Uttarakhand captured on smartphones making way in news bulletins.

Smart phones have made the life of reporters easier as they have become 'mobile' in their work and can work independently without being assisted by a large production crew. It is also cost-effective for media organisations as they do not have to hire additional professionals and instead spend funds on modem equipment for improved production techniques.

Mobile journalists can also go to those places where it's difficult to place camera equipment’s and hold interviews of people who are uncomfortable to face the production crews. It has been observed that most people are willing to speak in front of smart phone cameras, while they get conscious or nervous in front of professional cameras with large crews. Even from remote places, reporters can use their smart phones to cover news events, without depending on computers or heavy broadcast equipment. The LIVE news-broadcast with the help of a

smart phone is generally viewed as authentic coverage, because people trust live reports of news events.

It is important that mobile journalist is first trained on using smart phone for newsgathering, editing and broadcasting, before being sent for field reporting. Once a reporter is trained in MoJo, it becomes convenient to telecast exclusive news from any comer of the world.

TOOLS AND ACCESSORIES of MOJO

While citizen scan record any event; trained reporters are required to handle the smart phone camera for professionally appreciable results. They are expected to follow the process of news selection and collection as well as ethics of journalism. The following are some equipment required for MoJo:

Equipment Required

Smartphone: Any Smartphone with IOS and Android with good Internet connectivity can be used for Mojo. These days, smart phones, are available with high quality video and audio features.

Tablets: Tablets are also equipped with high quality audio and video facilities to record, so that the news can believe-streamed easily.

Digital Cameras: Digital cameras, like smart phones are light, convenient, and easy to carry. High quality images and videos can be recorded using digital cameras, which can be later conveniently transferred to the computers and/or laptop for streaming online.

Tripod: For stability, a light tripod is required. A tripod-mount is also needed to support the smart phone.

Grips: It is attached to the tripod to move the camera around as you film.

Microphones: A clip-on microphone is useful in capturing audio in an environment where it's noisy and windy.

Video Light: All smart phones come within-built camera lights, but using

An extern. Alight is also crucial for better results. However, natural light gives good results while shooting out doors, compared to artificial lights.

Power-Bank and Extra Batteries: Smartphone batteries do not last long when it is used for shooting videos Therefore, it is always advisable to carry a power-bank and extra batteries for shooting.

Backpack: Alight sturdy back pack is needed to carry all the equipment.

Mobile Applications

Mobile Applications for MoJo are more useful than other audio-video editing applications, which are convenient to learn and use by mobile journalists. In order to master the software, users have to be adequately trained. These apps help in recording, editing and distribution of the news content.

Webcasting

Webcasting is same as the LIVE broadcast of an event with the help of cameras. In webcasting, mobile phone is used to do LIVE coverage of an event with the help of Social media platforms. Facebook, Twitter and YouTube are the popular social platforms where live streaming of videos can be done for news channels and independent reporters. Even mainstream mass media often rely on social media to reach their target audiences.

PRODUCTION ASPECTS OF MOBILE JOURNALISM

Shooting videos for the purpose of journalism has to be taken seriously and done professionally. Reporters have to follow certain rules while shooting and preparing storyboards, with proper sequencing. There are certain production aspects that every trained journalist need to follow to produce quality news content.

Shots

While shooting for news content, it's important to know the shots and present it professionally. A shot is a single photographed scene taken from continuous filming. It is a single piece of action taken by camera. There are several types of shots:

Extreme Wide: It is also known as the 'establishing shot' - to show the viewer the surroundings of the scene being recorded.

Wide: Popularly known as a long shot, it includes a full view of the scene or shows the full body of a person from head to toe.

Mid-shot: A shot framing the person from their head to their knees.

Medium: Medium shots are usually taken during interviews or dialogue sequences. This shot is important to capture the emotion and body language of the participants. This particular shot is aimed at showing the object from head to the waistline.

Medium Close-up: The shot focuses on the face of the subject. It is taken from the head and cuts off around the chest. This shot is also commonly used during interviews with focus on subject and not the surroundings.

Close-up: This shot shows the subject from the head to the neck. The frame is filled with the subjects' face, while it captures the emotions and expressions.

Extreme Close-up: This shot focuses on a particular part of the subject - such as the eyes. It frames only a part of the face to highlight the emotions during the interview.

Two-shot: This shot is often used in interviews to bring into the frame both the interviewer and interviewee.

Over the Shoulder: The shot is taken from behind a person who is taking the interview of the subject and may also show the interviewer. The shot is commonly cut in between the conversations, alternating the view between the two speakers.

Reverse over the Shoulder: The interviewer's frame is taken from over the shoulder of the interviewee.

Cut-ways: During interviews, extra shots are taken of the hands and eyes engaged in an

activity to create variety and give context to certain points in an interview. Cut-ways can be taken for a maximum of 10 seconds because during edit only 3 or 4 seconds will be used for the content.

Overlay: The shot is taken of different scenes from internal and external locations that support the story. Overlay shots are important during edits.

Sequencing and Storyboards

Sequences are important to support the visual narrative of the content. It is a well-established form of narrating the story with a video. Sequences are formed using different types of shots that we have discussed above.

Storyboards or Filming for Editing Shots: Storyboards are graphic illustrations of stories created before any film shot and are used infilm making, documentary making and dramatic films. The drawings are the sequence of shots to make the edit much easier. The series of graphic drawings are also known as filming for edit. It is not possible to create a storyboard for live events, but it's useful when the story is offline and based on news content. A storyboard will have some of the following information:

Title of the story:

Sl no	Voice-over	Type of shots	Bytes

Those of you who wish to use MoJo professionally should read more in this upcoming area and attend seminars to enhance your skills to become successful professional MoJos.

CHALLENGES OF MOBILE JOURNALISM

With the advent of 2G, 3G and 5G technologies in India, mobile companies are producing high-end smart phones at affordable costs. The prices of smart phones are quite competitive and consumers have wide choices to pick and choose the brand of their preference. Let's discuss some of the challenges faced by MoJos.

Several technological, financial and logistical issues may arise while shooting with mobile phones. Some of these are listed below:

Battery Related: The average life of smart phones battery is low, especially while shooting. In order to avoid abrupt disconnection in the mist of important shoots of an event, it is advisable to carry extra batteries and chargers. Solar batteries can be used to prevent such challenges. A power bank can also be helpful in such situations.

*Quality of Shots (*4K or HD): Mobile Journalists should be familiar with the quality and standard of shots, because whatever the medium of output is, it is highly important to shoot with 4K or high definition cameras. 4K is also known as ultra HD, its dimensions are 3840 x 2160 pixels. It is called 4K because its pixel size is four times the resolution of HD that has pixel size of 1920 x1080 pixels. While shooting with mobile phones, the format should

be set before the shoot commences. While buying mobiles phone, it is important to check for high-resolution camera phones.

Internet Related Issues: In spite of the fourth generation 4G-network connectivity, sometimes due to poor network, journalists have to face problems in broadcasting live news content. While covering a live event or managing live chats, uninterrupted Internet connectivity is very important. If there is no Internet connectivity, it becomes very difficult to execute the job.

Reporting Challenging Situations: Mojos may face uncertain situations. For example, while covering protest demonstrations or riots where police or agitators indulge in violent clashes, police may resort to using water canon to thwart the agitators. The reporters could become victims of such circumstances in which expensive reporting equipment and smart phones, could get damaged, or even destroyed. In order to safeguard one's equipment and gadgets during such situations it is advisable to cover the smartphone with a waterproof casing. Se1fie sticks and mobile tripods should also be taken adequate care of.

Additionally, reporters may not able to send live feeds to their stations. If there is no connectivity, reporters can look for a place where there is Broadband connection or a Wi-Fi facility. If reporters are not able to send live feeds, they can record the events and send the tapes or the clips at a later stage, when internet connectivity is restored.

Theft of mobile phones: In the event of theft, valuable inputs and news recordings already collected may get lost; therefore, it is always advisable to keep mobile phones safe to avoid theft or loss. The recording should be transferred to Google drive or saved in a pen drive. An extra mobile phone helps during emergency situations.

Quality and Cost of Smart phones: The prices of smart phones are currently very competitive; but the quality of cameras can often be compromised. Smart phones are designed to be user-friendly with diverse inbuilt applications which feature advanced audio-video settings. People can shoot images and videos and share them with the social media subscribers, thereby becoming active social media reporters and citizen journalists. While the common people have the freedom to choose any smart phone, MoJos should not compromise on the quality of cameras. They should survey the market before opting for a brand of smart phone that is equipped with an inbuilt high-resolution camera and supports the apps needed for production and editing.

MOJO in Digital Marketing

A digital marketing agency specialized in agribusiness can offer your company a number of valuable benefits, including market insight, personalized marketing strategies, improved online visibility, improved brand image and analysis and constant monitoring of your campaigns. E.g., AMAZON, FLIPKART, ARKA VYAPAR, KISAN SUVIDHA, KISAN RATH etc.

Problems with digital agriculture

Challenges of digital agriculture. Some important challenges include the lack of awareness about the benefits of digital agriculture among farmers and rural residents, inadequate infrastructure and resources, unreliable internet connections, and a lack of skilled professionals.

Conclusion.

Mobile journalism, a form of digital reporting using mobile devices, has demonstrated strengths in creating news content using professional formats and techniques. Advocates of digital agriculture argue that digital tools in farming can reduce the need for chemical inputs, such as pesticides and fertilizers, by enabling more precise application. However, challenges faced by mobile journalists, including issues related to authenticity, credibility, and ethics, were also discussed. While smartphones empower users to capture video footage of events around them, this has led media experts to grapple with the complexities of news circulating without a firm basis or truth. Therefore, it is essential for journalists to adhere to certain criteria. It was emphasized that mobile journalists should view smartphones merely as tools for news gathering and exercise caution in reporting. The report should be accurate, unbiased, and obtained through ethical means, respecting the rules and laws of the land. Seeking permission from relevant authorities is advisable to prevent legal complications..

References:

1. AdomaA, 2018, MobileandSocialMediaJournalism: APracticalGuide.SagePublications.
2. Burum&Quinn,Stephen.,2018,Mojo:TheMobileJournalismHandbook,RoutledgePublication
3. HillSteve&BradshawPaul,2018,MobileJournalism,Producingnewsforsocialandinteractive media,Taylor&FrancisPublication
4. https://youtu.be/9eb-KG5x7lE?si=c6JV_HQ2_X_mX-Fg
5. https://intellias.com/artificial-intelligence-in-agriculture/
6. https://www.google.com/search?client=firefox-b-e&q=digital+Agriculture#ip=1&vhid=X7vPpwNhpkM0PM&vssid=l
7. https://play.google.com/store/apps/details?id=com.krishidevgyaan&hl=en_IN&gl=US
8. StephensMitchell,2018,BeyondNews:ThefutureofJournalism,KindleEdition
9. MontgomeryR,2014:AFieldGuideforMobileJournalism.VisualEditors

Chapter – 2

From Newsrooms to Smartphones: Mobile Journalism's (MOJO) Influence On Journalism in India

[1]Darshan Devaiah B P, Principal Correspondent, the Hindu, Bengaluru

Introduction:

Mobile journalism (MoJo) is a form of newsgathering and storytelling that uses smart phones and other mobile devices to produce high-quality journalistic content. It has revolutionized the way news is reported and consumed in India, and has had a significant impact on print media houses in particular.

MoJo began to gain traction in India in the early 2010s in traditional print media, as smart phone penetration increased and the quality of smart phone cameras and video recording capabilities improved. News organizations began to experiment with MoJo, and soon it became a regular part of their newsgathering workflow.

With the rise of platforms like YouTube and other social media gaining widespread popularity, coupled with India's staggering 650 million smart phone users, media organizations made significant investments in training their journalists in MoJo skills. They provided journalists with essential hardware and software tools and revamped their editorial processes and workflows to seamlessly incorporate MoJo content.

According to a Deloitte study, India will have one billion smart phone users by 2026 with rural areas driving the sale of Internet-enabled phones. After the decline in mobile data prices in India MoJo quickly became popular among journalists in the country, as it offered a number of advantages over traditional newsgathering methods. MoJo was more efficient, cost-effective, and portable. It also allowed journalists to capture stories from a wider range of perspectives and to reach new audiences on social media and other digital platforms.

The Impact of MoJo on Print Media Houses

MoJo has had a number of positive impacts on print media houses in India.

Increased efficiency and cost-effectiveness: MoJo has made newsgathering more efficient and cost-effective for print media houses. Journalists can now report from anywhere, at any time. According to a 2020 study by the Reuters Institute for the Study of Journalism, 83% of Indian journalists use smart phones for newsgathering. This is the highest percentage in the world.

More immersive and engaging storytelling: MoJo has made it easier for print media houses to tell stories in a more immersive and engaging way. Journalists are now using their smart

phones to capture high-quality video and audio, and to experiment with new storytelling techniques, including podcasts and video stories.

Wider reach: MoJo has facilitated print media houses in expanding their audience reach. MoJo content is frequently shared on social media and various digital platforms, enabling it to reach a broader audience compared to traditional print journalism. Print media websites have transformed into fully multimedia platforms, embracing the diverse possibilities of digital storytelling.

New revenue streams: MoJo has ushered in fresh revenue opportunities for print media houses. Some have begun creating and selling MoJo content on subscription platforms. Additionally, many leading print media websites have implemented paywalls due to the high-quality multimedia news content they offer. This shift represents a novel revenue model wherein people pay for access to high-quality news content.

Challenges and Opportunities

While MoJo has had a number of positive impacts on print media houses in India, there are also some challenges that they need to address.

Training and resources: MoJo requires journalists to have specialized skills and resources. Print media houses need to invest in training their journalists in MoJo skills and in providing them with the necessary hardware and software.

Verification and fact-checking: MoJo content can be easily manipulated and spread as misinformation. Print media houses need to have robust verification and fact-checking processes in place to ensure that their MoJo content is accurate and reliable.

Competition: MoJo has also made it easier for new entrants to the media industry to produce high-quality content. Print media houses need to compete with these new entrants by producing innovative and engaging MoJo content.

Opportunities: Despite these challenges, the opportunities that MoJo offers to print media and all other traditional media houses in India are significant. MoJo can help them to produce more engaging and immersive content, to reach new audiences, and to stay competitive in the digital age.

The Future of MoJo in Indian Journalism:

In the vast landscape of Indian journalism, Mobile Journalism (MoJo) stands at the forefront of a transformative wave, reshaping how news is gathered, produced, and consumed. As India rapidly embraces digital technology, MoJo is poised to revolutionize journalism in the country, promising a future where storytelling is not confined to traditional media houses but extends to the palms of every individual with a smartphone.

In 2021, India boasted a staggering 1.2 billion mobile subscribers, out of which approximately 750 million were smart phone users. According to Deloitte's 2022 Global TMT predictions, the country is on the verge of becoming the world's second-largest smart phone manufacturer within the next five years.

The expansion is anticipated to be primarily driven by the rural sector, with a compound annual growth rate (CAGR) of 6%, in contrast to the urban sector, which is expected to grow at a CAGR of 2.5% from 2021 to 2026.

Empowering Citizen Journalism:

MoJo blurs the line between professional journalism and citizen reporting. In a country as diverse and vibrant as India, citizen journalists can capture local stories that might be overlooked by mainstream media. With just a smart phone, anyone can become a storyteller, highlighting issues that matter within their communities. This grassroots approach not only democratizes information but also fosters a sense of civic engagement among citizens.

Multimedia Storytelling:

The future of journalism lies in multimedia storytelling, and MoJo is at its epicentre. Journalists can now seamlessly integrate text, images, videos, and interactive elements to create immersive narratives. Visual storytelling, in particular, has a profound impact, resonating deeply with the audience. MoJo enables journalists to craft compelling visual stories, enhancing the overall news experience and making information more accessible and engaging.

Augmented Reality (AR) and Virtual Reality (VR):

As technology advances, the integration of Augmented Reality (AR) and Virtual Reality (VR) in MoJo is on the horizon. Imagine being able to explore a news story in a 360-degree virtual environment or interact with AR-enhanced info graphics that provide in-depth analysis. These innovations have the potential to elevate journalism to new heights, offering audiences an immersive and interactive news experience.

Embracing MoJo becoming MoJo journalists:

Presently, the influence of Mobile Journalism (MoJo) is reshaping the roles within media organizations. The traditional title of a 'reporter' has evolved into 'Multimedia Reporter,' reflecting the integration of diverse media formats. Editorial practices have undergone a significant transformation, prioritizing multimedia elements, particularly visualization, and emphasizing the rapid delivery of stories. Consequently, journalists are now required to produce multimedia content, marking a shift in their skill set and responsibilities.

Effective storytelling lies at the heart of MoJo. Journalists should explore various formats, such as short video documentaries, live streams, and podcasts, to convey their narratives. Interactive elements, like polls and Q&A sessions during live streams, encourage audience participation.

Captivating visuals, concise scripts, and compelling narratives are key to creating engaging MoJo content.

The digital landscape is constantly evolving, and journalists must adapt to new technologies and trends. Continuous learning through online courses, webinars, and workshops keeps journalists updated with the latest MoJo techniques and tools. Adapting to changing algorithms and audience preferences on social media platforms ensures content remains visible and engaging. Embracing feedback and analysing audience metrics provide valuable insights for improvement.

Mobile Journalism in India offers journalists an unprecedented opportunity to amplify their voices, connect with audiences, and tell impactful stories. By mastering MoJo skills, cultivating a strong social media presence, and upholding ethical standards, journalists can navigate the digital realm with confidence and credibility.

References:

The Hindu. "India to Have 1 Billion Smartphone Users by 2026." The Hindu, [Online] Available: https://www.thehindu.com/business/india-to-have-1-billion-smartphone-users-by-2026-deloitte/article65075151.ece

Reuters Institute for the Study of Journalism. "Digital News Report 2023." [Online] Available: https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2023

Times of India. "The Tech Age of Storytelling through Mobile Journalism (MoJo)." Bennett University, [Online] Available: https://timesofindia.indiatimes.com/education/news/bennett-university-the-tech-age-of-storytelling-through-mobile-journalism-mojo/articleshow/101272303.cms

Hindustan Times. "Inside India's Podcast Boom." [Online] Available: https://www.hindustantimes.com/lifestyle/art-culture/hear-and-now-inside-india-s-podcast-boom-101622272494892.html

Reuters Institute for the Study of Journalism. "Digital News Report India 2019." [Online] Available: https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2019-03/India_DNR_FINAL.pdf

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CHAPTER – 3

Content Development for Mainstream Media

[1]R Venkattakumar and [2]P Venkatesan

Research organizations serving under National Agricultural Research and Education System (NARES) of the country, such as State and Central Agricultural Universities, research institutes serving under Indian Council of Agricultural Research (ICAR), New Delhi strive to develop need-based technologies, especially varieties and hybrids of agricultural and horticultural crops, breeds of animal husbandry, fisheries and technologies pertaining to natural resource management and agricultural engineering with a main objective of disseminating the same to the needy farmers. The Extension Division of ICAR through its wide spread network of Agricultural Technology Application Research Institute (ATARI) and Krishi Vigyan Kendras (KVKs); and development departments of Ministry of Agriculture and Farmers Welfare etc., try continuously to disseminate such technologies among the farming community for their wider adoption. KVKs and development departments involve themselves in such technology dissemination through various modes of transfer of technology, of which, one of the major modes of transfer of technology is communicating the information about such technologies is through mainstream media, mainly, newspapers, radio, television and social media. These channels carry the treated messages about the agricultural technologies to the farmers in their own style to the intended audience, especially the farmers.

Out of these major channels of mainstream media, the newspaper and news magazines are distributed in a printed form and hence the news need to be comprehended by the farmers to move towards taking any desirable action for adoption of the disseminated technology. The other three components of the mainstream media such as radio, television and social media constitute the electronic media. When radio needs listening skills of the farmers before comprehending the technologies disseminated, the television and social media involves audio-visual skills of the farmers to understand them. Since, differential viewership and readership behaviour has to be exhibited by the farmers, content development for all components of mainstream media, varies drastically. Different set of skills are required by the subject matter specialists to treat the message to suit the requirements of these media and such skills can be mastered through experience and continuous practice. This chapter of work, tries to explain the various techniques that were used by the media personnel to effectively communicate through mainstream media listed above, so that the extension professionals of SAUs and ICAR organizations may understand and appreciate such techniques and also can use these media in an effective manner to disseminate the technologies developed under NARES...

Writing for Newspapers

Considerations for ‘art of writing’ for newspapers

The following are the points to be considered, while writing information about agricultural technologies through newspapers:

- "Allowing a considerable degree of participation by the readers (reading, imagining, interpreting, discussing and decision making etc.)", imply that for allowing the readers for their effective participation, the writing has to be so effective and attractive.
- "Serving a diverse readership (differences in literacy, age, gender, profession, purpose etc.)" imply that as such the literates, neo-literates and highly educated readers, women, men, youth etc., read the newspapers and they consume information about agricultural news. In order to satisfy the needs of such diverse readers will be a challenge and answer such challenge, the information has to be a complete one.
- "Compelled to emphasize on "depth" and "interpretation" of news", imply the competition faced by the newspapers from the corners of radio, television and social media.
- The competition from the electronic media, especially radio and television made the newspaper no longer a prime news medium. Hence, the writing through newspaper about agricultural technologies should provide information about impact created by the respective technologies under real farm situations.

Types of articles written in newspaper

There are two types of articles are written in newspapers as follows:

1. **News story:** A news story is a journalistic, factual presentation of news about current events, typically one presented as a narrative account.
2. **Feature story:** A feature story is distinguished from other types of non-news by the quality and depth of the theme and writing

Format of a New Story

- In order to arouse interest of the readers, there is no need for a definite format, in case of news story is concerned. However, following standard format may enable the farmers and other stakeholders, a clear understanding about the information given across.
- To be effective, in terms of understanding and follow-up by the farmers and other stakeholders, provide a single information/news in an article.
- To invite better follow-up by the stakeholders, write the story with enormous human interest, so that the stakeholders will exhibit positive and immediate follow-up towards the given information.
- However, when you would like to expect immediate and positive follow-up by the farmers, the story has to be substantiated with adequate facts and figures.

The following is the general format of a news story to be written in the newspaper:

- Title
- Punchline
- Lead

- Secondary Lead/ Catch-all paragraph
- Subsequent paragraphs
- End

Title: The title must be in such a way that it must tell the story in short. In order to do so, use active voice and present tense along with catchy verbs.

Eg.

- Indian Institute of Horticultural Research identifies third unique farmer's jackfruit variety for promotion *(The Hindu, 5.7.2023)*
- Berry borer infestation: Coffee Board issues advisory to farmers *(The Hindu, 15.3.2023)*
- Three multi-state societies to procure and distribute seeds *(The Hindu, 11.1.2023)*
- Kalanamak Rice, 'Buddha's gift to people', is now small and strong *(The Hindu, 29.10.2022)*

Punchline

The punchline (PL) accompanies the title and gives a conclusive message. The title and the punch line must tell entire story in a nutshell.

Eg.

1. Title: Indian Institute of Horticultural Research identifies third unique farmer's jackfruit variety for promotion
   PL: The new variety which is bigger in size is deep orange in colour and suitable for processing to make products like jam and squash (The Hindu, 5.7.2023)

2. *Title: Kharif* sowing turns around to rise 1.2%
   PL: Sown area for rice clocks growth for the first time this season; pulses still lagging (The Hindu, 24.7.2023)

3. Title: Govt. hikes sugarcane FRP by ₹10/quintal to ₹315/quintal for 2023-24 season
   PL: This FRP of ₹315 per quintal at a recovery rate of 10.25% is higher by 100.6% over production cost (The Hindu, 28.6.2023)

The Lead

The 'lead' is the first paragraph that catches the attention of the readers honestly. Also, it directs the feeling of the writer to the readers. Usually, the lead is given in two distinct phases. One phase gives maximum impact to the reader and the other one explains the meaning of the story with exact facts and figures. The following facts underlay the importance of the structure of a lead:

- The lead is a story in nutshell
- Gives abstract of the story in a meaningful way

- ❖ Determines the shape and tone of the entire news
- ❖ Need to spend more time, as it is the most difficult task
- ❖ Make the lead as short as possible
- ❖ A single emphatic sentence will do the job of a lead

Eg.

1. Title: Southwest monsoon arrives in Madhya Pradesh, bringing cheer to farmers
   Lead: The southwest monsoon arrived in Madhya Pradesh on Monday, bringing cheers to thousands of farmers in the state, which is the largest producer of soybean and also a major grower of paddy and pulses. (Mint, 26.1.2023)

2. Title: Indian Institute of Horticultural Research identifies third unique farmer's jackfruit variety for promotion

   Lead: Enthused by the massive response to two farmers' varieties of jackfruit — Siddu and Shankara — which were promoted by it, the Bengaluru-based Indian Institute of Horticultural Research (IIHR) has identified one more variety of jackfruit being grown by a farmer for promotion. (The Hindu, 5.7.2023)

3. Title: Three multi-state societies to procure and distribute seeds
   Lead: The Union Cabinet has approved the setting up of three national-level multi-State cooperative societies to act as an apex body for procurement, processing, marketing and distribution of seeds. (The Hindu, 11.1.2023)

The language of the lead is decided by the following criteria:

- ❖ Word order
- ❖ Voice
- ❖ Verb selection
- ❖ Sub-ordination
- ❖ Attribution
- ❖ Identification

Word Order

- ❖ Construct the sentence, in the beginning and at the end with emphatic words, whereas at the middle of the sentence reserve for less important part.
  Eg.

  Title: Weekly farmers' markets selling home-grown produce are big hit in Thiruvananthapuram
  Lead: Padmaja Gladis looks forward to *Saturdays. That is when she sells vegetables and leafy greens grown at her home,* besides eggs, coconuts, coconut oil and mushrooms among other

things, at the farmers' market near Avukkulam Sree Dharma Sastha Temple, *a few kilometres from Powdikonam junction. The homemaker is one of the vendors* at the Saturday market *organised by Haritham Organic Group, a farmers' collective. (The Hindu, 14.4.2023)*

Voice

- Use Active voice to have stronger and emphatic sentence

Eg.

Title: 'Inji gramam', a new scheme to cultivate ginger in Kulathoor grama panchayat in Thiruvananthapuram, yields a bumper harvest
Lead: An agrarian village well known for its paddy and banana, 35 kilometres from Thiruvananthapuram, is rooting for ginger. For the first time, VK Girijanadhan Nair had to dig up his fields to harvest the fruits of his labour. After growing plantain, coconut and varieties of vegetables on his two-and-a-half-acre plot, this year he added a new crop — ginger. (The Hindu, 17.2.2023)

Verb Selection

- Verb selection should be in such a way that the verb should tell, not only – what happened? but also – how it happened?
- However, 'accuracy' should be kept in mind, while explaining the 'how', i.e. there should not be any place for the exaggeration.

Eg.

Title: Declare floods as national calamity, compensate farmers: Samyukt Kisan Morcha
Lead: The Samyukt Kisan Morcha (SKM), an umbrella organisation of various farmers' outfits, urged the Centre to declare the floods and landslides in north Indian States, particularly in Himachal Pradesh, as a national calamity. The SKM said in a statement here on Friday that farmers should be adequately compensated for the loss they suffered due to the floods. (The Hindu, 14.7.2023)

Sub-ordination

- Frame the sentences, in a way that important news angle is covered first and the lesser important news is covered next.

Eg.

Title: Centre rules out an increase in MSP for cotton, but farmers seek more
Lead: While cotton farmers in several States have demanded an increase in the minimum support price (MSP) of the crop, the Centre has said that it is "watching" the cotton production scenario and decide accordingly. (The Hindu, December, 22, 2022

Attribution

- Link the noteworthy statement to an authority
- Factual statements must accompany accurate source

Eg.

Title: Fertilizer scarcity may hamper crop cycle, cautions scientist
Lead: South Asian countries may see fertilizers scarcity in the next crop cycle as a result of the conflict situation in Ukraine and Russia, cautioned Bram Govaerts, Director General of International Maize and Wheat Improvement Centre (CIMMYT) and the Borlaug Institute for South Asia (BISA). (The Hindu, 2.9.2022)

Identification

- Identification is concerned to referring of persons, places/ organizations, while giving data/ information about the news of huge impact. While doing so, the reader establishes relationship through the news article.

Eg.

Title: Five new varieties to expand India's Basmati platter
Lead: Five new varieties of seeds of Basmati rice, developed by a group of scientists led by the Indian Agriculture Research Institute (IARI) Director Dr. Ashok Kumar Singh in 2020 and 2021, are all set to bring revolutionary changes in the way Basmati rice is cultivated in the country. (The Hindu, 24.10.2022)

Secondary Lead – 'Catch All' Paragraph

- Write the next emphatic story to the lead as a second paragraph
- Lead and the secondary lead answers– what, when, where, who, why and how

Eg.

Title: Paddy cultivation sees decline

Lead: The trend of decrease in paddy sowing has continued even as the monsoon season in northern India is in its last legs. According to the data released by the Union Agriculture Ministry on Friday, the decrease in the area of paddy cultivation is 22.90 lakh hectares, 5.62% less that the area covered in 2021.

Secondary Lead: As of now, paddy has been cultivated in 383.99 lakh hectares of area and in the corresponding period of last year it was 406.89 lakh hectares. "Thus 22.90 lakh ha less area has been covered compared to last year," the Centre said. States such as Jharkhand (decrease of 9.80 lakh hectares), Madhya Pradesh (6.32 lakh hectares), West Bengal (4.45 lakh hectares), Chhattisgarh (3.91 lakh hectares), Uttar Pradesh (2.61 lakh hectares) and Bihar (2.18 lakh hectares) are the major contributors for the decrease in the cultivated area of paddy in this kharif season. Meanwhile States such as Telangana (increase of 4.71 lakh

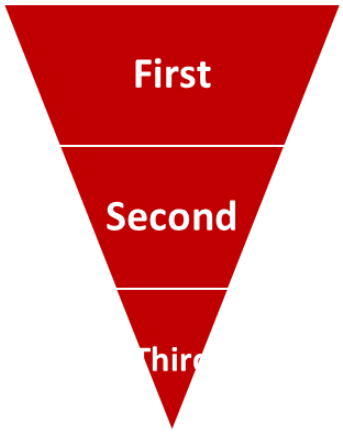
hectares), Haryana (0.94 lakh hectares), Nagaland (0.78 lakh hectares) and Gujarat (0.55 lakh hectares) showed an increase in the area of cultivation of paddy. (The Hindu, 2.9.2022)

Developing the story

For developing the remaining paragraphs of the story, please follow the following criteria:

- Follow the order of importance of news pieces
- Follow to the possible extent, the chronology of events
- Write 'key words', to give signal to the readers for new ideas
- Use transitional words to indicate the relationship between one idea to another (Eg.)
- Meanwhile
- Nevertheless
- As a result
- In a related action
- Pronoun references to emphasize the subject
- Do 'Information weaving' by making the story understandable to the reader

Order of importance for Story Development



Ending the Story

- Give a simple statement that provides accurate perspectives to the news story
- The statement should not be a comment by the writer
- No redundancy of statement should be noticed at the end; If so, manage with emphatic facts

Eg.

Title: Yellow revolution: Mustard farming becomes popular in Kashmir Valley
End: "Echoing the same, another farmer in the UT, Wali Muhammad, is happy to have switched to mustard farming instead of growing grass for animal grazing. "After 12 years, I again sow mustard seeds, which is giving 100 times more returns than grass," he said". (Deccan Herald, 3.4.2023)

Essentials of a News Story

- Choice of words – brevity and clarity
- Use 'non-technical' words
- Use 'unspoiled words' i.e. unrepeated words
- Use active voice
- 'Subordination' is the key for better understanding
- Sentences should 'move' the story forward
- Prepare short and strong sentences
- Avoid 'faulty relationship' – always address the 'subject', in the sentences
- Avoid 'false relationship' – One sentence one idea; not to give two or more ideas in a sentence

Feature Story

Feature story is different from the news story from the angle of depth, meaning and perspective. When the news story informs the readers about the newness of the subject covered, feature story provides additional facts that gives in depth meaning and impact.

The Lead

The lead of the feature story captures the attention immediatelyof the intended readers.

Eg.

Title: Vertical farm cuts energy use 75 per cent by using sunlight
Lead: Walking into the newest greenhouse run by vertical farming company Eden Green on the outskirts of Dallas, Texas, I am greeted by floor-to-ceiling walls of lettuce. The greenhouse is warm, bright with sunlight and busy with workers tending to the more than 300,000 heads of romaine, butter head and red oak growing in hydroponic pots. (New Scientist, 7.4.2023)

Story Development

- In feature story, ideas are given in a way that one idea is given in one sentence/ paragraph; and the ideas are given for the follow-up by the readers, especially the farmers
- Hence, while writing the feature story, 'empathy' of the readers should be kept in mind. The story of the feature story has to be written in such a way that how the reader wants to read the story.
- The story has to be written in such a way that it should be able to keep the interest of the audience throughout the story. Hence, in each and every idea, the impact of adoption of the given idea, has to be explained to the reader.

- Further, all the techniques that are explained, while writing a 'news story' is applicable to that of 'feature story' also.

End of Story

The 'end' of the feature story must provide lasting impression about the story and the idea/ideas told in the story with facts and figures. The contact details of the references pronounced in the feature story also may be given at the end.

Types of Feature Story

There are three different kinds of feature stories are available, as follows:

- **News feature:** It is a combination of news item of a technology or information and the corresponding explanation for the same given in an in-depth manner.
- **Human interest feature:** It is an in-depth story about performance of a technology or an agricultural output over a larger area, so that the reader will be automatically motivated towards adoption of the particular technology, through aroused motivation.
- **Personality feature**: Personality feature is about narrating a personality who adopted the technology or invention and the impact accrued to him, so that the readers from the same agro-ecological situation will be motivated towards adoption of such technology.

Writing for Radio

Characteristics of Radio as a Medium

- **Aural medium:** Hence, only one sense of the reader is utilized to disseminate the information about inventions and technologies, which must be kept in mind while writing the script.
- **Time bound:** Since, only one sense of the readers is involved, the programmes must be organized with the objective of giving well-treated message in a shot span of time.
- **Spoken words**: Well-planned script must be used, as the reader cannot refer back the programme.
- **Feel of human presence:** The presenter or the host of the programme should create his voice signature through his programmes, so that the readers must be able recognise the feelings conveyed through the voice of the presenter.
- **Personality of speaker:** The voice signature of the speaker must create a positive impression about the speaker in the minds of the listeners. Thus, all the programmes hosted by such speaker will be well received by the listeners.
- **Represents the location:** The jurisdiction of the radio broadcasting is limited to a locality. Hence, the programmes must talk about subjects that represents the locality, so that the listeners from the same locality, will be able to appreciate the information broadcasted.

Challenges of Writing for Radio

- Radio listening is no longer a free time activity. Hence, the programme must be able to attract and maintain the interest of the listeners

- Since, the listeners are of diverse profile, complete information must be given to the intended audience.
- The speaker must be able to deliver his speech in a language that is familiar among the listeners of the locality.
- Since, radio listening is not a free time activity, the tone of the speaker should be delivered in friendly and informal way, so that the listeners will develop an informal relationship with the speakers.

Basic Elements of Radio

- Spoken Words
- Sound Effects
- Music
- Pause or Silence

Radio Formats (classified based on the 'sound')

With only Spoken Words

1. Radio talk
2. Dialogue
3. Interview
4. Discussion
5. News Bulletin

Spoken Words with Sound Effects

1. Quiz
2. Radio Report
3. Live Commentary

Spoken Words with Sound Effects and Music

1. Radio feature and documentary
2. Radio drama
3. Radio spots (Advertisements/ Commercials)
4. Docudrama
5. Newsreel

Categories of Radio Programmes (classified based on the 'purpose')

For Information

- News bulletins
- Programmes on Current Affairs

- Primary Information Disseminator

For Education

- Service to Visually Challenged
- Farmers Educational Programmes
- Students Educational Programmes

For Entertainment

- Vivid Bahrathi
- FM Rainbow/ FM Gold

Tips for Writing for Radio

- **Research for a Script: how to develop script for a radio?**

- Books
- Magazines
- Relevant articles
- Subject Matter Specialists
- Primary Survey

- **Attractive Beginning: how to attract the listeners in the beginning of the programme itself?**

- Open decides fate of programme
- Don't make a formal beginning
- Connect to the listener immediately, through friendly statements
- Create curiosity by telling impactful facts about the theme
- Touch emotions, by talking about the gains, the listeners will be getting by listening the programme

- **Maintain the Flow of Script**

- Maintain informal and friendly language
- Present relevant facts in an interesting manner

Basic Rules of Writing for Radio

- **Use Simple Words**

- Use easy, simple and common words
- Write for ‘how to speak’ not ‘how to write’
- Remember a ‘layman’ as an audience and write the script

Example

Written	**Spoken**
Adequate	Enough
Anticipate	Expect
Commence	Begin, Start
Conclude	End
Manufacture	Make
Underprivileged	Poor
Purchase	Buy

- **Use Short Sentences**

- Avoid conjunctions and make simple and short sentences
- No opportunity for rehearing it, hence make the script with clear, easy and understandable words

- **One Idea per Sentence –** provide only one idea per sentence

- **Avoid Sound Clashes**

- Avoid ‘difficult to pronounce’ words such as ‘institutionalization’

- **Use Present Tense**

- To drive home immediacy and urgency, use only present tense

Example

- The monsoon session commenced (commences)
- We have responsibility (are responsible) for quality
- The Prime Minister has inaugurated (inaugurates)
- **Use Active Voice**

Example

- A new Governor was appointed by the President (appoints)
- Ten shops were destroyed by fire (Fire destroys)
- A meeting will be held by the teacher (Teacher will hold)

- **Avoid Stock Phrases, Superfluous Words and Clichés**

Example for Stock Phrases

- Lead from the front – write ‘lead’
- Follow the footsteps – write ‘follow’
- Ground rules – write ‘rules’

Example for Superfluous Words

- Set a new record; died in a fatal accident; holiday period;
- Future plan; it is a true fact; in a week’s time; first priority; past history

Example for Clichés

- Golden words can’t be repeated
- All that glitters are not gold

Precaution while Making the Radio Script

- Print the script in one side of the paper
- Finish a para in a single page; If not at least a sentence in a para
- Don’t write against the code of conduct of the broadcast organization
- Decency of language has to be maintained
- Don’t write against sentiment of any community or disabled people

Writing for Video

Points to be Considered While Writing for Video

- Maximum duration advisable is 15 minutes; hence don’t make lengthy video programmes
- Plan for a lot of visual medium; plan for sequence of scenes with a lot of short shots
- Portion of instructor or speaker should not be more than 20%; hence, plan for other video formats such as interviews, panel discussion etc.
- Assemble as much as number of shots in to a sequence
- Make proper mix of shots: use creativity and novelty in planning the shots to arouse interest of the audience

Tips for Video Script Writing

- For one short video, give one key message
- If several key messages are there, make multiple short videos
- Tell the key message early, viewers will be motivated and informed
- Plan and record lot of visuals with the help of video clips, photographs, charts, tables, animated messages etc.
- Avoid lengthy paragraphs of script
- Instead of giving more facts and figures, show tables, figures, graphs, photos and videos
- Instead of showing continuous and monotonous voice over, include other formats like interviews
- Grab the attention of the viewers through initial shots itself

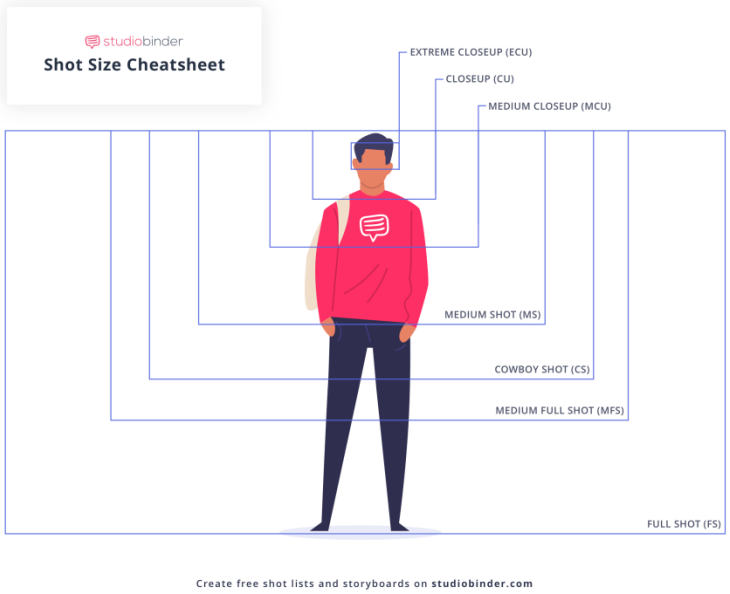
- ❖ Get the viewers engaged throughout the video through creativity and novelty by mixing of different video formats
- ❖ Use simple language
- ❖ Avoid jargons such as highly scientific or technical words
- ❖ Use short sentences
- ❖ Read the script loudly to check verbal flow
- ❖ Review the script through other experts, so that the mistakes in the script will be pointed out easily.

Video Production Approaches

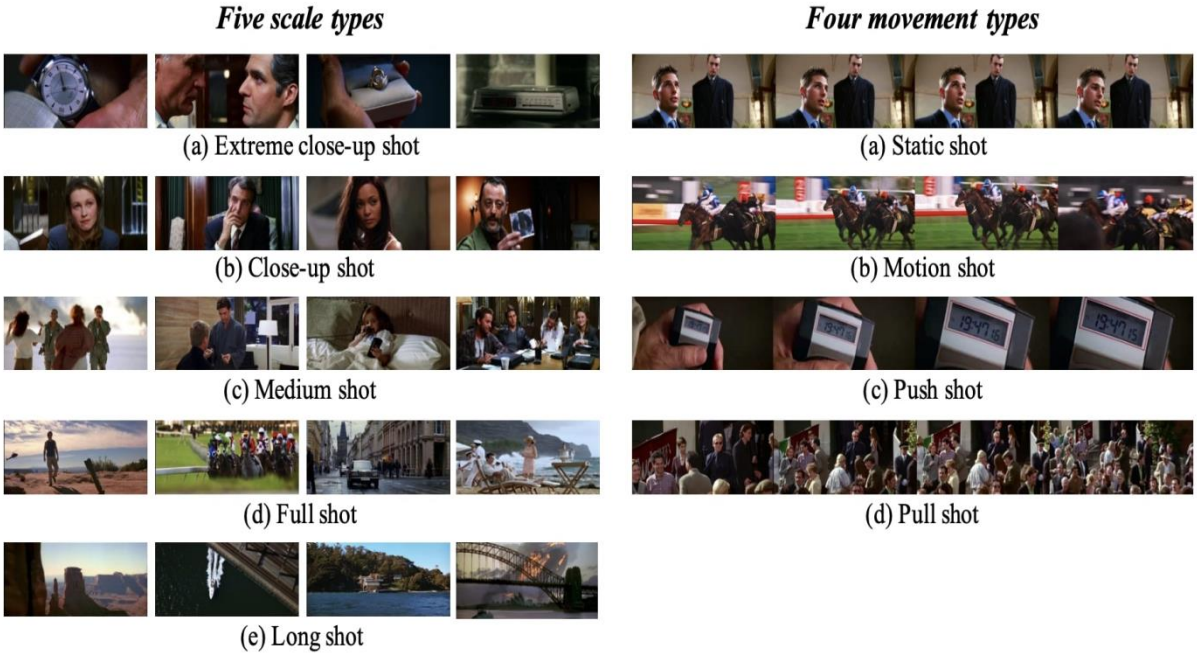
1. Record the instructor's voice with supporting visuals
   (Or)
2. Visual portion are shot as per the convenience; shots are rearranged during editing; Commentary is recorded separately as 'voice over'

Types of Video Shots

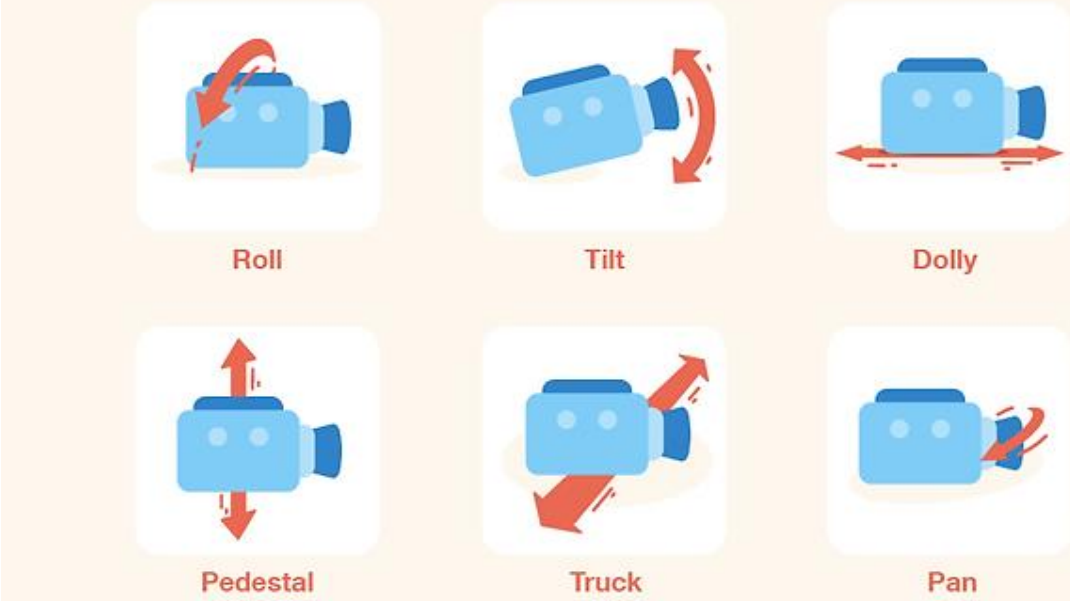
Classification of video shots based on the projection of the subject



Classification of the video shots based on the projection of the subject and movements of camera



Classification of the shots based on the movement of camera



Format for Video Script

Scene/ Shot No.	Type of Shot	Video	Audio	Duration

Writing for Social Media

What is Social Media?

- Web or mobile-based platform
- Enables an individual or organization
- To communicate interactively
- Enables exchange of user enabled content

Need for Social Media?

- Enhanced outreach
- Real time engagement
- Individual interaction
- Managing perceptions

Different Types of Social Media Networks

- **Social Networks:** Facebook, Twitter, LinkedIn
- **Media Sharing Networks:** Instagram, Snapchat, YouTube
- **Discussion Forums:** Reddit, Quora, Digg
- **Bookmarking & Content Curation Networks:** Pinterest, Flipboard
- **Consumer Review Networks:** Yelp, Zomato, TripAdvisor

Characteristics of Social Media

Social Media Types Used in Government Organizations

Social Media Types	Purpose

Social Networking	Chatting, instant messaging, photo sharing E.g. Facebook, Orkut and LinkedIn
Blogs	Descriptive content created and maintained by individual users with text, photos, links to other websites. Readers can leave their comments. Blogospheres can be used very effectively to gauge public opinion.
Micro blogs	Similar to blogs with typical restriction of 140 characters or less E.g. Twitter
Vlogs and sharing sites	Video blogs or Vlogs are blogging sites that mainly use video as the main form of content supported by text. E.g. YouTube
Wikis	Collaborative website that allows multiple users to create and update pages on particular or interlinked subjects
Slide share	Presentations in PDF, PPT, Keynote or Open Office Formats can be uploaded
Picasa and Flickr	Photo sharing sites

Ways of Using Social Media by Agricultural Organizations

- Informing programmes and events
- Informing products/ services
- Making regular and periodical advisories
- Sharing publications/ press notes
- Publicity for occurred events
- Advertisements of various nature
- Profile of organizations
- Rules/ regulation/ guidelines

Tips for Writing in Social Media

- Keep the content concrete, concise and catchy
- Headlines should be creative and compact
- Body of the content should be informative/ valuable
- Keep quality of write-up
- Don’t use abbreviations/ other short forms of phrases
- Exclude unnecessary wordings to avoid repetitive content
- Be grammatically correct to maintain professionalism; also increases the ease of understanding the content
- Avoid too much punctuations like exclamatory remarks
- Prepare different types of contents for different platforms
- Adapt to the new social media trends; colourful and impressive display of information through info graphics, memes, videos and pictures
- Keep your content plagiarism free; craft original content; take inspiration but don’t copy
- Cite Sources – reliability increases; It increase the interest, curiosity and investments of the readers
- Don’t make a promise you can’t keep; provide reliable content

Core Values for Using Social Media

Core values	Do's and Don'ts
Identity	Publish in first person and use appropriate disclaimer
Authority	Do not comment or respond unless authorized to do so
Relevance	Comment on your relevant area and make relevant and pertinent comments
Professionalism	Be polite, be discrete, be respectful, do not make personal comments against individuals/ agencies, don't politicize professional discussion
Openness	Be open to comments, not necessary to respond to each and every comment
Compliance	Be compliant to relevant rules and regulations, do not infringe on copyright of others
Privacy	Do not reveal personal information about other individuals, do not publish your own private and personal details

Challenges in Using Social Media

Why to use social media-lack of clarity?	Whether to provide information or seeking feedback or generic interaction
Which platform to use?	Which platform to choose and how to interlink these platforms
Who will engage?	Need to authorize a person and information level, as social media demands a deeper and constant interaction
How to engage?	How to create and manage content, what should be the response time and the legal implications

Conclusion

In conclusion, the art and science of content development for mainstream media are pivotal in shaping narratives, informing the public, and fostering societal dialogue. The landscape of mainstream media is evolving rapidly, demanding adaptability and innovation in content creation. A forward-looking approach involves not only understanding the pulse of the audience but also embracing diverse formats and platforms. As we navigate this dynamic terrain, several guiding principles emerge: a commitment to accuracy, a dedication to inclusivity, and an unwavering focus on ethical journalism. Content developers in mainstream media must harness the power of storytelling, visuals, and technology to captivate audiences and deliver information in compelling ways. The future of content development lies in a harmonious blend of tradition and innovation, where journalistic integrity remains at the core. By staying attuned to audience preferences, incorporating multimedia elements, and upholding journalistic ethics, content developers can continue to play a crucial role in shaping the narratives that define our collective understanding of the world. In essence, the journey of

content development for mainstream media is an ongoing exploration, one that balances tradition with the demands of a rapidly evolving media landscape.

References

- https://egyankosh.ac.in/bitstream/123456789/57128/1/Unit%202.pdf
- MS Nain. 2014. Script Writing for Radio and Television. (In:)Premalatha Singh, JP Sharma, RR Burman, and NV Kumbhare. Extension Education: A Handbook. PG School, IARI, New Delhi.
- Walter Fox. 1977. Writing the News; Print Journalism in the Electronic Age. Communication Art Books. Hating House Publishers, New York.
- Www. g.ndsu.edu/agcomm/training/tips-for-video-scriptwriting

CHAPTER – 4

Agricultural Video Production as Digital Platform for Technology Transfer

[1]Dr. B. N. Ambarish

The paradigm shift in agricultural Communication from Transfer of Technology to a Demand driven Approach has been accompanied by new extension methods implemented through a variety of institutional arrangements involving state institutions, private sector agencies, farmer organizations and farming communities. Information, knowledge and skills for sustainable agriculture can be delivered in a variety of ways: through verbal means, typically involving a trained facilitator, printed materials and Information Communication Technologies (ICTs), including two way ICTs such as mobile phones and the Internet and one way ICTs such as documentary video film.

Among the different sources of mass media, documentary film gains a special status because of its ability to communicate to the two sense organs, viz., eyes and ears, simultaneously and to reach a large section of population even those are living in isolated and remote regions.

Video documentaries are fact-based films designed to be educational, informational and instructional with the use of audio-visual inputs. Video documentary has the advantage of sound and sight that can catch, retain and sustain attention for a long period of time. Films can be stored and are readily available for use at any given time and area. They can also be used repeatedly over a long period of time without affecting the production quality. Since number of extension personnel is getting reduced in recent years, these documentary films are used as effective extension tool for communicating to farmers.

Use of documentary film as teaching extension aid could bring possible changes in knowledge level of the farmers. It helps them to adopt innovations and get better benefits in production and productivity.

Documentary films shared through social media have become most opted source of information by farmers in recent days. These developments have opened up new avenues for improving reach of extension services for the needy farmers and other stakeholders.

Use of Audio-Visuals as communication tool

- Audio-Visual Aids are found to be very effective for the following benefits in communication.
- Convey meaning clearly
- Capture attention, arouse and sustain interest
- Enhance the correctness, clarity and effectiveness of the idea and skills being transferred
- Help in learning more, faster, and with thoroughness
- Help in remembering for a longer period Extension Education, reach more people, irrespective of their level of literacy or language
- Save the instructor's time · Reduce the possibility of misinterpreting concepts
- Supplement the spoken word - the combination of audio and visual stimuli is particularly effective since the two most important senses are involved
- Highlight the main points of the message clearly

Production of a Video / Documentary film

"Successful production of a documentary film requires a comprehensive grasp of the concept, a clear identification of objectives or purpose, and a thorough understanding of the diverse stages involved in video film production."

Certainly, video films are created for various purposes to achieve effective communication. Here are some common purposes for which video films are made:

- To create Awareness
- To advise Farmers
- To educate farmers on scientific information
- For advertisement Promotional activities
- For entertainment
- For dissemination of Information Etc

Video documentation in farming can be a valuable tool for communication, education, and advocacy. Here are some specific areas where video documentation can be beneficial:

1. **Farmer Success Stories:**

   Showcase successful farmers and their stories. Highlighting their achievements, best practices, and the strategies they employed can inspire and motivate other farmers. It provides a platform for sharing knowledge and promoting positive farming experiences.

2. **Technology Stories (New Innovations):**

   Feature videos on the latest agricultural technologies and innovations. This could include advancements in farm machinery, precision agriculture, irrigation systems, and other technologies that contribute to improved efficiency, productivity, and sustainability in farming.

3. **Stories on Critical Issues (e.g., Climate Change/Global Warming):**

   Produce videos that raise awareness about critical issues affecting agriculture, such as climate change and global warming. These videos can educate farmers and the wider community on the impact of these issues on agriculture and explore potential solutions and adaptive strategies.

Video films come in various formats, including dramatic/dialogue versions, narrative styles, panel discussions, static interviews with scientists, and dynamic WALK–THROUGH interviews.

1. **Dramatic/Dialogue Version**

   This format involves creating a video with a scripted dramatic storyline. It often includes characters engaging in dialogue to convey a message or tell a story. It's a common format for fictional films, TV shows, and scripted videos.

2. **Narrative:** The narrative format is a broader category that includes any video with a clear storytelling element. This can include documentaries, short films, or any video that tells a story, whether it's fictional or based on real events.

3. **Panel Discussion:** In this format, a group of experts or individuals with knowledge on a particular topic engage in a discussion. It's a common style for videos aimed at presenting multiple perspectives on an issue or sharing insights from various experts.

4. **Static Interview of Scientists:** This format involves conducting interviews with scientists or experts on a specific subject. The interviews are typically shot in a static or fixed position,

focusing on the person providing information. This format is effective for conveying in-depth information on scientific topics.

5. **WALK–THROUGH Interviews:** This format involves conducting interviews while walking through a particular location or setting. It adds a dynamic and visually interesting element to the interview. It's often used in documentaries or interview-style videos to keep the audience engaged. Each of these formats serves different purposes and can be effective in conveying information or telling a story.

The choice of format depends on the goals of the video, the nature of the content, and the target audience

Important elements of video film for effective communication include 1. Attractive voice narration, 2.The use of the most relevant visuals to the content 3.Engaging graphics or animation, subtitles for accessibility 4. Background music and sounds to enhance the viewing experience 5. Incorporation of emotional elements to connect with the audience on a deeper level.

Certainly, video film production involves several stages, often organized into a step-by-step process. The specific details may vary depending on the project and the scale of production, but here are the general stages of video film production.

Different stages of video film production

Pre-production	**Production**	**Post production**
1.Planning(Timeline, Production Team) 2.Developing concept 3. Research 4.Gathering relevant Information 5.Story board preparation 6.Video Script preparation	1.Identification of locations 2.Selection of camera and equipment 3.Identification of resource person for interviews 4.Preparation of Shooting Schedule 5.Recording of visuals and interviews	1.Preview of recorded video footage 2. Script finalization 3.Collection of Graphics, stock photos 4.Selection of Background music 5.Voice recording & editing 6.Video editing 7. Preparation of Master film

Guidelines for video shooting provide practical advice for capturing high-quality footage.

- Indeed, shooting in the morning or evening sunlight, often referred to as the "golden hours," is considered highly favourable for capturing the best shots.
- Avoid Shooting in Unfavourable Weather conditions like fog or cloudy weather
- Midday sunlight can be harsh and create unflattering shadows.
- Always use a tripod or gimbal to avoid shaky visuals.
- Your preparations for shooting encompass essential aspects that contribute to a well-organized and effective production.
- **Location Observation:** Observe the location from different angles to understand the lighting conditions, potential obstacles, and the best perspectives for capturing shots. **Position Selection and Listing:** Identify the best positions for filming and create a list. This includes considering lighting, background, and overall composition. **Interview Background:** Ensure that the background for interviews is appropriate and enhances the visual appeal. Consider factors such as lighting, composition, and relevance to the content.
    - **Interact with Resource Persons:** Communicate with resource persons to confirm their availability and discuss the visuals required for the shoot. This ensures alignment with the script or concept.
    - **Shot Planning:** Plan the shots according to the script or concept. This involves determining the sequence of shots, camera movements, and any specific framing requirements.
    - **Avoid Date and Timings on Visuals:** Ensure that the date and timings are not recorded on visuals unless intentionally included for context. This helps maintain a professional and timeless quality to the footage.
    - **Lens Cleanliness:** Check and clean the camera lens to avoid any distortion or artifacts in the footage. Clean lenses contribute to clearer and more professional-looking visuals.

These preparations reflect a comprehensive approach to ensuring a smooth and successful shooting process. By paying attention to details such as location assessment, shot planning, and equipment maintenance, you increase the likelihood of capturing high-quality and visually appealing footage.

Various types of video shots that filmmakers use to create visually engaging and dynamic content. Let's briefly describe each of them:

Close-ups: Focuses closely on a subject, often capturing facial expressions or details. Close-ups create intimacy and highlight specific emotions.

Steady Shot: A stable and smooth shot achieved using stabilization equipment like a steady cam or gimbal. It provides a steady and controlled view of the scene.

Pan Left/Right: The camera swivels horizontally from one side to another, capturing a wide view. This technique is commonly used to follow action or reveal a new part of the scene.

Zoom In/Out: Adjusting the lens to make the subject appear larger (zoom in) or smaller (zoom out). Zooming can be used for emphasis or to provide context.

Wide/Tight Shots: Wide shots capture a broad view of a scene, while tight shots focus on a specific subject, providing a closer and more detailed view.

Tilt Up/Down: The camera tilts vertically, moving upward (tilt up) or downward (tilt down). This technique is often used to reveal or follow a subject.

Low Angle: Captured from a lower position looking upward, emphasizing the subject's power or importance. It can create a dramatic and imposing effect.

High Angle/Top Shot: Captured from a higher position looking downward. This can be used to show vulnerability, insignificance, or to provide an overview of a scene.

Aerial View: Shot from an elevated position, often using drones or other aerial platforms. Aerial shots provide a unique perspective and are commonly used for landscapes and establishing shots.

Wide Shots: Captures a broad view of a scene, providing context and establishing the setting. Wide shots are often used as opening shots or to transition between scenes.

Each of these shot types serves a specific purpose in visual storytelling, contributing to the overall narrative and impact of the video. Skillful use of these shots enhances the viewer's experience and helps convey the intended message effectively.

Text to speech (TTS).

The integration of artificial intelligence (AI) in mobile technology has led to the development of advanced applications for converting text to voice, often referred to as text-to-speech (TTS) applications. These applications leverage AI algorithms to produce more natural and human-like voices, enhancing the overall quality of narration.

When choosing a text-to-speech app, consider factors such as language support, voice quality, and additional features that may enhance your user experience. Additionally, some devices and operating systems come with built-in text-to-speech functionality that you can explore

Here are some popular ones:
Google Text-to-Speech,
Natural Reader:
Talk Free
T2S
Voice Aloud Reader
Narrator's Voice
Text to Speech (TTS)
My Voice Etc

Video editing has a diverse range of software options to cater to different needs and skill levels. Here are a few more notable video editing software options:
Video pad, Wondershare
VSDC, you cut
Open Shot, Filmora
Lightwork, Apple iMovie
Hitfilm Express

Apple Final Cut Pro, ETC

These tools cover a spectrum of user needs, from simple and easy-to-use editors to more advanced software for professional video production. The choice of software often depends on the user's skill level, specific requirements, and the platform they are using.

Video Editing:

Creating an effective video film on agriculture with the specified requirements involves a thoughtful approach to storytelling and technical execution. Here's a step-by-step guide based on your criteria:

1. Introduction: Start with the film title, and optionally, include the names of the producer and director. This can be accompanied by engaging visuals related to agriculture.

2. Music: Begin with folk music to capture the audience's attention. Use it sparingly and strategically, either at the beginning or intermittently to maintain interest.

3. Voice Narration: Use clear and dominant voice narration throughout the film. Ensure that the voiceover is louder than the background music to maintain clarity.

4. Video Shots: Select suitable video shots from your gallery and place them on the video track. Pay attention to the sequence and flow of shots to complement the narration.

5. Bytes/Interviews: Integrate short bytes or interviews (30 to 40 seconds) strategically between the narrations to provide real-world insights. Ensure that these interviews align with the overall narrative.

6. Text and Graphics: Incorporate text where necessary, especially for statistics. Use visible colours, high contrast, and an appropriate font size for readability.

7**. Maps, Graphs, Animations:** Use maps, graphs, and animations if they enhance the storytelling. Ensure that these visuals are relevant and contribute to a better understanding of the agricultural context.

8. Superimpose Names and Designations: Superimpose the names and designations of the individuals being interviewed or featured. This adds credibility and context for the audience.

9. Smooth transitions For technical stories, focus on smooth transitions between shots. Avoid flashy effects that may distract from the technical content.

10. Background Music to Narration: Add background music to the voice narration but avoid melodies that may compete with the spoken content. Choose music that complements the mood of the film.

11. Credits: Include credit titles at the end of the film. Acknowledge the contributors, crew, and anyone involved in the production.

12. Closing: Conclude the film with a powerful message or call-to-action related to agriculture. Ensure the closing visuals and music leave a lasting impression.

13. Review and Edit: Review the entire film to ensure a smooth flow, proper pacing, and alignment with the intended message. Make necessary edits for coherence.

14. Export and Share: Export the final video and share it through appropriate channels, considering your target audience.

By following these steps, you can create an engaging and effective video film on agriculture, combining visual elements, storytelling techniques, and technical details for a compelling narrative.

Conclusions

Nowadays, farming sector demands planned, systematic and sustainable media intervention strategies for information on latest technologies adopted across the globe. Media is considered very important in enhancing farmers' access to information. Audio-visual media found to be a significant teacher of modern age. Optimum use of documentary films can certainly bring about comprehensive development in agricultural communication. The speed with which information is disseminated today is the outcome of social media intervention. The advent of

social media platforms have saved energy and time of farmers and ultimately enhanced their knowledge level. Farming communities appreciate mobile phone as easy, fast and convenient way to learn the technologies and adopt in their farms. The government organizations in agriculture sector, farm universities and media organizations have to work in close collaboration towards developing a need based communication system for transferring technologies in rural areas.

CHAPTER – 5

Web Applications for Dissemination of Horticulture Crop Production & Technologies

[1]Dr. Reena Rosy Thomas

Introduction

Digital technology will be key to increasing agriculture productivity by delivering recommendations to farmers, based on crop details. Cultivation needs skill and a farmer needs to know when to plant, irrigate, apply fertilizer, protect plants and when to harvest. To remain competitive, the modern farmer often relies on agricultural specialists and advisors for growing population demand. Internet of things based farming provides great benefits which includes optimization of inputs, water usage and treatments. Agricultural system requires the accumulation and integration of knowledge and information from many diverse sources. IT applications solves problems of farmers at doorstep, providing information about various management aspects, improving their livelihoods and bringing awareness. Web application is a cost-effective way of communications channel and is accessed over network using web technology to perform tasks over the internet. For higher productivity in farming an information-based decision-making system is the need of the hour. The end user or farmer must get information at the right time and place.

Mobile Journalism (MoJo) and Agricultural Journalism

The world has become more accessible and one sector where its application has shown extraordinary results is the **agricultural sector**. It has also led to the metamorphosis of journalism with a change in the ways and methods new stories are produced and disseminated. Digital means of communication is an effective tool to achieve effective and timely communication of agro advisories to the farmers. Agricultural Journalists play an important role in communicating news and information to large group of farmers, agriculture officers and stakeholders in very short time and also strengthening agricultural extension services.

Agricultural Journalism is a branch that deals with the agriculture industry, food production and agriculture-related topics. It plays a vital role in informing and raising awareness among the general public of the latest developments in the fields of agriculture, farming, food production, food security and rural development. Agricultural Journalism serves as a platform to inform and educate farmers, policymakers, and the general public about the latest developments (farming techniques, crop patterns, soil health, and the impact of climate change on agriculture) in the agricultural sector. It also highlights the challenges and opportunities in the agricultural sector and provides solutions to these issues. It's a way for farmers, politicians, and the public to come together, share ideas, and come up with solutions

to problems. As agriculture continues to play an increasingly important role in the global economic landscape, agricultural journalism will remain an essential resource for informing and educating the public.

Importance of Online media in Agriculture

News organizations can now reach people all over the world, regardless of geographic location to reach a global audience. Basic steps to streamline the process of effective mobile journalism: research, write, shoot, edit, geotag, store and socialize. Artificial intelligence can optimize news distribution on digital platforms, provide personalized recommendations, or improve interaction with readers through virtual assistants. The result of Mobile Journalism (MoJo) can be printed on a newspaper or broadcasted on a television or radio channel or streamed as a podcast or published on a web portal. Important effective tool in transfer of technology in the form of videos covering success stories, sustainability, profitability and empowerment. Small duration videos and audios can be shoot and made in the fields, animal sheds, demonstration units and uploaded from anywhere for the larger benefit of farming community. It is said that we believe what we see, thus these videos and online media news ensures higher adoption of the technologies.

Web Applications

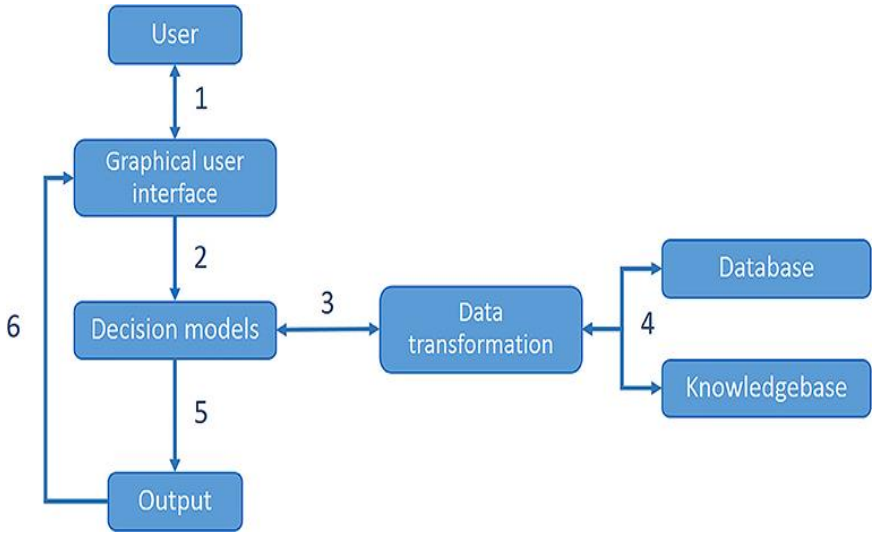
A web application is software that runs in your web browser. It needs a **web server, application server and database**. Web servers manage the requests that come from a client, while the application server completes the requested task. A database stores any necessary information. Developers write most web apps in JavaScript, HTML5 or CSS (front-end). Server-side programming creates the scripts a web application will use. Languages such as Python, Java are commonly used in server-side programming**.** Server-side processes are executed on the web server, while client-side processes are executed on the user's device. Web

applications run on multiple platforms regardless of OS or device as long as the browser is compatible. They are not installed or downloaded on the hard drive since they are accessed through a network, thus eliminating space limitations. However, they have an added advantage of working across multiple platforms, having a broader reach, and being easily accessible from anywhere. Users can access the applications through various platforms such as a desktop, laptop or mobile.

Decision Support System

Decision support systems (DSS) are **interactive software-based systems** intended to help users in decision-making by accessing large volume of information generated from various related information systems. Types of decision support systems: These can be categorized into five types: communications driven DSS, data driven DSS, document driven DSS, knowledge driven DSS and model driven DSS.

To develop DSS in Agriculture system, interdisciplinary knowledge combining different disciplines, accurate collection and recording of agricultural knowledge, list of advice for supporting their decision-making under different circumstances is required. First stage in developing a decision support system (DSS) is the acquisition of data. Information to be collected for developing a well-designed DSS varies from weather data such as temperature, relative humidity; biological data, pest population data and disease symptoms; biophysical data such as plant growth stages; geophysical data like season, climate, soils, etc. survey results, residual levels of pesticides, commodity prices; sensors that measure temperature, humidity, rainfall, leaf wetness, wind speed and direction, etc. DSS can help decision-makers to use models and data and solve defined issues. Most models developed in agriculture system are climate driven. Developing user-interactive content and real-time pest forecasts and management support is very beneficial for the end user thus avoiding unwanted consequences of pesticide applications, providing accurate application times for pesticides, nutrient, and fertilizer. Further with advanced development in technology real-time weather forecasting, irrigation management, market information and geographical information-based systems will maximize the crop productivity, improve decision quality and problem solving.



Web applications developed at ICAR-IIHR, Bangalore

ICAR-IIHR actively disseminates technical knowledge of the research outputs through print media, radio talks, TV programmes and social media reaching out to a number of growers and other stakeholders. The web applications acts as a powerful tool with extensive potential in agriculture and benefitting farmers. At IIHR, Bengaluru, several web applications are developed on horticultural crops; fruits, vegetables (Fruits: mango, papaya, pomegranate, guava, grapes &sapota, and on vegetables crops; brinjal, onion, okra, french bean, watermelon and tomato) and flower crops to disseminate the information.

The front end of the web applications were designed in windows platform using Microsoft web expressions to make it user friendly, with GUI using HTML and CSS scripting languages. With the user interface design the navigation to different web pages is made user friendly and attractive. The home page displays various features for crop cultivation and provides links to different important information such as Crop description, Area, planting, spacing, varieties, propagation, nutrient requirements, irrigation methods, soil & climate and cultural practices on each crop. These crop cultivation and disease and management information were collected from respective divisions and these contents were uploaded to system. Under varieties link, the varieties released by IIHR are given with detailed description and its disease resistance.

Web applications for flower crop management system was also developed covering all major flower crops viz., Carnation, China aster, Chrysanthemum, Crossandra, Gerbera, Gladiolus, Jasmine, Marigold, Rose, Tuberose & Orchids. The Disease diagnosis and management modules helps the farmers to view the various diseases affecting the crop with information on the disease symptoms, its development and management and control measures are provided in the system. Also various pests affecting the crops and its effect on the crop and the management measures are detailed in the application. The developed web applications are available in ICAR-IIHR website where users can easily access through the web browser.

ICAR-IIHR Seed portal

The Institute is producing breeder seeds and has witnessed a huge increase in the demand for seeds which are sold with the brand name 'Arka'. Hence, the institute have expanded the seed production activities and also has developed ICAR-IIHR Seed portal through which farmers can get quality seeds through online. The portal, having information on seeds of high yielding and disease resistant varieties, and hybrids of 17 crops and 28 varieties developed from ICAR-IIHR for online sale, was made fully functional from 29 May 2020. It also collects data viz., region, district & state through customer registration and validation while signing up. It provides information to farmers about the suitability of crop varieties for different agro-climatic zones. The portal aims to take the institute's quality seeds to even remote places of the country. The productivity of horticultural crops will be increased as the seeds are high yielding and has resistance to several diseases. The online seed portal can be visited at https://seed.iihr.res.in.

QR code:QR codes allow users to access information instantly, hence it's called as **Q**uick **R**esponse code. It is an easy way to access online agricultural information. Every QR code consists of a number of black squares and dots which represent certain pieces of information, for a machine to read. When your Smartphone scans this code, it translate that information into something that can be easily understand by humans. These codes are commonly seen printed on product and food labels that lead to information about a certain item or product when scanned using a smart phone device. For example, from a food product it gives a better idea of what the product is all about, what the brand stands for, the nutrient content information, source etc., QR codes can store various types of information, including alpha numeric text, plain text messages, URLs, contact information, email addresses, phone numbers, etc. It is faster and more intuitive way to direct people to websites than by entering URLs manually. It could be a website, social media account, online menu or registration. QR codes are used for making payment, for accessing social media platforms, sharing contact information, for access control etc.

Artificial Intelligence in Agriculture

Artificial Intelligence technologies can assist in monitoring crops, predicting weather conditions, develop plant protection measures, and derive the ideal growth conditions with input use efficiency.

AI techniques are used in agriculture in the following areas:

- Sensors
- Soil Analysis
- Automation of irrigation System
- Camera-Computer vision
- Drones
- Pets, insects and diseases
- Robotics
- Classification of ripe fruits
- Harvesting
- Sorting and packing
- Weed control

  Sprinkler management
- Weather prediction
- Smart Irrigation

Conclusion

Farmers face a lot of problems in agriculture from sowing to harvest and further with post-harvest period and marketing of the product. At farmers' level, productivity and monetary benefits act as guiding principles while opting for a particular crop/cropping system. The lack of access to reliable and timely information about weather conditions, various management practices is another problem faced by the farming community. Thus a good decision making and information system with the help of advanced technology would provide valuable information to the farmer for his cultivation plans, recommendations for the appropriate use of fertilizers, crop protection measures and marketing strategies. Mobile journalism being one of the fastest growing area in the journalism industry, dissemination of information though smart phones and digital media is the fastest way to communicate to the farming community.

CHAPTER – 6

Mobile Applications for Horticultural Crop Cultivation

[1]Dr. M.K Chandra Prakash

With the advancement of technology and penetration of mobile phones, mobile apps and services are being exclusively designed for farmers in empowering them and facilitate the extension services that can address the global food security issues. The agriculture industry realizes the need to introduce tech-oriented innovation for providing value to its farmers. Mobile applications in agriculture have become increasingly popular and essential for modern farming practices. These applications offer a range of tools and features designed to help farmers involved in agricultural crop cultivation and enthusiasts improve productivity, manage resources, access information, and make more informed decisions.

Here are some common functionalities and types of mobile applications in agriculture:

Crop Management and Monitoring: Applications that assist in monitoring crop growth, providing information on planting, irrigation, fertilization, and pest control. Some apps use sensors or image recognition to monitor crop health. With the operation of real-time farm data, they are playing a key role in decision-making.

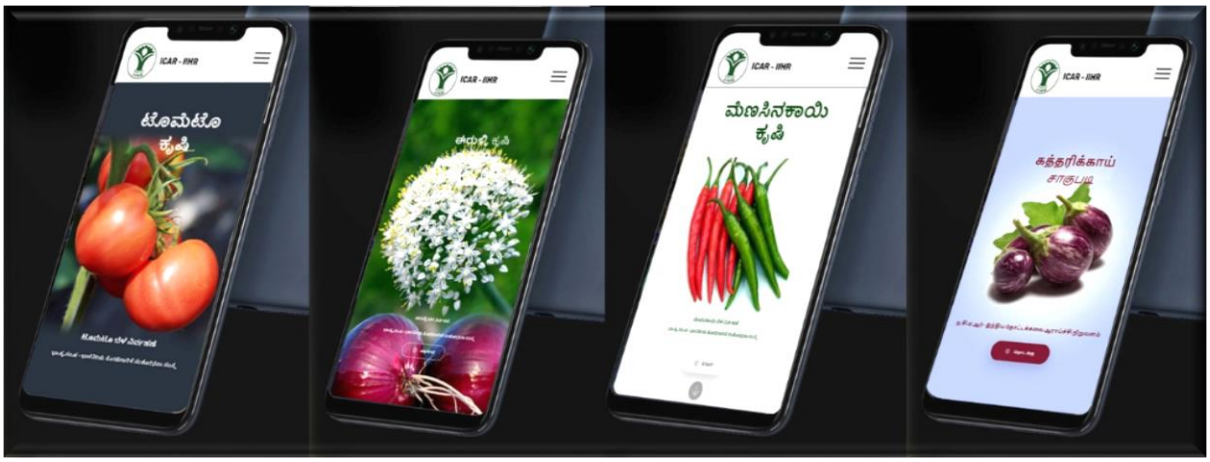
The mobile applications developed at ICAR-IIHR, Bengaluru are available at https://mobileapp-iihr.web.app **- Mobile app on Fruits & Vegetable crop cultivation**

The above Mobile apps are being developed in English and Regional language. Tomato, Onion, Brinjal, Mango, Papaya, Okra, French bean, Pomegranate, Sapota and watermelon cultivation in English language, and in regional languages the following apps are available:

- Tomato, Onion and Chilli cultivation in Kannada language
- Brinjal, French bean, Sapota cultivation in Tamil language
- The Pomegranate and Papaya cultivation in Telugu language

The app is included with crop management solutions and also providing the following features; Crop cultivation aspects, Disease and Pest management, FAQs, Farmers Query submission, Contact Us. In the regional languages, the language content was converted to Unicode format to display local languages in all mobile devices. Theses Unicode scripts were embedded in main program modules to display content in regional languages to cater local famers. The crop cultivation aspects will be benefitting farmers on crop production, disease and pest control measures and different varieties available with its salient features would be useful for efficient cultivation.

The mobile app for Tomato, Onion and Chilli cultivation app has been developed in Kannada language and Brinjal in Tamil language to cater the need of local farmers are displayed above. These apps are integrated with consolidated mobile app for fruits and vegetables developed for

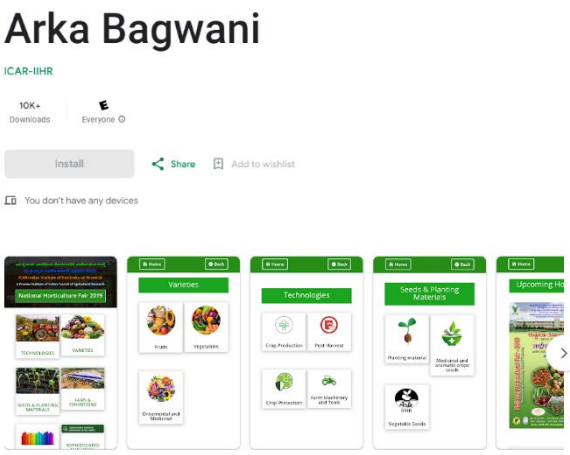


smart phones which could be installed from Google play store and as well as from IIHR website.

The Mobile app was designed using Java script and jQuery codes for various modules of the app. The UI was designed to accommodate various Sizes of Digital Gadgets. Disease and Pest management: The dynamic sliders developed using jQuery codes embedded with Unicode scripts for Regional languages with main application on Disease and pest management measures. It includes various diseases and pests affecting the crop describing its symptoms and control measures to be taken by the farmers for better management. JQuery codes were developed for scrolling automatically and navigational features of various disease images. On selection of disease, jQuery codes enables to display the relevant information such as disease symptoms and control measures on parent window The crop cultivation aspects viz., Land preparation, Use of Bio agents, Nursery raising and Seed rate, Transplanting, Drip irrigation, Fertilizers and Fertigation, weeding, mulching, IPM and IDM, Harvesting and yield are provided in Kannada language in the application. The Cultivation aspects of Tomato were listed as Expandable and collapsible menu. From sowing to Harvest all process listed sequentially, the up down arrow buttons provides viewing each aspect in same screen.

The Tomato promising varieties cab be filtered based on selection Viz., rainfed, processing, TLCV resistant etc., The filters are listed in Kannada languages based on selection result are displayed. Further, Integrated Disease management modules were developed in local language at different stages of crops, ex., IDM at Nursery stage, at the time of planting and after planting saplings.

Similarly IPM (Insect pest Management) during Nursery stage while planting and IPM in the main field. All these are available as mobile apps link at institute website https://iihr.res.in. The details are provided in regional language for easily understandable language to cater local farmers. Further, the IIHR released varieties and hybrids with salient features are included, the other promising varieties and hybrids details are also included in the app on selection of the specific crop.A query window for farmers related to crop cultivation is available to post the cultivationproblems on above specified crops in regional language. The module designed to accept locallanguage as query input for the cultivation problems. All these farmers queries are received bymail and reply will be communicated by Email by domain experts. The application has been hosted in Google firebase cloud application. As the apps are available in Google Firebase Cloud it could be universally accessible throughout the year across the world.



ICAR-IIHR, Bangalore has designed and developed mobile app; Arka Bagwani to increase the visibility and client connectivity for instant information. The app provides information on varieties, technologies, success stories, seeds & planting material available for client's support. It also provides link to an online system – 'Sophisticated Analytical Instrument Facility' (https://saif.iihr.res.in) developed by the Institute for use by scientists, teachers, government institutions and private companies across India, Horti advisory for the benefit of farmers and the list of technical/extension bulletins released by the Institute. The app is simple and user friendly with continuous up gradation capability and have options of android /IOS mobile operations.

Conclusion: In conclusion, the integration of mobile applications into horticultural crop cultivation represents a significant leap forward in precision farming and resource management. The advent of these applications has streamlined various aspects of cultivation, offering farmers real-time data, insights, and tools at their fingertips. Mobile applications for horticulture facilitate more informed decision-making, allowing farmers to optimize water usage, monitor crop health, and implement precise pest and disease control measures. The accessibility of these applications empowers farmers, regardless of their location or technological expertise, contributing to increased efficiency and productivity in horticultural practices.

CHAPTER – 7

Arka Samachar for YouTube Broadcasting, Streaming On Mobile

[1]Dr. Ramya H R

The use of mobile extension (m-extension) has enabled effective communication between farmers and extension scientists/workers and ensures that technology transfer continues in the absence of face-to-face communication. The aim of the mobile agro-advisory services is to complement and extend existing extension efforts, and to reduce the time lag in dissemination from research system to client system thus further empowering farmers to solve their everyday farming problems. The mobile revolution in the country is a powerful digital intervention that has empowered people and systems alike in achieving efficiency, viability, inclusiveness and sustainability which emphasizes the need for a "digital revolution" to usher in an "income revolution" in agriculture. ICAR Institutes, KVKs & ATARI have tapped full potential of different Information and Communication Technology (ICT) tools including Expert Systems and Mobile Apps, and provided advisories on appropriate crop management technologies to address farm challenges during the lockdown and supported farmers and farm women. It was documented that more than 5.48 crore farmers have already been reached through the issue of 1,126 advisories across the states by Krishi Vigyan kendras (KVKs) through m-Kisanportal. Dissemination of advisory was also made through WhatsApp groups (4893 KVK WhatsApp groups covering 5.75 lakh farmers) and other digital platforms (reaching 8.06 lakh farmers). 936 News items on advisories issued by KVKs appeared in newspapers; messages were disseminated through broadcast of 193 radio talks and 57 TV programs. (*e book:* ICAR initiatives during COVID-19 pandemic. 2020). Hence it is evident that e-extension models are effectively proving their worth in the difficult situations to reach the farmers rapidly.

An exclusive YouTube channel for diffusion of ICAR-IIHR, Bengaluru technologies: "Arka Samachar" would act as a channel comprising information on all the different activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical and management skills and practices in horticulture production and processing, so as to improve their livelihoods and well-being. Arka Samachar being disseminated in 7 different vernacular languages is a combination of personalized and ICT based extension approach due to the presence of human element called

extension expert who handles ICT tools to link farmers and experts for the purpose of technology transfer. All news pertaining to IIHR Activities, services, research, education, training, weather forecasting, Government Schemes, exhibitions, fairs/melas etc, will be broadcasted through youtube and available on mobile for all the stakeholders.

Stages of Arka Samachar Production

1. Pre-Production

- Planning - (Timeline, Production Team)
- Developing concept
- Research
- Gathering relevant Information
- Story board preparation- (By developing Seasonal Calendar)
- Video Script preparation

2. Production

- Identification of locations
- Selection of camera and equipments
- Identification of resource person for interviews
- Preparation of Shooting Schedule
- Recording of visuals and interviews

3. Post-Production

- Preview of recorded video footage
- Script finalization
- Collection of Graphics, stock photos
- Selection of Background music
- Voice recording & editing
- Video editing
- Preparation of Master film –Arka Samachar

What to consider in developing writing materials for farming community?

- Educational objective
- Whether you wish to change his knowledge, skill /attitude
- Educational task
- Whether it is intended to be distributed to the whole world, nation, state, district, village
- The people to be reached
- Farmers
- Extension workers
- Para extension workers etc.

Characteristics for writing for farming community

- Accuracy (correctness)
- Brevity(brief)

- Clarity (clear)
- Concise(summarizing a lot of information)
- Consistent
- Avoid exaggeration

Steps to develop the material for Arka Samachar/any mass media

- Collect additional information for the topic/content to be covered
  - **Research-Write-Shoot-Edit-Geotag-Store-Socialize**
- Discuss with your colleagues/peers /scientists/extension workers and even farmers if feasible to whom it is intended
- Decide the style

Factors to be considered to decide the style

1. Quantity of the material after treatment

i. If your material has a wide applicability then think of popular article/feature story
ii. If it is immediate value to farming community then think of mass media video production, radio talk or TV talk
iii. If material is little then think of folder or a leaflet
iv. If the material is around 3-12 pages then go for a pamphlet
v. If it is a voluminous material then think of a bulletin

2. Time availability

i. Mass media video production, radio talk or TV talk involves preparation &takes time and is it worth the efforts?
ii. Whether the time put in earns him the recognition/prestige/promotion/award
iii. Above all useful to the farmer and satisfaction to the scientist
iv. If the material is for farmers/extension workers then better let it be in local language

3. Treatment of the material

i. Avoid generalizations
ii. Decide style and type of material
iii. Collaborate with institute staff/extension workers/farmers
iv. Include state and central Govt organizations to see how they develop similar materials
v. Indicate exact action the farmer have to do e.g.., use 5kg Furadon granules before 15th January for Rabi sorghum
vi. Avoid vague statements like disease resistant breed helps, take preventive measures, sow in the optimum period

Readability

- Readability refers to the ease with which a written text can be understood by its target audience.
- A readability index, or readability score, quantifies how difficult a piece of text is to comprehend.
- These indices often use various factors such as syllable count, word count, and sentence length to determine a text's readability.

How to test the readability? And what is it?

- A written material is readable if it can be read by the intended users
- A good readability is that the reader(farmer/extension worker) feels interested/pleasant
- Less of scientific jargons/difficult words-more the readability
- Easy sentences/ and lesser words per sentence-better readability
- Active voice increases readability
- Limit sentences to one thought-it increases readability
- Cut useless words and information

Types of Readability Indices

1. Flesch Reading Ease: Developed by Rudolf Flesch, this is one of the most widely used readability tests. The score ranges from 0 to 100, with higher scores indicating easier readability.

2. Flesch-Kincaid Grade Level: This test indicates the American grade level a reader needs to be at to understand the document.

3. SMOG Index: An acronym for "Simple Measure of Gobbledygook," this formula was created by Harry McLaughlin. It focuses on words with three or more syllables to estimate the years of education a reader needs to understand the text.

4. **Coleman-Liau Index:** This formula uses characters rather than syllables to estimate the U.S. school grade level required to understand the text.

5. **Automated Readability Index (ARI):** This uses character counts to predict the grade level required.

6**. Dale-Chall Readability Formula**: Instead of focusing on sentence length and word length like many other formulas, this one relies on a list of familiar words to assess the text's difficulty.

7. Gunning Fog Index: Developed by Robert Gunning, this test estimates the number of years of formal education needed to understand a piece of text on the first reading.

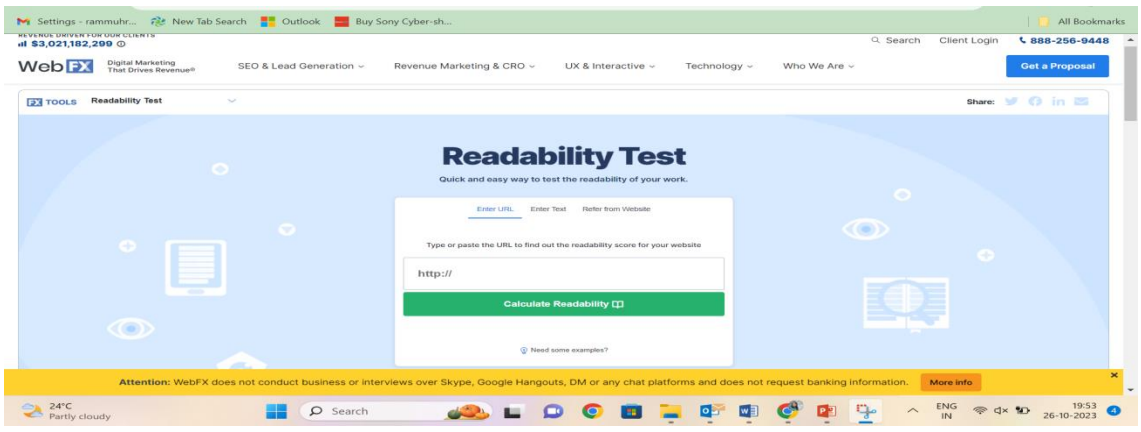
Gunning fog Index formula

Readability test using online tools

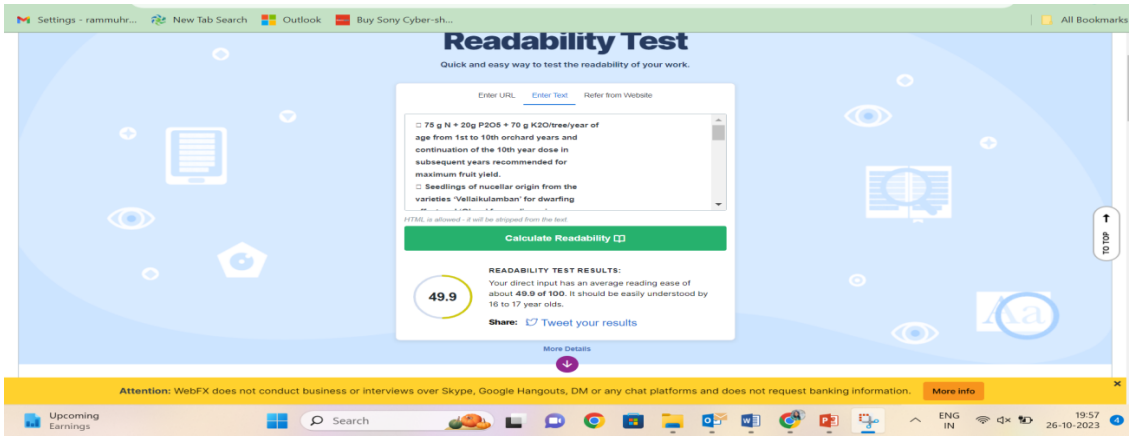
The online Readability Test Tool provides a quick and easy way to test the readability of your work. It is the most flexible readability software for assessing readability formulas.

Example: Web FX Readability Test Tool

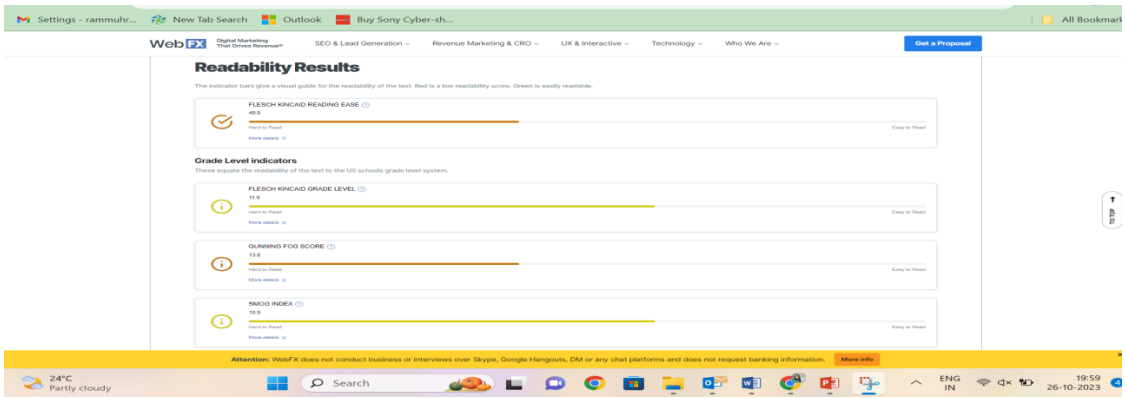
Step 1: open the web FX webpage and click on it, the window opens and then Enter text which you need to check for the readability level

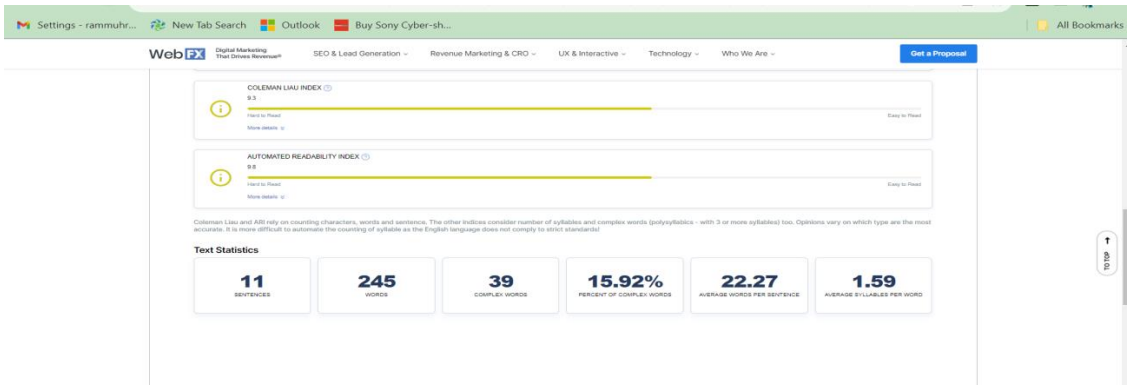


Step 2: Click on calculate readability



Step 3: Check on the readability results and draw inferences with comparison of different index





Criteria for Considering Hard and Easy to Read

- Generally, a higher score in Flesch Reading Ease indicates a more straightforward text. A score above 90 is considered easily understandable by an 11-year-old, 60-70 by 13-15-year-olds, and 0-30 is best understood by college graduates.
- For the Flesch-Kincaid Grade Level and other grade-level based indices, the score typically corresponds to school grade levels. For example, a score of 8 would indicate the text is suitable for an 8th grader.

Readability Score for Farmers: There isn't a specific "readability score for farmers," as farmers, However, if you're trying to communicate essential information to a broad farmer audience:

1. Make sure your content is free of jargon, unless it's industry-specific terminology familiar to most farmers.

2. Use clear and concise language.

3. Aim for a readability score that corresponds to **an 8th to 10th-grade reading level to reach a wide audience**. This is a general recommendation often used for mass communication.

What to do after you develop the material for mass media?

- Disseminate it without time loss
- Either to the public or to the intended end users

How do you find out Arka Samachar is relevant and useful?

- Follow up work- YouTube Analytics, Sentiment analysis, word cloud
- Surveys - telephonic survey, online survey
- Discussions with users and promoters
- Even a PRA/RRA would be good enough

Sentiment analysis

Sentiment analysis is the process of detecting positive or negative sentiment in text. Sentiment analysis algorithms fall into two buckets – Automatic and Hybrid.

- Types of analysis used– Fine-grained Sentiment Analysis, Emotion detection, Aspect-based Sentiment Analysis, Multilingual sentiment analysis.

Text Classifier : With the recent advances in deep learning, the ability of algorithms to analyse text has improved considerably. Creative use of advanced artificial intelligence techniques can be an effective tool for doing in-depth research. It is important to classify incoming beneficiary conversation about a technology based on following lines:

- Key aspects of a technology and service that beneficiaries care.
- Users' underlying intentions and reactions concerning those aspects.

Intent Analysis: Intent analysis helps in analyzing the user's intention behind a message and identifying whether it relates an opinion, news, marketing, complaint, suggestion, appreciation or query.

Contextual Semantic Search (CSS): To derive actionable insights, it is important to understand what aspect of the technology a user is discussing about. An intelligent smart search algorithm called **Contextual Semantic Search (a.k.a. CSS)**. The way CSS works is that it takes thousands of messages and a concept (like **Price**) as input and filters all the messages that closely match with the given concept.

Effectiveness of Arka Samachar using three measures;

i) Awareness
ii) Knowledge acquisition
iii) Knowledge sharing

• Awareness is measured by the number of farmers reached by information on new practices and technologies

•Knowledge acquisition is measured by farmers' reporting of understanding of information, and their perception of information relevance, timeliness, and reliability according to continuum with scores.

• Knowledge sharing is measured by the proportion of farmers who indicated to have shared information with other farmers within their community, and their willingness to share information they receive, an indicator of trust in the information source and content received with the help of scales with continuum and respective scores.

Next steps to develop the material for mass media

- Use this feedback to prepare better material next time
- Modify the treatment, style and type every time avoid monotony
- Use as many channels as possible so that the technology is spread faster in the shortest possible time
- Preparation for mass media is a continuous process because technologies/audience/ and style of presentations keep changing

Care to be taken while translating

I. The matter must be produced without loss of information
II. Use correct local words for technical terms
III. Coin new words to fit the local language naturally

Case study of Pusa Samachar, IARI New Delhi

ICAR-Indian Agricultural Research Institute (IARI) in New Delhi developed 'Pusa Samachar,' a multimedia extension model for farmers using YouTube. The model aimed to provide timely, location-specific crop information and weather updates. To evaluate its impact, YouTube analytics were used for secondary data, and primary data were collected from 318 stakeholders, including farmers, students, researchers, and extension professionals.

Validation of the model considered three key criteria: content and design, ease of understanding, and fulfilment of information needs. Stakeholder responses, gathered through a Likert scale, indicated positive perceptions. The model demonstrated effectiveness in systematic content presentation, appropriateness for learning, and practical applicability. Stakeholders found it comprehensible, with self-explanatory graphics, and fulfilling information needs, including saving time and money. For validation of the model, stakeholders responded on a five-point Likert scale from strongly agree to strongly disagree.

In conclusion, 'Pusa Samachar' proved valuable in disseminating agricultural information through social media, garnering positive feedback from diverse stakeholders for its content, accessibility, and practical relevance. ('Pusa Samachar': an innovative multimedia-based extension advisory model **Article** *in* Current Science · August 2022 DOI: 10.18520/cs/v123/i4/574-582)

Recommendations for content development for mobile journalism

1. Audience-Centric Approach: Tailor content to meet the diverse interests and preferences of the target audience, ensuring relevance and engagement.

2. Multi-Platform Adaptation: Develop content that can seamlessly adapt to various platforms, including social media, websites, and traditional broadcast channels, to maximize reach.

3. Visual Appeal: Incorporate visually appealing elements such as graphics, videos, and interactive features to enhance storytelling and captivate the audience.

4. Fact-Checking and Accuracy: Prioritize rigorous fact-checking processes to maintain the credibility of content and establish trust with the audience.

5. Diversity and Inclusion: Reflect the diversity of perspectives and experiences in society to foster inclusivity and resonate with a broader audience.

6. Timeliness and Relevance: Stay current with news and trends, ensuring that content is timely and relevant to the audience's interests and concerns.

7. Collaboration and Partnerships: Foster collaborations with experts, influencers, and other media outlets to enrich content with diverse voices and expertise.

8. Interactive and User-Generated Content: Encourage audience participation through interactive features and user-generated content, promoting community engagement and loyalty.

9. Data-Driven Insights: Utilize data analytics to understand audience behavior, preferences, and trends, informing strategic decisions in content development.

10. Ethical Considerations: Uphold journalistic ethics, integrity, and responsibility in content creation, ensuring that information is presented in a fair and unbiased manner.

CHAPTER – 8

ACCESS THE UNSEEN

[1]Dr. Mahender Kondapalkala

Context:

The significance of mobile journalism, emphasizing meticulous attention to detail, high-quality content production, and strategic planning. The success in mobile journalism is contingent on factors such as audio and video quality, deliberate editing, and compelling narratives. The importance of having a clear mental picture of the story before utilizing mobile devices, stressing the role of thoughtful and well-considered approaches in the field. Overall, the portrayal of mobile journalism underscore sits dynamic nature, where innovation, curiosity, and strategic thinking play crucial roles in producing engaging and impact full content.

Topic	Details
1	**Soil Testing as a Service(STaaS) Platform by Krishitantra**
2	**By Green Bliss Agri Inputs-commerce platform Market**
3	**The Devilis in the detail**
4	**Everything is in mind**
5	**Inquisitiveness**
6	**Beneficial Productive Tools**
7	**Case Study**

Soil testing as a Service (STaaS) Platform by Krishi tantra

India has primarily been an agrarian economy, and farming has undergone significant changes in recent years. The Sustainable Development Goals (SDGs)usher in a new phase, addressing challenges related to farming and soil health, necessitating comprehensive resource management from holistic perspectives.

In light of above, several questions come to mind.

 Is there merit in adopting scientific management of plant nutrients for higher crop productivity? How can farmers optimize crop production for the market and margins?

Is the supply chain suffering due to an in ability to forecast?

In plain terms, how can we improve soil nutritional balance?

And is there a missed opportunity in Carbon Credits due to a lack of insight on their sustainability?

The answer with certainly is that we need to put the data and knowledge into the hands of the people who are going to use it: farmers, policymakers, and corporates. And that's where The Krishitantra Soil Testing as a Service (STaaS) Platform comes in as a partner.

By Green Bliss:
Agri Inputs e-commerce platform:

The agri-inputs e-commerce platform offers farmers the following benefits:

- Farmers can conveniently purchase agricultural inputs online
- Wide range of seeds, fertilizers, pesticides, and equipment available
- Ensures access to high-quality, climate-friendly inputs
- Encourages sustainable farming practices.

Market Linkages Platform:
The market linkages platform offers farmers the following benefits:

- Farmers can connect directly with potential buyers
- Platform facilitates direct sales and partnerships
- Eliminates intermediaries, ensuring fair prices for farmers
- Enhances market access for farmers and promotes local economies

"The Devil is in the detail"
The phrase "the devil is in the detail" emphasizes the importance of paying close attention to small, seemingly insignificant elements. It suggests that the success or failure of a project can hinge on the careful consideration of even the smallest details.

In the growing field of mobile journalism, meticulous attention to detail might entail producing audio and video content of the highest caliber, deliberate editing, and compelling narratives. The overall quality and audience engagement of a mobile journalism article can be greatly influenced by minor factors like as appropriate framing, well-lit scenes, and audible audio.

"Everything is in mind"
"Everything is in mind" underscores the importance of strategic thinking, planning, and creativity. It suggests that success in these fields begins with a thoughtful and well-considered approach.

"Everything is in mind" refers to the idea that journalists should have a clear mental picture of the story they intend to tell before using a mobile device to cover a story. This entails thinking about the

Perspectives, images, and scenes that will effectively convey the narrative. It high light show important it is to plan ahead and have a conceptual frame work before actually starting the journalistic process.

Inquisitiveness

Inquisitiveness is a foundational quality. This trait drives them to explore stories from different perspectives and seek out unique angles. Inquisitive minds are more likely to discover compelling narratives that resonate with their audience.

Curiosity Fuels Innovation:

In the rapidly changing field of mobile journalism, the confluence of innovation and curiosity is essential. It takes an inquisitive mind to embrace new technology, narrative strategies, and multimedia formats.
Inquisitiveness propels inventiveness in content production and sustains audience interest through novel and intriguing narrative techniques.

Asking the Right Questions:
Having the ability to pose intelligent inquiries is crucial for mobile journalism. To get to the core of a story, reporters need to probe deeper than the obvious. Proper questioning facilitates a thorough investigation of the topic and yields deeper under standings. Investigative journalism, on-the-ground reporting, and interviews all benefit greatly from this ability.

AI Thrives on Curious Minds:
An inquisitive attitude becomes an invaluable skill as artificial intelligence gets more and more integrated into mobile journalism. Innovative uses of AI tools can result from knowing their capabilities, investigating how they can improve storytelling, and being inquisitive about the data they provide.
Inquisitive minds in mobile journalism are more likely to use AI to improve the storytelling experience over all, evaluate data, and optimize work flows.

Beneficial Productive Tools:
pitch.com: The fastest and easiest way to make an A grade presentation with high quality design and data integrations.

Examine. com: This website lets you cut through the noise of nutrition & supplements information. Get right into the facts that you want.
newspapers. com: The world's largest online newspaper archive. Unlock childhood memories or hidden gems with ease. Ith as location and date range search capability.
excelformulabot.com: This website uses AI to transform text instructions into an excel formula.my90stv.com: TV simulator showing shows, music, videos, ads &trailersfromthe1990s.toffeeshare.com: Share files privately and securely. With no size limit or storing anything online.tools.pdf24.org: This website allows you to access everything you need to handle PDFs online for free.tinywow.com: Powerful all in one website that can crop, edit and compress your picture, videos, PDF files and much more.

ChatGPT:

https://themarketergury.notion.site/themarketergury/500-Best-AI-Tools-Prompts-

c50164c19ac4431590396c229d10be38

Case Study: Artificial Intelligence in Artificial Insemination

www.agverse.in

Conclusion

In conclusion, the realm of digital mobile marketing communication design stands at the forefront of modern advertising and brand engagement. As technology continues to advance, the importance of strategically crafted and visually compelling content for mobile platforms becomes increasingly evident. Digital mobile marketing communication design not only adapts to the evolving preferences of consumers but also actively shapes and influences these preferences. The key to success lies in a holistic approach that integrates user experience, data-driven insights, and creative innovation. By leveraging the interactive and personalized nature of mobile devices, brands can establish meaningful connections with their audience. However, it's essential to strike a balance between captivating design and respecting user privacy and preferences. As we navigate this digital landscape, staying abreast of emerging technologies and consumer behaviours is paramount. The future of digital mobile marketing communication design holds exciting possibilities, from augmented reality experiences to immersive storytelling. By embracing innovation, ethical practices, and a user-centric mindset, marketers can unlock the full potential of mobile platforms, creating memorable and impactful brand narratives in the ever-evolving digital era.

CHAPTER - 9

MOBILE JOURNALISM AND MEDICINE

[1]Dr. Mandakranta Bhattacharya

Intro: Mobile journalism is a form of using devices like smart phones and tablets to capture, edit and share information or news. It is not a direct tool for medicine but it can play a role in several ways. The ability to download medical apps on the mobile has made a wealth of clinical resources available to healthcare personnel. There are medical applications for many purposes, here briefly a few will be mentioned in relation to mobile journalism. The mobile has proved to be one of the most powerful tools for communication and access to information, which is the essence of journalism.

Medical Reporting; The mobile was a most important tool for reporting during the pandemic. When Covid started I have used the mobile to get reports of those who were tested from IIHR campus, and about those who tested positive directly from the Hessaraghatta PHC (Govt Covid Testing centre) updated from BBMP sources. This information helped to isolate the persons and their primary contacts with in various divisions, and to have the affected areas sanitised as per the standard operating procedures given as guidelines by Government of India. By knowing how many were positive, and the medical profiles of these persons it was useful for statistical purposes or for preparing realistic reports. Similarly for vaccination it was a useful tool for drawing up lists according to who were more vulnerable or higher at risk of Covid, eg. Age wise, existing co-morbidities, immuno-compromised persons within our campus, and covering such people on priority.

Crisis Reporting: This includes reporting of medical conditions during any crisis, eg. A fire in a building happens. All hospitals in the area are alerted of it so as be prepared for any burns casualty. After a major disaster crisis reporting by journalists or even lay persons using the mobiles helps sending sms, visual or WhatsApp alerts to medical facilities nearby regarding where, how many affected and what type of injuries are to be expected and helps them in preparing to handle sudden influx of mass numbers of patients. After the major train accident in recent times in Odisha all hospitals in the district had such alerts within minutes.

Instant news delivery: This happened during earthquakes, accidents and natural disasters like landslides or floods. Persons on sites end initial feedback and then an ongoing real time update keeps circulating to concerned departments to avail maximum resources for management. It is also used in war inflicted areas. These frequent updates and information helps in medical management

Citizen journalism: This is a type of response involving the patients and caregivers to document their health journeys. Major hospitals use it for families of patients suffering

cancer or other life threatening diseases. It empowers them to question, clear doubts, share their bad experiences in a specific group of members so that their experience can help others in a similar situation to handle the emotional and physical stress. It helps to remove stigma attached to various health issues. Citizen journalism can work like an audit in places where there is less transparency. It can reveal unwanted or unnecessary procedures, malpractice and negligence on the part of the medical staff in a particular situation if used by a vigilantly person.

Health Education and Health Promotion; the mobile apps are frequently used to spread awareness of facts related to health, especially related to lifestyle and diet. In the medical fraternity it is useful in creating awareness of newer modes of treatment, newer investigations, and about new drugs available. Very useful to counter fake videos and false propaganda regarding certain forms of treatment which claim to cure or treat without scientific data or evidence based backup.

One of the most influential posters which helped in showing a balanced diet was the picture of a dinner plate filled according to the required quantity of various nutrients (one third with protein items, one third with vegetables and fruits, and one third of grains). This plate picture was more impactful in community medicine than any number of lectures or charts

Telemedicine: Remote health centres like mine benefit from Tele medicine where mobile can be used to share reports of my patients with specialists in the city and get urgent advice. Useful during the pandemic as we extensively used messaging or video calls to advise patients for minor ailments or consultations for other problems and of course to monitor progress of the Covid cases on day today basis.

Remote Health Monitoring: This is an extension of telemedicine where regular patients send via WhatsApp **self-monitored readings** like BP, blood sugar levels, readings from oxy meters or some lab readings and as their regular doctor I can advise regarding dosage or change of medication. This is not a substitute for direct consultation with the doctor but for monitoring chronic diseases it can save time and resources It provides a supportive care over short term.

Medical Training, research and Investigative medical journalism:

Mojo is used to record various medical and surgical procedures and helps as a training tool for healthcare professionals and medical students. For example an intensives circulates a video of proper way to perform CPR and this helps as a refresher to both health workers as well as for lay persons.

Mobile is useful as it can keep all research results at the finger tips , accessible at all hours, and can be complied as needed to assess the impact or relevance of the work.

A professional can investigate health care related issues in uncovering malpractice or highlight challenges within the medical system. This promotes transparency and accountability.

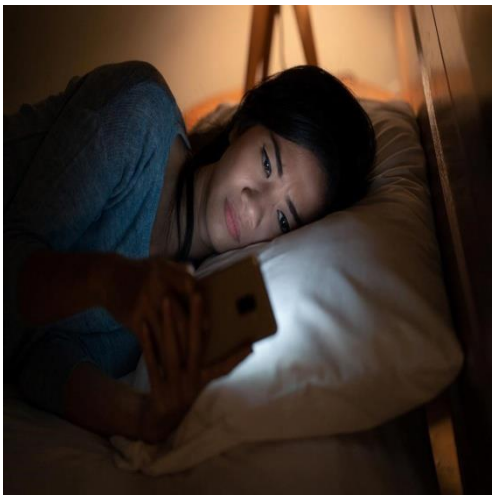
Collaboration with Healthcare Professionals

This is a very useful output of the mobile where immediate interaction is possible by sharing lab reports or scan reports with hospital or with specialists for proper guidance. It is useful in saving time of the hospital staff when a patient is referred there. There is useful creation of informative content instead of wasting time on fresh testing or interpretation, and even regarding the billing for admissions, whether they can avail treatment at discounted rates.

Medical mobile Photography: Useful tool in our hands for high resolution pictures and videos for recording events and sharing on professional basis with utmost care regarding

Privacy. Lot of issues still to be addressed in this regarding taking prior permission from the patient and how much privacy can be ensured.

Adverse effects of Mobile Usage



- Radiation Exposure.
- Impaired Cognitive Function.
- Sleep Disturbances.
- Increased Stress Levels.
- Eye Strain and Vision Problems.
- Neck and Back Pain.
- Increased Risk of Accidents.
- Decreased Social Skills

Conclusion

In conclusion, the fusion of mobile journalism and medicine marks a transformative era in healthcare communication and reporting. Mobile journalism's agility and accessibility empower healthcare professionals and journalists alike to share real-time, impactful stories from the medical field. The immediacy of mobile reporting facilitates faster dissemination of critical health information, bridging gaps in public awareness. However, as we embrace this dynamic synergy, ethical considerations must remain paramount. Upholding patient privacy, ensuring accuracy, and maintaining sensitivity in medical reporting are essential. Moreover, continuous training and adherence to journalistic standards are crucial for mobile journalists navigating the complexities of the healthcare landscape. The collaboration between mobile journalism and medicine offers unprecedented opportunities for transparency, education, and advocacy in healthcare. By harnessing the power of mobile devices, we can foster a better-informed society, enhance medical awareness, and ultimately contribute to improved healthcare outcomes. As technology and medicine evolve, the potential for mobile journalism to positively impact the field is boundless, promising a future where information dissemination contributes to healthier, mre informed communities.

CHAPTER - 10

Participatory Rural Intelligence for Sustainable Rural Livelihoods

[1]Dr. V. K. Jayaraghavendra Rao & [2]Dr. Chandrasekhara .P

Background

Rural intelligence is a prerequisite for strategic rural development and the processes, required inputs are captured with digital platforms customised and available platforms existing in the market, but what makes the problem so grave is the arrival of an action plan by the community through identifying the problems, storming the solutions, and arriving at the most feasible solutions for implementation, through a process of participatory planning for action, with the support of the rural intelligence framework. Further the initiatives by various actors in the Asia pacific countries as evident from the review is focusing on broad themes like education, finance, health, livelihoods, financial inclusion, climate change and so on. But the real integration of all the dimensions at a village, taluk, district level can dovetail the digital efforts and avoid pluralism in the digital initiatives. This paper focusses on that integration as a methodology of rural development framework in the ASIA PACIFIC and the oppressed communes whose livelihoods are vulnerable. Prioritisation of livelihood vulnerability and addressing the concerns are top[priority because vulnerability of livelihoods can lead to migration, famine, death and loss of precious human resources and other physical assets which contribute to sustainable rural livelihoods, further building social capital through organisation of community based organisation for participatory planning and action calls for a digital platform which can capture the vulnerability and guide the community through collective participatory action accepted and implemented by the community , be it participatory development of watersheds, or managing the community property resources(CPR).Presently the plural efforts need to be integrated into one action point for a village or community which calls for synthesising the rural knowledge into strategy points and a community action plan, for a meaningful time period, with refinement of the action plans being done from time to time to strategies, prioritise and come out with realistic executable plans.

Introduction

The Asia Pacific Region is home to 4.3 billion people, constituting approximately 60 per cent of the global population. Within this demographic, there are 1.73 billion unique mobile subscribers, which accounts for about 62 per cent of the population, with nearly 50% having access to mobile internet. This widespread mobile connectivity enables the deployment of digital technologies crucial for supporting Information and Communication Technology for Development (ICT4D) initiatives. (IFAD 2024)

Over the last decade, the use of information and communication technologies (ICTs) and digital tools has been steadily increasing across vast swathes of rural Asia. This surge has propelled Asia to rapidly emerge as a global technological leader; however, the continent is not a monolith, and significant technology gaps remain within the region.

Digitalization presents a crucial opportunity for developing economies to leapfrog across various sectors. By 2050, the demand for food is anticipated to grow significantly, necessitating a 70%

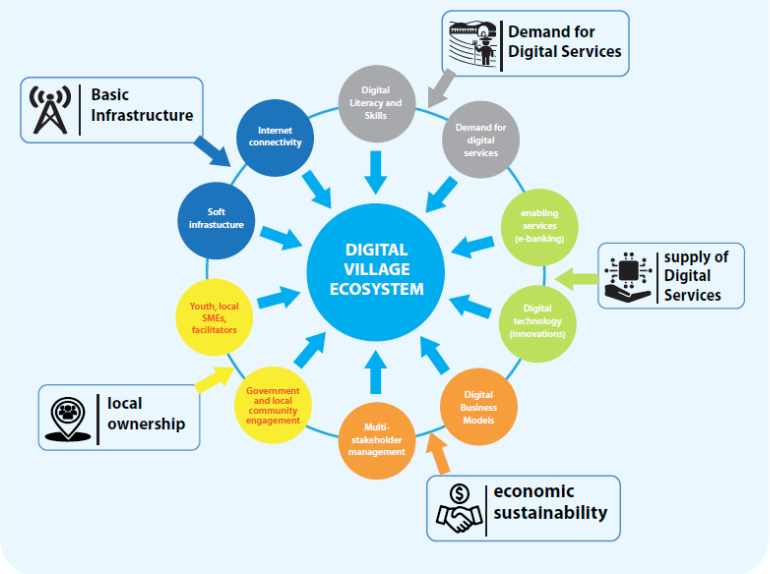
increase in production. To meet this rising demand, the adoption of digital technologies will be essential for improving crop monitoring, pest management, and the precision use of water and other inputs.

Asia Pacific is a vibrant epicentre of global economic activity and home to more than 60 per cent of the world's young people. No wonder the region has an ambitious eye on the future – it's estimated 750 million young women and men, aged between 15 to 24 years, are better educated and skilled than ever before.

The FAO Regional Office for Asia and the Pacific conducted a rapid pre-pilot assessment

of the current status of digital village developments in the region. The assessment reviewed and documented several digital village pilots, models and prototypes from 13 countries, and revealed a variety of approaches, models in developing digital village or smart villages prototypes. Inspired by this rapid assessment, FAO developed a blueprint, for supporting digital villages in the region based on the principals of country-ownership, bottom-up, and ecosystem-cantered digital village development support.

With the help of drones, satellites, and artificial intelligence, information on every aspect of the Longxian Village, from farmland, roads, and houses to residents, traffic, and economy, is collected in almost real-time. The rice-fish system now produces products that meet standard requirements thanks to digital soil testing and formulated fertilization applications. Every product within the rice-_fish system comes with a digital tag that can trace from production to sales. Meanwhile, public services are also digitalized and can be accessed through smartphones.



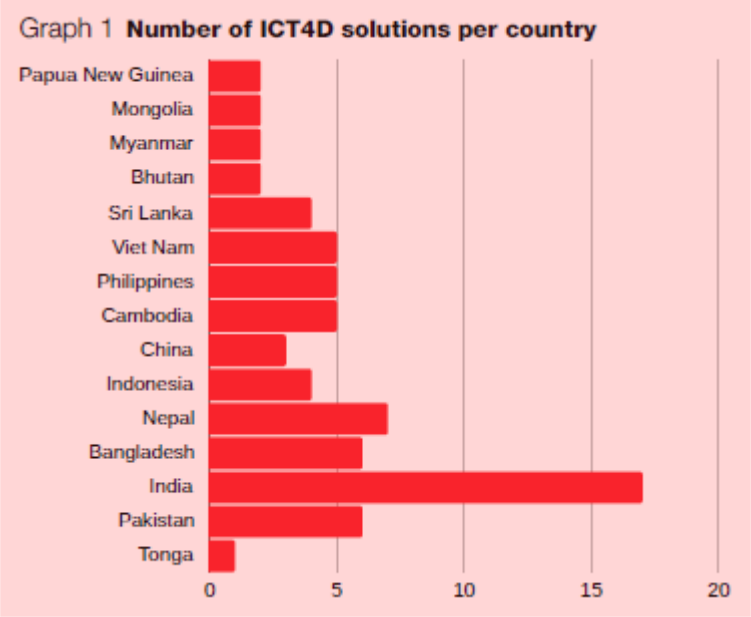
Source: FAO (2022)

Aspirational and ready for change like its youth, the economies of our region are already generating unprecedented GDP growth and enthusiastically embracing emerging digital technologies as tickets to an even brighter future – where low-end manufacturing will Progressively make way for high-value, knowledge-based industries with global reach. The agricultural sector benefits from a wide range of digital tools, from low-tech solutions like SMS, USSD, IVRS, and radio for

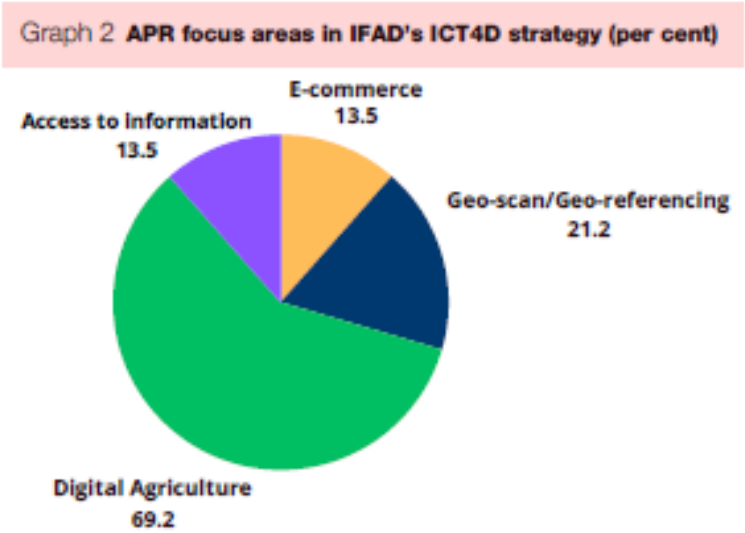
disseminating agronomic advice, to high- tech, integrated tools involving mobile apps, satellites, sensors, AI, and big data analytics. However, challenges such as the digital divide, information asymmetries, and limited literacy hinder smallholders' access to digital technologies for market information, financial services, and advanced agronomic practices, which are vital for enhancing efficiency, profitability, and inclusivity.

According to the International Telecommunications Union (ITU), digital technologies have the potential to accelerate the achievement of Sustainable Development Goals (SDGs), despite only a fraction currently being on track (ITU, 2024).

The majority of ICT4D solutions were funded through Loan Programmes, accounting for 59 per cent of the total funding. The remaining initiatives are supported through grants or supplementary funding sources. In terms of focus areas outlined by the IFAD ICT4D strategy Graph 1 Number of ICT4D solutions per country 2 Read more: IFAD ICT4D Strategy Mapped during the 2022 regional portfolio stocktake 3



(Graph 2), the APR initiatives primarily target digital agriculture, specifically extension services, which constitutes 69.2 per cent of the projects. This is followed by geo-scan and geo-referencing technologies, representing 21.2 per cent of the initiatives. E-commerce and access to information each account for 13.5 per cent of the projects. Graph 2 APR focus areas in IFAD's ICT4D strategy (per cent) ICT4D awareness, capacity, and leadership. While these initiatives may involve upgrading specific ICT capabilities to enhance the quality, efficiency, and effectiveness of IFAD's services, they do not encompass the use of ICT for supporting the Fund's core business processes and activities



Digital Agriculture 69.2 Geo-scan/Geo-referencing 21.2 E-commerce 13.5 Various technologies have been integrated into IFAD projects in the Asia and the Pacific region, including mobile apps, geospatial technologies, decision support systems, automated milking and feeding systems, drones, and more. Among these, mobile apps, decision support systems, and geospatial technologies are the most prevalent and advanced in terms of implementation, as demonstrated by the following examples. 0 5 10 15 20 Papua New Guinea Mongolia Myanmar Bhutan Sri Lanka Viet Nam Philippines Cambodia China Indonesia Nepal Bangladesh India Pakistan Tonga digitalization within IFAD operations by reviewing 46 projects that integrated digital solutions globally, including 15 from the Asia Pacific region (approved from 2008 onwards). As of September 2024, 61 per cent of the ICT4D solutions were identified in South Asia (Graph 1). Access to information 13.5 2

BUILDING A DIGITAL ECOSYSTEM of RURAL intelligence for Sustainable rural livelihood support

Digital agriculture/horticulture uses various technologies along the agricultural value chain. The goal is to leverage Information and Communication Technologies (ICT) along with data ecosystems to provide timely, targeted information and services for profitable and sustainable farming, ensuring the production of safe, nutritious, and affordable food. In this context, mobile journalism plays a crucial role in creating, collecting, editing, and customizing multimedia content for stakeholders with minimal literacy levels and tacit knowledge. Digital agriculture aims to institutionalize farming with technologies like sensors, drones, GPS, and machine learning. ICAR-IIHR, Bengaluru, introduced ARKA BAGWANI and web applications & ARKA VYAPAR for data-driven, digital agriculture. Challenges include content development and mobile accessibility, requiring a strategic action plan.

Digital Technology in Agriculture Posted On: 02 AUG 2022 6:03PM by PIB Delhi)

The Committee on Doubling Farmers' Income (DFI) in its Report has appreciated the role of Digital Technology, which can play a transformational role in modernizing and organizing how rural India performs its agricultural activities. Digital technologies are finding increasing use in the

agricultural value system, and farmers are increasingly becoming more informed, as various measures are taken to provide them ready access to technology and information.

Government of India has taken various initiatives to give a push to digital agriculture in the country, which are given below:

i. Government has finalized the core concept of India Digital Ecosystem of Agriculture (IDEA) framework which would lay down the architecture for the federated farmers' database. Further, the databases related to the schemes governed by the Department have been integrated. The IDEA would serve as a foundation to build innovative Agri-focused solutions leveraging emerging technologies to contribute effectively in creating a better Ecosystem for Agriculture in India. This Ecosystem shall help the Government in effective planning towards increasing the income of farmers in particular and improving the efficiency of the agriculture sector as a whole.

ii. Under plan scheme viz. National e-Governance Plan in Agriculture (NeGP-A) wherein, funds are released to the State(s)/UT(s) for project involving use of modern technologies viz. Artificial Intelligence (AI), Machine Learning (ML), Robotics, Drones, Data Analytics, Block Chain etc.

iii. Sub Mission on Agricultural Mechanization (SMAM) is being implemented w.e.f April,2014.The scheme aims at 'reaching the unreached' by bringing to the small and marginal farmers in the core and giving the benefits of farm mechanization, by Promoting 'Custom Hiring Centres' , creating hubs for hi-tech & high value farm equipment's, distribution of various agricultural equipment's, creating awareness among stakeholders through demonstration and capacity building activities, and ensuring performance- testing and certification at designated testing centres located all over the country.

iv. National Agriculture Market (e-NAM) is a pan-India electronic trading portal which networks the existing Agricultural Produce Market Committee (APMC) mandis to create a unified national market for agricultural commodities. Digital services are provided to traders, farmers, Farmers Producer Organizations (FPO), Mandis through various modules of e-NAM platform such as FPO trading module, warehouse-based trading module.

v. Under PM KISAN Scheme, fund is directly transferred into the bank accounts of the eligible farmers under Direct Benefit Transfer mode. Farmers can do their self-registration through the Farmers Corner in the portal. PM-KISAN Mobile App was launched to broaden the reach of the scheme where farmers can view the status of their application, update or carry out corrections of name based on their Aadhaar card and also check history of credits to their bank accounts.

vi. Integrated Scheme for Agricultural Marketing schemes (AGMARKNET) to promote creation of agricultural marketing infrastructure by providing backend subsidy support to State, cooperative and private sector investments Services are provided through (AGMARKNET) portal which is a G2C e-governance portal that caters to the needs of various stakeholders such as farmers, industry, policy makers and academic institutions by providing agricultural marketing related information from a single window. It facilitates web- based information flow, of the daily arrivals and prices of commodities in the agricultural produce markets spread across the country.

vii. Agriculture Infrastructure Fund (AIF): To mobilize a medium - long term debt finances facility for investment in viable projects for post-harvest management Infrastructure and community

farming assets through incentives and financial support in order to improve agriculture infrastructure in the country. Financial assistance is provided digitally in the form of Interest Subvention and Credit Guarantee for setting up post-harvest management Infrastructure to beneficiaries such as Farmers, Primary Agricultural Credit Societies (PACS), Farmer Producers Organisations (FPOs), Self Help Groups (SHG), State Agencies/APMCs.

vii. **National Mission on Horticulture**: It Promotes holistic development of Horticulture sector (including bamboo & coconut) HORTNET project is a web enabled work flow-based system for providing financial assistance under MIDH. It is a unique intervention to accomplish e-Governance in NHM where-in total transparency has been envisaged in all the processes of workflow i.e., online application filing, authentication, processing and online payment to the beneficiary's bank account through DBT.

viii. **National Project on Soil Health and Fertility**: To issue soil health cards to farmers of the country, so as to provide a basis to address nutrient deficiencies in fertilization practices. Soil Health Card Portal is available where farmers can track soil samples.

ix. **Development of Kisan Suvidha mobile application** to facilitate dissemination of information to farmers on the critical parameters viz., Weather; Market Prices; Plant Protection; input Dealers (Seed, Pesticide, Fertilizer) Farm Machinery; Soil Health Card; Cold Storages & Godowns, Veterinary Centres and Diagnostic Labs. With market information, farmers are better informed about markets to sell produce, prevailing market prices and quantity demanded in the market. Thus, they can make informed decisions to sell produce at the right price and right time.

x. The Indian Council of Agriculture Research (ICAR) has also compiled more than 100 mobile apps developed by ICAR, State Agricultural Universities and Krishi Vigyan Kendras and uploaded on its website. These mobile apps developed in the areas of crops, horticulture, veterinary, dairy, poultry, fisheries, natural resources management and integrated subjects, offer valuable information to the farmers, including package of practices, market prices of various commodities, weather related information, advisory services, etc.

xi. xii. Government is providing advisories services on various crop related matter to the registered farmers through SMSs.

xii. **Implementation of Digital Agriculture in India**
The main factor behind the gradual acceptance of digital farming in India is the prominence of segregated small-holder farms in the country, this complicates data gathering. Additionally, limited penetration of mechanisation tools and frequent natural calamities, like droughts, floods and excessive monsoon rains, have negatively impacted the deployment of digital solutions in the sector. Thus, a customised approach would be needed to implement digital agriculture to a typical Indian small farm, this can be later be scaled up and made available to many Indian farms. Following measures could be implemented to make digital agriculture a success in India: -

xiii. Low-cost technology: - The average annual income of an Indian farmer is >US$ 1,000. This low income explains the precarious financial circumstances in which a typical farmer operates in India. Thus, lowering the cost of technology will help.

xiv. Portable hardware: - As typical Indian farms are small, plug and play hardware has a better opportunity in the Indian market. Also, agricultural land leasing is widely prevalent under various farming arrangements, therefore a farmer farming on a specific plot of land may move to another farm plot next season. In such scenarios, investing in portable equipment is better for farmers.

xv. Renting and sharing platforms for agriculture equipment and machinery: - Owing to both constrained financial resources and small farm plots, opportunity exists for digital platforms that offer equipment renting and sharing services instead of outright purchases. A few agritech start-ups like Farmkart (rent4farm), EM3 Agri Services and Trringo, are already providing equipment rental services.

xvi. Academic support: - The local agricultural organisation and academic institutes regularly interact with farmers through various locally conducted programs and government initiatives. Training facilities provided by various academic institutes and agricultural organisations will improve digital adoption among farmers.

Private efforts in Digital support to farmers

xvii. Arya Shakti has a Transformative Impact, Arya Shakti is redefining farming for 50,000+ farmers and 350+ FPOs, by providing a platform that economizes purchases, maximizes sales, and fosters sustainability. Feature-Rich With real-time satellite farm monitoring, intuitive member management, and dynamic communication channels, Arya Shakti empowers communities with unparalleled efficiency and engagement. It is beyond an App

xviii. Arya Shakti is a comprehensive support system offering unique benefits like the Arya Kisan Sustainability Card for traceability and Arya Mitra loans for financial empowerment, putting farmers and their communities at the forefront of agricultural progress.

xix. Arya.Ag has developed digital interface in the services called ARJUN – Designed for Agribusiness by Agripreneurs.Arjun is designed for agribusiness by agripreneurs who understand your challenges and the day-to-day struggles of procuring agricultural commodities. Arya.ag has designed this procurement SaaS to streamline and simplify business of commodity procurement management, vendor management, billing, and payment to the suppliers.

xx. With Arjun, you can ensure quick, accurate, easy and organized record keeping with genuine verification of all your suppliers. The system enables verification of your suppliers, their PAN, GST, bank accounts and immediate payments with automated calculations. It removes any scope of human errors and brings credibility to your day-to-day business.

xxi. Arjun eliminates any calculation errors while effortlessly tracking trade commitments of your suppliers. Not just this, Arjun can speak to your accounting software to ensure data transmission is smooth to avoid any duplication and manual intervention. Create easy reconciliations in a Paperless environment and ensure immediate payments to build your credibility.

xxii. With Arjun you can: Manage a Warehouse, effectively manage all your warehouses across all locations with just a few clicks. You can track documentation and daily transactions with absolute ease. Manage Clients and Vendors, register your client and vendors and verify their KYC. Be it your buyers to sellers, you can easily tackle their documents and details and interact with all of

them from one place. Procurement Contracts, Arjun builds contracts automatically and ensures all conditions of the contract are implemented when you procure or supply commodity. Inventory Management, managing your daily inventory is now simple with Arjun. Keep track of your stocks at the click of a button. Manage Invoices. Arjun assists you in creating invoices along with commodity quality checks, inward vehicle mapping, mandi receipt tagging etc. for end-to-end management. Invoice management has never been easier. Make Payments,

xxiii. With the help of integrated payment channels and meticulous record-keeping options, you can make instant digital payments in no time. Enhanced Features include Reap the benefits of upgraded feature sets, which include client bank account validation, automated quality tracking based on predetermined criteria, warehouse monitoring, surveillance, and security. Payment Facilitation Services, Arjun comes with a standalone digital payment mechanism for external clients making payments simple, quick and efficient. The Deployment on Agriculture Drones, operate out of zones, geofence the operations within the farm range. Supports multi zone creation through single APIs. for Tractors, Transplanters, harvesters, create operations plan based on micro farm distributions. Design the operations route dynamically through robots, they support the vision of autonomous farming, enabling farmers to focus on profitability, connect with vama@prakshep.com for suggestions. They macrozone your deployments in real-time, customise data points based on farm a boundary, localization & further satellite intelligence.

A digital ecosystem encompasses the stakeholders, systems, and enabling environments that collectively empower individuals and communities to leverage digital technology for accessing services, engaging with others, and pursuing economic opportunities. This section highlights a range of digital agriculture solutions tested by various projects in the APR region, showcasing the efforts and benefits of these digital solutions in enhancing specific digital ecosystems. The identified solutions span several categories, including access to services and markets, advanced digital technologies, access to information, and financial inclusion.

The Integrated Village Development Plan for Kagala Bamori Village in Baran district, Rajasthan, reveal that under Pradhan Mantri Adarsh Gram Yojana (PMAGY) to develop the Village Development Plan is to develop the selected village in an integrated manner. Economic development, infrastructure development and other aspects of human development i.e., education, health, drinking water supply, etc. The Plan should aim at developing the selected village in such a manner that it becomes a replicable ‘model’ for holistic development

- **Micro-level Planning**

Planning is an act of formulating a programme for a definite course of action. It is a blue print for a definite action within a time frame. Macro planning is a planning for mainstream development at macro level. Micro planning is a location specific planning or grass roots planning.

Micro-level planning (MLP) means detailed planning at a lower level, usually at or below a district, which takes into account the variations in the community. A good micro-level planning methodology should be based on an assessment of the local situation, client sensitive and participative replicable, and easy to institutionalize. The methodology for micro-level planning comprises of Quick sample survey of households in the community

a. Analysis of this data to assess the levels of coverage, unmet needs and its reasons, as well as analysis to study their distribution in the community

b. Diagnosis of underlying causes of poor or good performance and reasons for unmet need and identifying remedial interventions

c. Developing plans for interventions to reduce unmet need and to increase the quality of services.

d. Implementing the plans, and

e. Resurvey at the end of the plan period to assess the change

The priority problems are analysed in mixed groups using the (problem and solution tree) problem and cause analysis approach. For each identified problem the group analyses the underlying causes and goes as far as possible in this analysis. The group also discusses and understand the impact/ effects of each of the identified problems. The use of problem tree raises an awareness among the villagers that they can actually influence many of the causes of the big problems and that many causes are due to their own actions (for example, inadequate attention to child's immunization leading to disease and death). Villagers continue to work diligently on each of the identified problems and then take the next step of identifying possible solutions. Once again villagers become aware of their capacity to influence and deal with some of the priority problems using their own resources.

Prioritization of Issues and Problem Analysis

Causes	Issues	Possibilities
Children		
No basic facilities No support from parents	No playing facilities, especially during summer vacation	Need play kits for football and cricket
No infrastructure facilities after primary education Only 1 teacher in the school Household work-load Lack of interest among parents	High dropout rate of girls after primary education	School infrastructure to be upgraded up to 12 standard
No infrastructure facilities after primary education Only 1 teacher in the school Household work-load Lack of interest among parents	High dropout rate of girls after primary education	School infrastructure to be upgraded up to 12th standard

Travel long distance Acute problem during monsoon	No medical facilities	Medical facilities should be ensured in the village
Only 1 hand pump Lot of time wasted in	Women quarrel over water	2 more hand pumps should be installed

Action Planning Matrix

Sector	Problem	Underlying Causes	Solution	Action Proposed Activities	Resources Required	Time Frame	Responsible Group	Monitoring Indicators

Check list		
Information to be gathered	Tools to be used	Responsible person
Infrastructure available - Schools, Roads, Health care facilities, Water, sanitation, facilities, Electricity, Community building, location of Hs, hand pump, AWC, Temple Natural Resources available land, forest, pasture, water bodies,	Social and Natural Resource Mapping	PRA experts and local social Mobilizer and CFCL Staff
Training, skills and opportunities for all members of the society cutting across gender, age, caste and religion.	Focus Group discussion	PRA experts
Health issues in the community: level of health care available in the situation of morbidity.	Focus Group discussion on available health care facility	PRA experts
Agriculture cropping pattern, productivity, protection measures, cost profitability, suggestive action for improvement	Focus Group discussion	PRA experts

Livestock population, qualitative/quantitative aspects, productivity, fodder production and requirement, suggestive action for improvement	Focus Group discussion	PRA experts
Irrigation sources, efficiency, productivity level	Focus Group discussion	PRA experts
Employment (season wise): identify the particular context of each group: the season or the time of day when its members are available, the seasonal nature of their economic occupations, their physical setting.	Seasonality Mapping on Employment	PRA Experts
Existing development programmes by Govt and other NGOs and its impact	Focus Group discussion with Male and Female group separately	PRA Experts
Identification of farming needs, Level of agriculture development for higher economic growth and stability with predefined economic indicators,	Focus Group discussion on sustainable Agriculture with male group	PRA Experts
Infrastructure available - Schools, Roads, Health care facilities, Water, sanitation, facilities, Electricity, Community building, location of Hs, hand pump, AWC, Temple Natural Resources available land, forest, pasture, water bodies,	Social and Natural Resource Mapping	PRA experts and local social Mobilizer and CFCL Staff
Training, skills and opportunities for all members of the society cutting across gender, age, caste and religion.	Focus Group discussion	PRA experts
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Livestock population, qualitative/quantitative aspects, productivity, fodder production and requirement, suggestive action for improvement	Focus Group discussion	PRA experts
Irrigation sources, efficiency, productivity	Focus Group discussion	
Identification of infrastructural and other development needs of the village and its prioritization	Year wise activity mapping of all intervention with prioritization into 5 years	PRA Experts , local social Mobilizer
Assessment of opportunity of networking /convergence / partnerships with Govt. /Local bodies' plans	Responsibility allocation mapping of each planned activities into 5 years	PRA Experts , local social Mobilizer
Review the plans and the budgets available / under various central/state government schemes for development of the area. Identification the gaps between the plans of the government/ local bodies and the specified indicators/goals.	Collection of Gram Panchayat 5 years perspective plan from Local bodies and review, discussion with elected members of PRIs on plan developed and identification of gaps	PRA Experts , Sarpanch , local Social Mobilizer

Table List of identified problems and their assessment through Situational analysis

Problems	Possible Root Cause
Infrastructure	
Ground water level depleting	Low rains and over withdrawal of ground water
Inconsistent supply of irrigation water from Gopalpur pond to tail end farmers.	Excessive use of irrigation water by neighbouring head end farmers
Poor transport facility/movement in interior hamlets (*felu ki tapri, Sahariya basti, kirad basti, chandragarh*, river bank, crimination place)	Lack of tarmac road/Kharanja within village
Sewage problem	Poor drainage facility
Inadequate protection of school premises	Lack of fund mobilization by local Panchayat

Poor sanitation on public place and nearby area due to open excretion	Earlier there were two community toilets available but now they defunct due to lack of maintenance Poor drainage system and surface muddy due to animal hooves
Poor sanitation in individual housing and nearby area due to open excretion	Lack of awareness about better hygiene practices Lack of fund mobilization
Lack of proper protection around temple	Lack of village fund and collective action
Lack of playing space of school children	Lack of collective action in interest of children Poor initiative by school management
Lack of proper shading at crimination place	NA

Agriculture	
Limited irrigation facility	Due to low rains and heavy uses of ground water, water level goes down. Check dam construction at Parvati River is not possible to conserve water for Rabi season irrigation. Height of *Chandragarh* anicut is not enough to conserve water for round the year. Village located at tail end thus supply of irrigation water is not timely. Distributional canal of *Gopalpura* irrigation tank is damaged at many places and needs repairing
Low crop productivity	Lack of awareness about high breed varieties. Low nutrient input in farms. Lack of FYM due to increase in farm mechanization and decreased in number of cattle Poor adoption of modern agriculture technologies Poor seed replacement rate in an area Poor crop protection measures

Poor rain water retention in *Panchampura Talai*	Lack of base stone pitching in pond
Increasing runoff on slopes	Lack of effective erosion control measures
Appropriate water lifting device for lifting of river water for irrigation	Poor purchasing capacity Lack of awareness about lift irrigation scheme of Govt.

Health	
Inadequate staff strength at Sub PHC	One post of ANM is vacant out of two approved
Poor protection of sub PHC centre premises	Lack of boundary wall Lack of fund mobilization by Panchayat
High medical expenses	Almost all personals including youth and women addicted to using tobacco, Lack of awareness about ill effects of tobacco. Lack of awareness about personal and community hygiene Village Health & Sanitation Committee not active.
Malnutrition in SC children	Lack of proper balanced dietary food to pregnant women and children. Poor livelihood leading poor expenditure pattern on nutritional food in BPLs. Poor practices in kitchen gardening and orchard farming
Rapid occurrence of seasonal diseases like Malaria, Typhoid, Pneumonia, TB, Jaundice	Poor sanitation facility on common place Poor medical treatment facility in village Mythological belief, treatment with indigenous method
Lack of safe delivery facility among pregnant women	Untrained midwife Improper staff of ANM and ASHA worker
Education	

Lack of Quality Education	Lack of quality teaching methods and materials. Lack of interest in teaching as teachers are outsiders. Village Education committees not formed by Panchayat. No monitoring of teachers by village education committee.
High expenses education	People do not wish to send their children in government school due to quality education problem. Private school fee is high. Private schools are about 2-10 km from village. Higher education is not available in the village.

Livestock	
Limited availability of pasture land	Encroachment on existing pasture land and forest land
Low milk productivity	Poor quality & quantity of fodder &feed Lack of adoption of high degree proven breed. Artificial Insemination (AI) facility not available Lack of awareness about AI.
Lack of Drinking water facility for cattle	Common drinking water hodge not available. Lack of fund mobilization by Panchayat.

Availability of quality fodder	Decreasing fodder quantity due to encroachment on pasture land and forest land. Degraded pasture land with non-palatable grasses Lack of awareness about feed preparation and fodder cultivation Inadequacy of irrigation water for enhancing fodder cultivation
Drinking Water	
Drinking water facility at cremation place	Lack of Hand pump/ Bore well Lack of fund mobilization by Panchayat.
Water availability sub centre and *Anganwadi* centre for drinking and other purposes	Lack of Hand pump/ Bore well Lack of fund mobilization by Panchayat.
Drinking water facility abrupt in 2-3 hamlets	Due to defunct hand pumps

Livelihood	
Lack of credit assistance from reliable institution	Increasing debt cycle due to less per capita income More dependency on money lender Poor procurement of seasonal farming inputs like seeds and fertilizers due to financial crisis
Unemployment among rural youth (men and women)	Decreasing cost effectiveness of farm cultivation. Fragmented small land holding due to population growth in successive generations. Lack of adequate livelihood resources and their augmentation. Lack of vocational input among unexperienced youth. Lack of awareness about employment opportunity schemes and outside employment opportunities and market potential
Restricted institutional development process even though 3 groups formed	Lack of awareness about SHGs management concept. Lack of awareness about loan schemes from various govt agencies to make them financial sustainable. No idea about federation or village level development committee
Poor livelihood alternatives for land less communities (102 Nos)	Lack of land
Women	
Widows not receiving pension	Lack of awareness about government procedures. Poor facilitation by Panchayat officials
Electricity	
Electricity not available in *Felu Ki Tapri* hamlet	Lack of poor planning by GP
Inconsistent supply of electricity in other hamlets	Long Power cut due to poor electricity generation by RSEB

Social Development	
Lack of unity in village towards development	Clashes among individuals due to personal interest and benefits
Poor communication with GP officials to accelerate development initiatives	GP HQ are located in Sevani village and 12 Km away from this village

	resulted, local mass can't get in consistent touch with leaders and Govt.officials
Some of those who are really poor, not included in BPL list, resulted poor accessibility of BPL targeted scheme	Lack of consultative approach in preparation of BPL list
Lack of postal facility within village	Nearest Post office at Digodpar is far away (10 Km) from this village.
Increasing debt among ST and SC group	Heavy expenditure on social customs Poor repayment capacity Heavy interest rate imposed by money lender

List of Possible Development Options to Combat Major Problems

Problems	Possible Development Options
Infrastructure	
Ground water level depleting	Ground water recharge measures should be practiced wherever feasible. Awareness on rain & ground water conservation. Afforestation to increase biomass cover.
Inconsistent supply of irrigation water from Gopalpura pond to tail end farmers.	Participatory irrigation management practices should be adopted by community for equal distribution of available water *(Barabandi).* Water User Association may be formed to manage and monitor water distribution.

Poor transport facility/movement in interior hamlets (*felu ki tapri, Sahariya basti, kirad basti, chandragarh*, river bank, crimination place)	Construction of intra-village approach roads (Kharanja) From Kaglabamori to felu Ki Tapri From Kaglabamori to Chandragarh From Mr. Jamnalal kirad house to Mr mangilal meghwal house. From Hanuman temple to old temple From old temple to house of Mr. Hari Vallabh From mata ji ka mandir to house of Mr Ramkaran Sahariya
Sewage problem	Construction of *drainage line along* with intra village roads*/Kharanja.*
Inadequate protection of school premises	School boundary construction
Poor sanitation on public place and nearby area due to open excretion	Awareness on consequences of open defecation and poor hygienic condition on community health. Construction of community toilets Formation of village health and sanitation committee Training to VHSC members
Poor sanitation in individual housing and nearby area due to open excretion	Construction of improved individual toilets. Training to individual towards proper maintenance of toilets.
Lack of proper protection around temple	Construction of stairs and boundary wall
Lack of playing space of school children	Development of playing ground
Lack of proper shading at crimination place	Construction of fabricated shade
Agriculture	

Limited irrigation facility	Awareness on water conservation and participatory water management. Construction of anicut at juncture of *Bargadi Nala* and Parvati River. Raising height of *Chandragarh* anicut. Repairing of minor distributory channels of *Gopalpura* irrigation tank.

Low crop productivity	Awareness on improved agricultural practices. Introduction of high breed varieties of cereals, pulses and vegetables. Exposure visits of select farmers to improved Agri-farms like *Krishi Vigyan Kendra*. Periodical interaction with agriculture department officials about customized suggestions/ recommendations on farm practices.
Poor rain water retention in *Panchampura Talai*	Stone pitching to protect water leaching
Increasing runoff on slopes	Low-cost SMC measures. Sprinkler irrigation system adoption. Plantation of trees and bushes at farm bunds as vegetative barriers.
Appropriate water lifting device for lifting of river water for irrigation	lift irrigation system at Parvati River. Distribution of low-cost water lifting device
Lack of timely supply of send and fertilizers	Opening on none mini lamps
Health	
Inadequate staff strength at Sub PHC	Panchayat should sensitize district administration for appointment of required staff. VHSC should be strengthened to monitor the sub centre staff.
Poor protection of sub PHC centre premises	Construction of boundary wall
High medical expenses	Awareness about ill effects of tobacco and other drugs on personal and community health. Awareness about government scheme of free medical treatment to all BPLs at all government health centres. Awareness about personal hygiene specially related to drinking water which is major cause of diseases if not potable.

Malnutrition in SC children	Awareness about need of balanced dietary food to pregnant women and children. Role of VHSC should be strengthened. Encouragement for kitchen garden as permanent source of nutritional vegetables and fruits

Rapid occurrence of seasonal diseases like Malaria, Typhoid, Pneumonia, TB, Jaundice	Awareness about proper sanitation through VHSC. Periodical vaccination cum treatment camps with help of medical department. Spray against malaria in rainy season at both common and individual places. Cleaning of drainage line Better sanitary practices
Lack of safe delivery facility among pregnant women	Arrangement of trained local personals as midwife. Proper availability of medical staff as ANM and ASHA. Awareness about institutional delivery scheme of government.
Education	
Lack of Quality Education	Village education committee must be formed on priority. VEC should monitor quality of teaching resources. Local teacher should be appointed, if available.
High expenses on education	Convincing the community for admission of children in government schools by Improvement in quality of education.
Livestock	
Limited availability of pasture land	Community mobilization to free encroached pastures. GP may impose punishment on encroachers and make free the pasture land with help of local community and district administration. Rehabilitation of pasture land through protection

Low milk productivity	Introduction of high degree proven breed bullocks. Awareness development about AI and facilitating it through animal health department. Breed improvement of local descriptive cattle Awareness development about improved feed preparation. Distribution of chaff cutter

Lack of Drinking water facility for cattle	• A common drinking water hodge in all hamlets

Availability of quality fodder	Introduction of improved varieties for fodder cultivation through minikits distribution. Front line demonstration on forage crop cultivation Fodder trees plantation on agriculture boundary
Drinking Water	
Drinking water facility at cremation place	Installation of hand pump
Water availability sub centre and *Anganwadi* centre for drinking and other purposes	Installation of hand pump.
Drinking water facility abrupt in 2-3 hamlets	Repairing of hand pump. Training to local SHG members to repair hand pumps.
Livelihood	
Lack of credit assistance from reliable institution	*Kisan Credit Cards* from nationalized Bank. Linking with banking institution. Inter loaning practices in SHG. Facilitation by Panchayat officials in developing forward
Unemployment among rural youth (men and women)	Vocational training programs.

Restricted institutional development process even though 3 groups formed	Formation of some more SHGs in hamlets. Training to understand institutional development process and to manage SHGs. Developing linkages with financial institutions for loaning.
Poor livelihood alternatives for land less communities (102 Nos)	Introduction of non-farm income generation activities.
Women	
Widows not receiving pension	Pension approval for disadvantaged widows
Electricity	
Electricity not available in *Felu Ki Tapri* hamlet	Electricity collection
Inconsistent supply of electricity in other hamlets	Ensuring regular electricity supply
Social Development	
Lack of unity in village towards development	Awareness on collective action and decision-making process

Poor communication with GP officials to accelerate development initiatives	• Shifting of Gram Panchayat HQ at centric place

Some of those who are really poor, not included in BPL list, resulted poor accessibility of BPL targeted scheme	Periodical review of BPL list and keeping it updated. Preparation of BPL list in consultation of local community.
Lack of postal facility within village	Setting up of post office at nearest place
Increasing debt among ST and SC group	Decreasing dependency on money lender by facilitation through banks and cooperative societies.
Poor protection around community hall	Construction of boundary wall for community hall

level		PRA experts
Employment (season wise): identify the particular context of each group: the season or the time of day when its members are available, the seasonal nature of their economic occupations, their physical setting.	Seasonality Mapping on Employment	PRA Experts
Existing development programmes by Govt and other NGOs and its impact	Focus Group discussion with Male and Female group separately	PRA Experts
Identification of farming needs, Level of agriculture development for higher economic growth and stability with predefined economic indicators,	Focus Group discussion on sustainable Agriculture with male group	PRA Experts

Identification of infrastructural and other development needs of the village and its prioritization	Year wise activity mapping of all intervention with prioritization into 5 years	PRA Experts, local social Mobilizer
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Review the plans and the budgets available / under various central/state government schemes for development of the area. Identification the gaps between the plans of the government/ local bodies and the specified indicators/goals.	Collection of Gram Panchayat 5 years perspective plan from Local bodies and review, discussion with elected members of PRIs on plan developed and identification of gaps	PRA Experts, Sarpanch, local Social Mobilizer

The mapping of five capitals of sustainable rural livelihoods, with respect to the Big, Small and Marginal farmers have been done to prepare the Village Agricultural development plant at

SIROHI, field experience training conducted by NAARM Hyderabad where the author was the monitoring faculty during 09.08.2016 to 29.08.2016 .

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SWOT Analysis

		Strength	Weakness	Opportunities	Threats
Natural	Big	➢ Land, tube well, hand pump, livestock (cow, buffalo, goats & sheep) ➢ Black Sandy loam soil (wheat, castor, mustard etc.) ➢ vermicomposting	➢ Cotton long duration crop ➢ Black Sandy loam soil require more water	➢ Horticultural crop lime, pomegranate and papaya, ➢ Development of water harvesting structures ➢ Vegetable cultivation inclusion in cropping system	➢ Drought, flood, weeds ➢ crop damage by wild boar, blue bull
	Small	➢ Land, hand pump, livestock (cow, buffalo, goats & sheep) ➢ Black Sandy loam soil	➢ Cotton long duration crop	➢ Vegetable cultivation, vermicomposting	➢ Heavy crop damage by wild boar, blue bull
	Marginal	➢ Very small land ➢ Black sandy loam soil	➢ Less land area	➢ Vegetable cultivation,	➢ Land taken by big farmers

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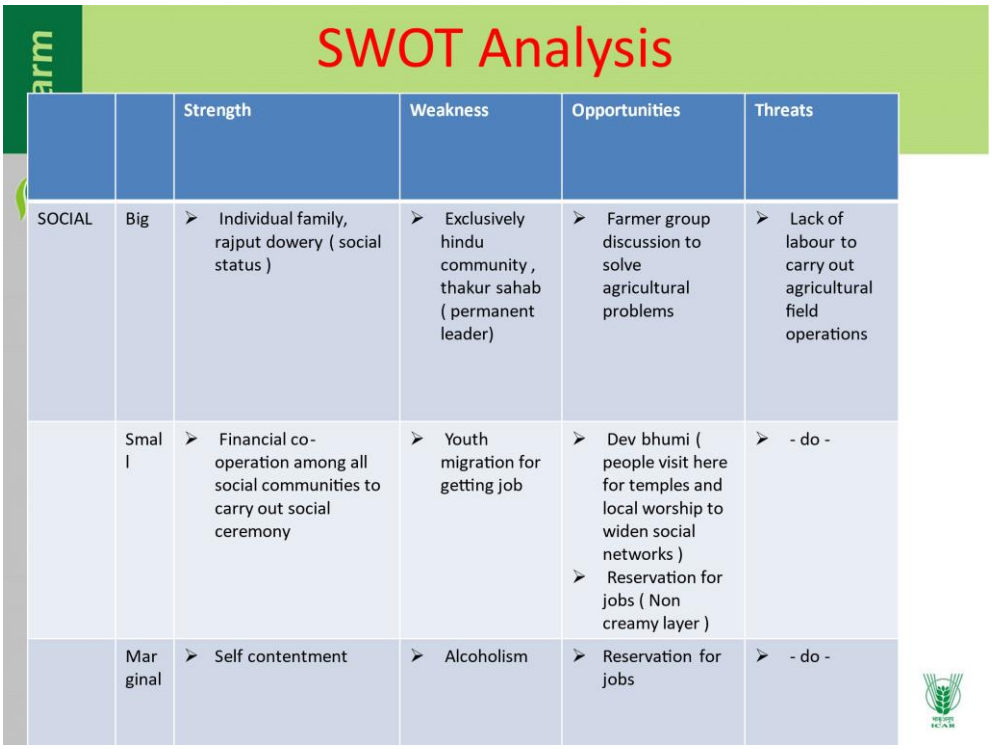
SWOT Analysis

		Strength	Weakness	Opportunities	Threats
PHYSICAL	Big	➢ Concrete houses, car, tractors, bike, jeep, buffaloes (6 -7), cow (2 - 3), thresher, seed driller, power drillers ,cultivator, tubewells, good irrigation facilities.	➢ High maintainance cost of machines	➢ Rent their agricultural impliments ➢ Can join milk co - operatives	➢ Outbreak of diseases both in animals and plants ➢ Depreciation of machines and vehicles
	Small	➢ moderate houses, 2 wheelers, 1 -2 buffaloes non android cell phones	➢ High maintainance cost of houses and vehicles	➢ Accessibility to KVK and KCC. ➢ can run other business	➢ Difficulty in marketing.
	Margi nal	➢ Sewing machines, carpenters	➢ Thatched houses , no animals	➢ Vegetable cultivation,	➢ House collapsing, no job assurance

		Strength	Weakness	Opportunities	Threats
Human	Big	Govt. Jobs, Business, educated, early adopters, take compete diet, settled abroad.	Nuclear family, pardha system strictly followed.	To become progressive farmer, access to new technologies.	Business failure, health problems, social and political pressures, non availability of labours.
	Small	Driving skills, agricultural work skills, joint family, tailoring skills, males are educated, females are involved in agricultural activities.	Youth migration, late adopters, poor management skills, female illiteracy,	Can avail low interest loans, entrepreneurshi p,	Debts, youth migration,
	Marg- inal	Big family, tailoring skills, carpentry skills, joint family, lobour skills, women involvement in agriculture.	Leggards, illiteracy, dowery,.	Can avail loans at low interest rates, attend trainings, get fellowship	High debts.

		Strength	Weakness	Opportunities	Threats
financial	Big	Govt./pvt. Service, large land holding, can invest high in agriculture.	Dependence on farm labour and subordinates for farm management	Investment on stocks, shares etc.	High risk on the success of new investment
	Small	Self and family involvement on farm activities	Medium land holdings Lack of access to credits for new investments	With the availability of credits can invest on new technologies Value addition	Credit on mortgage Credit on high interest from money lenders
	Marginal		Lack of farm mechanization Lack of access to credit	Micro finance with the help of SHGs Training on new vocations such as honeybee or mushroom cultivation	Risk of crop failure Risk of repaying credits



Access to services and markets

THE CASE OF BANGLADESH

Under the Promoting Agricultural Commercialization and Enterprises (PACE) project, 300,000 microenterprises, including 150,000 women-owned businesses, increased their combined sales by 50 per cent after receiving credit and technical support. PACE has also connected farmers with online retailers to market high-value crops. Building on an existing platform and supported by a Rural Poor Stimulus Facility (RPSF) grant of US$0.915 million, this project launched an integrated solution with three components:

1. Suponno: An e-commerce service that enables rural microenterprises to access virtual marketplaces, and online payment management gateways, and to assign product delivery to courier services using the same online platform.

2. E-Knowledge Window: A repository of knowledge management products and training tools for farmers and entrepreneurs.

3. Integrated Result-Based Monitoring (RBM) System: A system for monitoring value chains and technology transfer activities using electronic services.

By the project's completion, these initiatives had successfully strengthened the linkages between microentrepreneurs and customers, clearly identifying new opportunities for growth and collaboration.

THE CASE OF CAMBODIA

Both Accelerating Inclusive Markets for Smallholders (AIMS) and Agricultural Services Programme for Innovation, Resilience and Extension (ASPIRE) are part of a new generation of IFAD-supported projects with the core objective of enhancing the prosperity of Cambodian smallholder farmers through increasingly profitable links to agribusinesses and markets. Both projects are mapping all project-linked households in a GIS database, which will help to focus project and extension service delivery,

as well as facilitate integration with other databases to provide online services. In addition, a call centre has been established by ASPIRE to support farmers with extension.

Through a Korean-funded grant, in partnership with a private sector company named Bronx Technologies, a virtual market app called "Chamka" has been successfully developed with the aim of enhancing the profitability and resilience of Cambodian smallholders' farm businesses through the adoption of ICT applications for networking, information exchange and produce marketing.

The Sustainable Assets for Agriculture Markets, Business, and Trade Project (SAAMBAT) has launched an initiative to create an integrated digital ecosystem for smallholder agriculture in Cambodia. Solar Green Energy Cambodia (SOGE), supported by SAAMBAT's Challenge Fund and Khmer Agriculture Suite, is focusing on renewable energy technologies to benefit smallholder farmers, particularly in the water/irrigation sector. SOGE's hybrid solar- powered water pumps, controlled via a mobile phone- based automatic irrigation system, help farmers reduce greenhouse emissions, lower energy costs, improve yields, increase incomes, and enhance livelihoods. This innovation ensures efficient water use, constant water access, and supports climate adaptation and resilience in smallholder farming. The smart irrigation system saves farmers 80% of their time, enabling them to pursue other income activities. It also ensures water supply, allows for multiple

annual crops, and improves crop quality and yield. This innovation reduces conflicts over water, bringing stability and better incomes to smallholder communities.

A. Problem and Solution Analysis

collecting water Sometimes women quarrel		
Difficult to go to school during monsoon	Kachha road	Construct pucca road
Poor signal to mobile phone services	Communication problem	Tower to be erected nearby
Women		
Only 1 hand pump Conflict with others to fetch water 4-6 hours a day is wasted in collecting water	Drinking water	Need 3 more hand pumps

No facility after primary education Early marriage Only 1 teacher in school	High dropout rate of girls	School facilities to be the upgraded up to 12 standard Increase number of school teachers
Kachha road Black cotton soil No access to medical facilities outside the village during rainy season	Mobility during monsoon is restricted	Construct pucca road
Poor		
Only 1 hand pump operational long distance Water level is very low No recharging	Drinking water	Need more hand pumps

Landlessness Small land holdings among Kols and Harijans No regular employment No business enterprises	Low income	Want to know more about business enterprises Need support for small scale business Need regular employment

No capital to start business		
No sourcesof water for irrigation Ground water level is deep	No irrigation	Construct stop-dam in 2 places Deepen village ponds
No schools for girls Only 1 teacher in school	Poor educational output	Separate school for the girls Approach government for more teachers Use the services of local
Irregular supply of kerosene	Inefficient PDS	The Poor to be kept informed in advance regarding availability of essential items
Socio Economic Marginalised		
Low income Lack proper housing	7 families are in distress	Need houses Widow pension

A. Action Planning

Village groups together with the team of facilitators identify the actions most likely to produce the desired results. The actions are classified into three categories – (a) one that can be taken at the community level, (b) second that can be taken at the panchayat level; and (c) third which can only be taken at service provider level and the panchayat and village need to act as a pressure group to get desired results. The community with the assistance of the facilitators develop detailed action plans specifying key activities, responsibilities, resources required, implementation timetable, monitoring indicators, and follow-up mechanisms (please see below the Action Planning Matrix).

Action Planning Matrix

Sector	Problem	Underlying Causes	Solution	Action Proposed	Activities	Resources Required	Time Frame	Responsible Group	Monitoring Indicators

Advanced digital technologies

THE CASE OF CHINA

Increasingly, consumers want to know the origins and production methods of their food. In response to this trend and to support family farmers in meeting international standards, the Sustaining Poverty Reduction through Agribusiness Development in South Shaanxi (SPRAD-SS) project has launched the Zhenba Bacon Digital Traceability System4 in China's southern Shaanxi province. This innovative system ensures stringent production and management standards, hygiene measures, and disease control practices by using an identification card system that tracks each pig from the farm to the supermarket.

As of May 2023, enhancing traceability system of food production and processing has achieved a financial progress of 104.7% and this relies on advanced technologies, including software platforms and the Agricultural IoT, which enables monitoring and data exchange. The initial investment also funded training and capacity-building across the entire value chain, improved market access and resources for product marketing, and supported research and development activities. The benefits of this initiative became immediately evident, enhancing both transparency and efficiency in the food production process. Indeed, at completion SPRAD-SS has moved the Zhenba bacon industry into more sustainable, reliable and value-added livestock production.

THE CASE OF VIET NAM

The Climate Smart Agricultural Value Chain Development in Ben Tre and Tra Vinh Provinces (CSAT) project has led to significant advancements in agricultural practices, market access, and income generation. These improvements have not only reduced poverty but also instilled a sense of hope and optimism among rural communities.

With support from the Vietnamese firm RYNAN Technologies, a partner of IFAD in providing technical assistance under the Korean Grant, innovative cultivation models have been implemented. These include water-saving irrigation, microbial organic fertilizers, salinity monitoring systems, a smart pest surveillance network, and soil nutrient monitoring stations, benefiting both these provinces and the entire nation.

Given Vietnam’s vulnerability to climate change, prioritizing climate adaptation for small-scale farmers and engaging communities to adopt climate-informed approaches is imperative. This includes equipping them with the necessary tools and knowledge. Additionally, these initiatives have empowered rural women and young people, including those from ethnic minorities, fostering their active participation in sustainable development.

Access to information

THE CASE OF INDONESIA

The IFAD-supported Youth Entrepreneurship and Employment Support Services Programme (YESS) project has been instrumental in helping rural youth build livelihoods through entrepreneurship and employment.

YESS launched a dedicated online platform to facilitate youth integration into the rural economy.

The Rural Youth Online Platform is highly influential, offering not only information about employment opportunities in the agricultural sector but also e- learning courses for young agripreneurs. These courses enhance their knowledge of agrifood and agribusiness development. Additionally, the platform provides financial literacy advice and practical tools to build youth financial capabilities, enabling them to engage in agriculture-based activities.

Another notable example is the IFAD-UNDP jointly introduced Social Innovation Platform5 (SIP) in Indonesia, designed to enhance the quality of village planning by increasing effectiveness, participation and inclusivity of the local planning process. In 2023, SIP approach was tailored to accommodate village-level planning and was piloted in three villages. Field testing results showed that the SIP approach effectively captured information, issues, and community aspirations to address the Village Law and was easily adopted by the village community. Additionally, UNDP introduced Sustainable Transformation for Inclusive Village Empowerment (STRIVE), a digital listening tool integrated into the broader SIP. STRIVE is designed to strengthen Indonesia's local planning process, known as Musrenbang (village planning meeting), by fostering inclusivity and empowering communities to actively shape their development. Using AI, STRIVE discerns various challenges and opportunities within the collected data, serving as a discerning advisor to help communities gain profound insights into their unique circumstances.

THE CASE OF NEPAL

The Farmer's Diary is a key documentation tool used by smallholder farmers in the ongoing Agriculture Sector Development Programme (ASDP) and Samriddhi - Rural Enterprises and Remittances Project investments. It assists farmers in recording data on their on-farm activities related to production, sales, marketing, and income from value chain commodities.

By integrating this data into an information management system, the Farmer's Diary provides farmers with a comprehensive overview of their business activities, facilitating assessments and aiding in planning. Furthermore, the Farmer's Diary enables project implementers to measure impact and outreach, enhancing adaptive management and informing programmatic plans and policies.

Results indicate that this tool has significantly improved agricultural production, harvesting, the supply of agricultural inputs, and food security, thereby supporting rural communities.

THE CASE OF TONGA

The Korean Supplementary Fund has financed the development of a Food Security Dashboard in Tonga to improve access to, ownership of, and understanding of national food security data. This initiative aims to support timely and data-driven decision-making by relevant stakeholders. Currently being implemented, the dashboard is a valuable tool for monitoring and assessing various dimensions of food security, including availability, affordability, sustainability, and utilization. It enables policymakers, researchers, and other stakeholders to make informed decisions and implement targeted interventions, such as measures to address food price inflation and enhance the availability and affordability of nutritious, locally grown food.

The Tonga Food Security Dashboard is designed to benefit key target groups, including the Kingdom of Tonga's line ministries, MORDI Tonga Trust, and participants in IFAD's Tonga Rural Innovation Project (TRIP) II programme. These policymakers and development partners are expected to use the dashboard to make easily interpretable, informed decisions for short-, medium-, and long-term measures, ensuring access to affordable and nutritious food for the population.

The Farmer's Diary is expected to become the primary source of information for the project, regularly recording data such as the Poverty Probability Index, beneficiaries' baseline information, farmers' income and expenses, production plans, investment plans, and asset information. Ultimately, the Farmer's Diary helps farmers stay updated on their plans and manage their operations more effectively.

Financial inclusion

THE CASE OF NEPAL

The Accelerated Private Investment in Agriculture (APIA) project was designed during June-July 2020 for tapping the resources available under IFAD's Rural Poor Stimulus Facility (RPSF) grant project. APIA played a catalysing role, and its short- and long-term impacts at the smallholder farm level has been qualitatively assessed, and the following provides the highlights:

- The Agricultural Development Bank Ltd (ADBL) has operated Financial Education and Business Literacy (FEBL) classes, empowering smallholder producers, particularly women, to gain a deeper understanding of financial services offered by ADBL and other institutions. These classes have equipped participants with the skills to effectively manage production and market their produce. Additionally, FEBL has fostered greater self-confidence, especially in group and community communication, improved their computing and negotiation abilities, and helped them develop a clearer vision for their personal and professional goals.
- Through the digital services, mainly through the Kisan Card and Kisan Mobile App, APIA has helped: (i) increase the savings of farmers; (ii) save time for the farmers in undertaking banking transactions as they do not need to visit a bank branch for withdrawals and deposits; (iii) reduced the cost of borrowing and improved the timeliness of credit; and (iv) facilitated access to improved farming methods and market prices.

- He ADBL Knowledge Centre have facilitated digital access to markets and inputs for farmers to obtain up- to-date information on production, market demand, regionally differentiated prices, agro-vet service suppliers, market centres and other relevant information.

The Multi-Stakeholder Platform (MSP), Business to Business (B2B) and Business to Services (B2S) interaction workshops have enabled farmers to have enhanced access to markets and linkages with service providers. Importantly, APIA's initiative scaled-up under Value Chains for Inclusive Development of Agriculture helped the digitalized financial system, digital agricultural advisory services and marketing system to be more resilient and responsive to COVID-19 like pandemics as well as other future shock

ACHIEVING EXPONENTIAL IMPACT THROUGH PARTNERSHIPS

IFAD is dedicated to supporting rural communities globally, but our efforts are limited without collaboration. By joining forces with significant stakeholders in rural and agricultural industries, we can enhance IFAD's effectiveness through combined investments. We drive development forward by facilitating partnerships and promote innovation by transferring new technologies from research to practical use. Therefore, collaboration is essential for IFAD to make a large-scale impact, enhance our contributions to the SDGs, and fulfil its mission of empowering rural communities.

The Republic of Korea (RoK) and IFAD signed four supplementary funds agreements to support poor smallholder farmers in Asia and the Pacific for the following programmes: Enhancing Agricultural Productivity through ICT - Phase; Enhancing Agriculture Productivity through ICT - Phase 2; Enhancing Agriculture Productivity and Improving Agricultural Market in the Pacific Islands Countries and SEEDS.

ICT Phase1 programme was implemented in Bangladesh, Cambodia, India, and Papua New Guinea and was completed in December 2018.

Some of the main results and achievements that have been observed include: i) more efficient and effective communication tools among participating farmers; ii) greater access to markets, market information and rural advisory services; and iii) higher productivity and incomes for participating farmers.

ICT Phase 2, on the other hand, was implemented in Cambodia, Viet Nam and in the Philippines and is now completed.

In Cambodia, the project facilitated innovative ICT services for smallholder value chains, including a Direct Dial extension service to aid smallholders with production, technical challenges, and climate emergencies. Additionally, a Virtual Market platform helped producers and wholesale buyers enhance networks, share production and market information, and arrange sales, thus improved value chain efficiency and reduced production costs. These improvements primarily benefitted producers by reducing costs and increasing incomes.

In Vietnam, the project sought to increase smallholder farmers' incomes and reduce poverty by enhancing access to online market information networks established through the "Business and Information Centre for Farmers" under the National Target Program on New Rural Development. It involved creating an online network for sharing and forecasting market prices, production, and business information among stakeholders to strengthen trading linkages in agricultural value chains.

Finally, in the Philippines the project supported the development of models and solutions for effective monitoring and reporting of results of rural transformation initiatives through the application of ICT that influenced national policy and programme development. This included developing an enabling environment and delivery systems in support of competitive, inclusive and resilient agri-food value chains by demonstrating replicable ICT models for (i) project services, and (ii) participatory, quantitative and qualitative assessment of market transactions, natural resources and project interventions and outcomes.

SUSTAINABLE RURAL LIVELIHOODs & VULNERABILITY

Sustainable rural livelihoods and its management effectively by the community through participatory approaches have always been challenging for the community due to pluralism which exists among the stake holders and the agencies involved in it, thereby making the rural development efforts fragmented and disconnected, and integration of needs and aspirations of the community has been challenged. Therefore the initited in the Digital initiatives in ASIA PACIFIC for Rural development are listed below:

1. **Digital Television Project in Cambodia**

Provides free digital TV access to 3,000 rural villages through satellite dishes and set-top boxes

· Universal **Service Fund in Myanmar**

Subsidizes the construction of mobile towers in remote areas, with plans to upgrade to 3G and 4G in the future

· · Bharat **Net Project in India**

A government-funded initiative to connect all 250,000 villages to high-speed broadband by 2022

· · Smart **Villages and Smart Islands**

Uses digital infrastructure to improve local economies and social conditions in rural and remote communities

· · Digital **and Transport Connectivity**

An activity by ESCAP to empower governments to strategize for better rural digital and transport connectivity

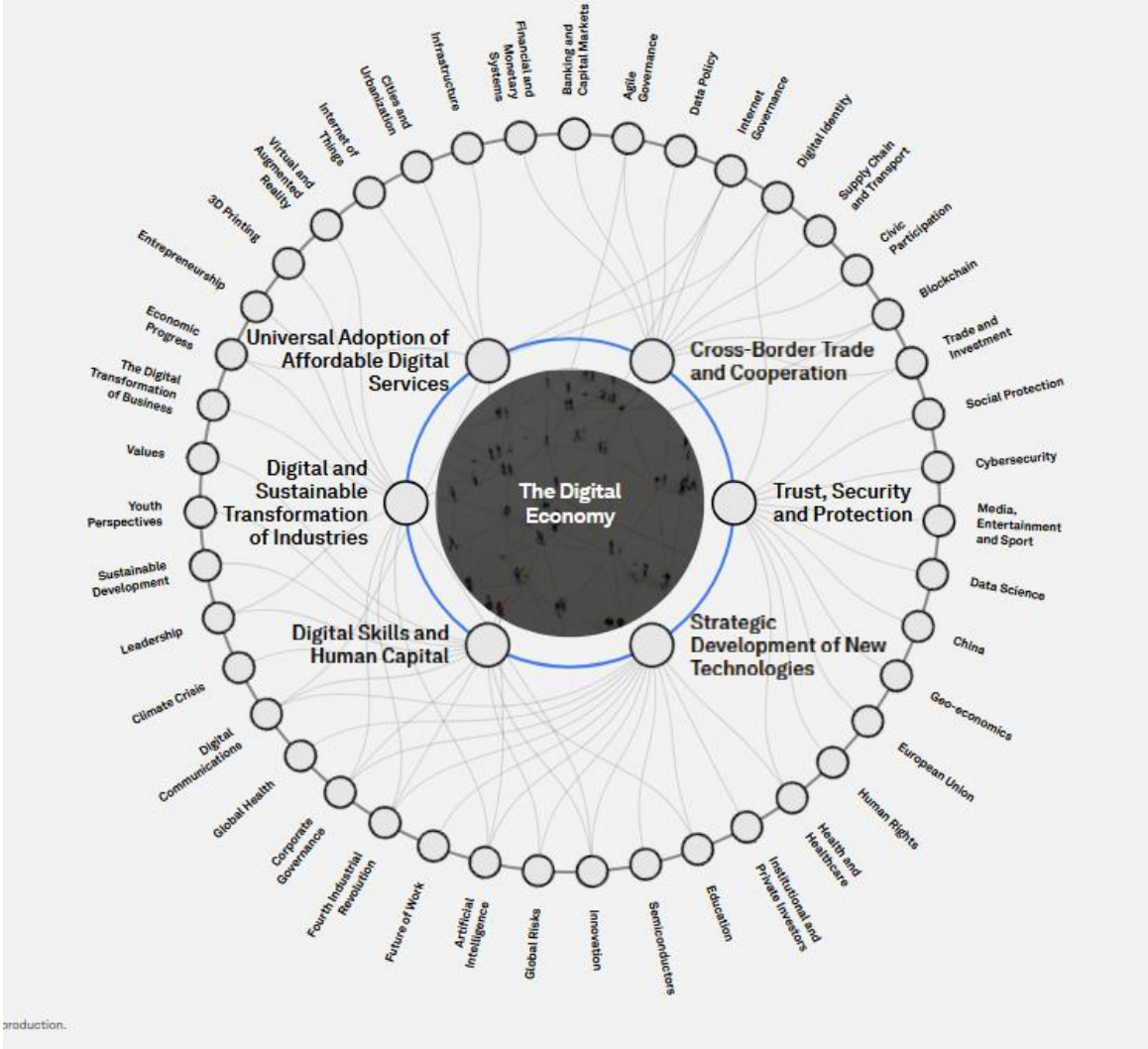
Digital Villages Initiative (DVI)

An initiative by the FAO Regional Office in Asia and the Pacific to support digital agriculture strategies and rural digitalization initiatives **The Digital Villages Initiative Knowledge Exchange (DVI-KE)** is a regional platform and database of digital solutions, initiatives, and villages covering the entire agrifood systems in Asia and the Pacific.

The Applications of ICT for solving social, environmental and economic issues, underlined the three dimensions of the digital village:

- For agricultural production: e-Agriculture focuses on improving productivity by using Information and Communications Technologies and relevant digital solutions;

- For farmers' lives: "Digital Farmer Services" focus on enhancing farmers access to different kinds of social and economic services including financial services, social protection and employment; and
- For the village: Digital Services support rural transformation by enhancing delivery of public services on health, education, jobs, welfare and tourism, including eco-tourism and Agri-tourism.



ICT Pilot Projects for Rural Areas

A program by the APT that provides up to US\$200,000 of support for each project

Improved connectivity can help reduce poverty, bridge the rural-urban divide, and foster social inclusion.

INITIATIVES IN INDIA

Among the several tools and technique available for capturing most of them are not flexible, some of the digital initiatives for rural development in INDIA are;

Digital Saksharta Abhiyan (DISHA)

This scheme aims to make Common Service Centres (CSCs) digital financial hubs by hosting awareness sessions and enabling digital financial services.

Pradhan **Mantri Gramin Digital Saksharta Abhiyaan (PMGDISHA)**

This scheme aims to make six crore people in rural areas digitally literate.

Universal **Service Obligation Fund (USOF)**

This scheme aims to provide connectivity to uncovered villages and habitations, especially in remote and difficult terrains.

SWAYAM

This initiative offers Massive Online Open Courses (MOOCs) for e-education.

· · Mobile **ATM vans**

These vans take banking services to unserved far-flung villages in hilly regions.

· · Driverless **vehicles**

These vehicles can operate 24 hours a day and travel far further distances than traditional trucks.

· · Drone**-based deliveries**

These deliveries can help rural regions overcome geography and infrastructure challenges.

3**D printers**

These printers can help small businesses create items and standard parts according to local demand.

Information on Digital Finance for Rural India Scheme

Digital Saksharta Abhiyan (DISHA) with objectives to enable the Common Service Centres (CSCs) to become Digital Financially compliant. (National Portal of India,Technology and Rural Development - Invest India 12 Apr 2022)— Driverless vehicles, for example, can operate 24 hours a day and travel far further distances than traditional trucks, Generative AI is experimental. Information may vary depending on location or individual circumstances. Additionally, initiatives like the **Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)** have been instrumental in imparting digital literacy skills to rural populations, enabling them to leverage digital tools for personal and professional growth (Kumar et al., 2022). Predominantly young population in rural India, indicating a workforce with significant economic potential and a higher likelihood of embracing digital technologies. Moreover, the study highlights the high levels of education among respondents, indicating a population well-

equipped to understand and benefit from digital initial- ties. Unexpectedly, the research shows a higher rate of digital technology adoption among female respondents, challenging the perception of gender disparities in technology access. This finding suggests that the DIP has played a vital role in bridging the gender gap and empowering women in rural areas. Additionally, the study uncovers a trend towards mobile-based services over computer-based services, signaling a shift in technology utilization patterns. This emphasizes the need to prioritize mobile technology and improve connectivity in rural areas to ensure wider access to digital platforms.

Gender equality and sustainable development depend on women's digital empowerment. To close the gender gap in technology access and empower women, the Indian government has launched several digital projects. The Government of India's digital literacy efforts are pivotal in enabling women to have a sustainable future, promoting socio-economic inclusion, and mitigating gender gaps in digital technology access. This article thoroughly examines the panorama of contemporary digital literacy programmes for women in India. It seeks to evaluate their efficacy, pinpoint obstacles, and investigate viable fixes to enhance the results of digital literacy. The article thoroughly assesses secondary data from government websites and reliable sources, including reports and publications. This article aims to illuminate these issues and o insights into the complex nature of the digital gender gap in India. The study also examines possible approaches and remedies to overcome these obstacles and raise women's digital literacy. To encourage digital inclusion and empowerment, these solutions include community-based strategies, the integration of mobile technologies, customized training courses, and focused awareness campaigns. This paper aims to inform policymakers, practitioners, and stakeholders about digital projects that empower women and promote a sustainable future. It thoroughly analyses available data and identifies key obstacles and opportunities. To bridge the digital gender gap and promote inclusive development, the article highlights the significance of digital literacy as a driver for women's socioeconomic empowerment

Agricultural Extension (AE) plays a pivotal role in modern farming, as it is integral in imparting knowledge from research institutions to farmers, thereby increasing productivity and sustainability.

This role is becoming increasingly crucial as climate change and fluctuating market dynamics emand agile responses and adaptation from the farming community. The effectiveness of AE lies in its ability to facilitate the transfer of knowledge from research labs to farmlands. Through AE, innovations in farming techniques, crop management practices, and technological advancements reach farmers, even in remote and underserved regions. It examines the role of agricultural extension in modern farming in India, highlighting its significance in communicating scientific research to farmers, facilitating skill development, advising on efficient farming methods, and promoting risk management and resilience. As India faces major challenges such as climate change and food security, the role of agricultural extension becomes increasingly pivotal. The advent of digital technologies, including artificial intelligence and virtual reality, offers novel avenues for extension practices. The deployment of these technologies must be inclusive, addressing issues of digital literacy and access among farmers. Despite the clear advantages, extension services are confronted with significant obstacles, including resource constraints, socio-cultural barriers, and policy issues. Addressing these challenges necessitates innovative approaches and comprehensive reforms. Looking to the future, the agricultural extension will remain central in addressing emerging farming

challenges and leveraging opportunities for enhancing agricultural productivity and sustainability in India

AGRICULTURAL EXTENSION IN THE AGE OF DIGITAL TRANSFORMATION

Role of Technology in Agricultural Extension

As the world steps into an era dominated by digital technology, agriculture is no exception.

The role of technology in agricultural extension in India has evolved significantly over the past

Decade, marking a shift from traditional extension methods to more dynamic and interactive

Platforms. Various technology platforms are being used to deliver extension services in India.

For instance, the Kisan Suvidha mobile application developed by the Ministry of Agriculture provides farmers with information on weather, market prices, agricultural advisories, and plant protection [22]. E-Krishi Samvad, an online interface, allows farmers, researchers, and extension workers to seek expert advice on farm- related issues [23]. Digital Green, a global development organization, uses locally-produced videos shared through social media platforms to disseminate agricultural information and practices among smallholder farmers [12]. The effectiveness of these technology platforms varies but is generally promising. A study by Mittal and Tripathi [24] found that farmers who used the Kisan Suvidha app reported improvements in crop productivity and income, thanks to timely information on weather and market prices. Meanwhile, the Digital Green

Approach has been reported to be ten times more effective per dollar spent than traditional extension systems, with farmers adopting new practices more rapidly after watching peer-to-peer videos [12].

Table 2. Technologies used in agricultural extension in India

Mobile Phones Used for delivering real-time agricultural information and advisory services to farmers. Various government programs like Kisan Call Centres (KCC) use this technology for extension. Farmer Portals Digital platforms provide a multitude of services like weather updates, market prices, crop advisories, government schemes, etc. An example is the National Agriculture Market (eNAM) for online trading. Krishi Vigyan Kendras (KVK) these are agricultural extension centers created by the Indian Council of Agricultural Research (ICAR) for providing various types of farm support to the agricultural sector. They employ various modern and traditional technologies for extension. Remote Sensing Technology Used for large-scale land mapping, monitoring of crop patterns, prediction of agricultural outputs, etc. ISRO's Bhuvan portal offers geospatial services and products for free. Geographic Information System (GIS) Used in precision farming to manage fields based on variability in factors like soil type, nutrient levels, and pest infestation. It is also used in watershed development, land resource mapping, etc. Mobile Apps Various mobile apps such as 'Kisan Suvidha', 'Agri App', and 'Pusa Krishi' provide information about weather, market prices, agricultural advisories, etc. Drones Used for mapping and surveying farmland, monitoring crop health, applying fertilizers or pesticides, and even planting seeds. However, drone usage is still evolving and subject to

regulatory frameworks. E-learning Platforms Online courses and digital learning materials are increasingly used to train farmers in modern farming techniques. For example, the Digital Green Foundation uses video-based learning for farmer training.

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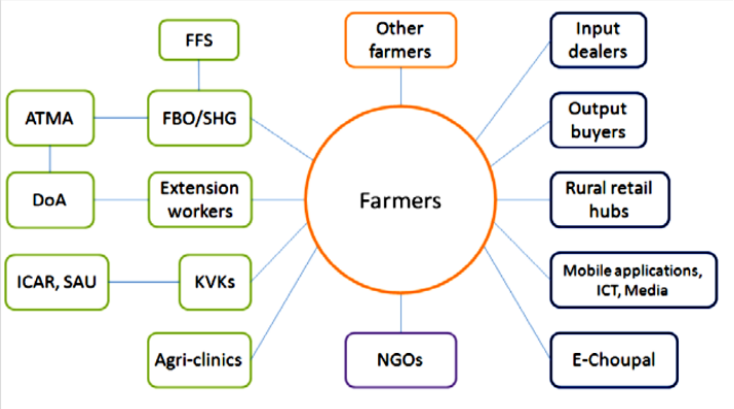
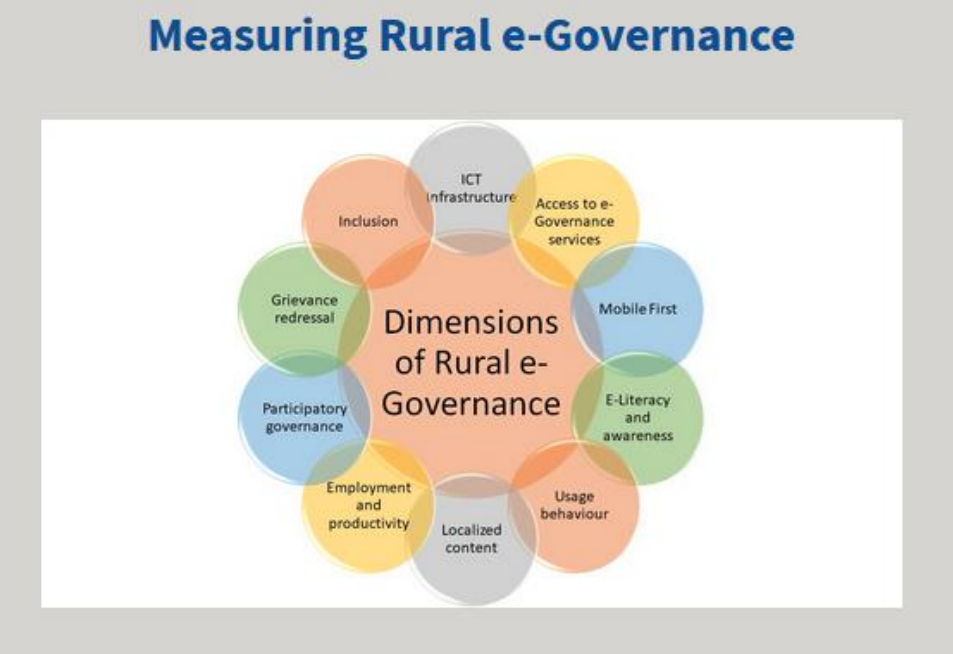


Fig. 1. Information exchange between extension and farmers in India (adapted from [9]



Rural e-Governance Dimensions

In order to develop the rural intelligence frame work for for sustainable rural livelihoods the rural e-governance dimensions interfaces will have to be integrated effectively and efficiently

Rural e-Governance can be measured through the following dimensions:

(i) ICT Infrastructure: It plays a foundational role in the rollout of e-Governance services. The success of ICT and e-governance projects lies in the availability of infrastructure by the Government for public accessibility. These can be measured through the presence of optical fibre backbone, telecom towers and 4G network availability, number of households with mobile connections or personal computers, amount of data consumed, availability of telecentres and kiosks etc.

(ii) Access to e-Governance services: Availability of the number of e-Governance services for rural areas and the ease of access of such services is an indicator to the success of the digital services. Better accessibility would lower the cost of availing such services.

(iii) Mobile First: It is a practice of starting the development with respect to the mobile user or a mobile device first. It favours lightweight and low-bandwidth design that can be responsive based on-screen size and available capabilities. Rural users are more likely to have smartphone than laptops / desktops to access e-governance services.

(iv) E-Literacy and awareness: Level of education complemented by basic awareness of IT skills, awareness of the several e-Governance initiatives and services available.

(v) Usage behaviour: Pattern of usage in terms of consumption or utilization of the services, behavioural change in the rural society in seeking the e-governance services such as e-Health, online education, skills enhancement etc.

(vi) Localized content: Availability of localized content from rural areas for e-commerce, tourism, consumption of content by non-local and external players such as industries. This requires and can be facilitated by each rural unit having their own distinct & configurable

website, managed by Village Secretary, such as being created in India for each Gram Panchayat (i.e. Rural Local elected Government comprising set of villages) as a part of National Panchayat Portal sponsored by Ministry of Panchayati Raj, Govt. of India

(vii) Employment and productivity: Generation of alternate source of income through employment locally or remotely, improvement in productivity through information available, innovations at the grassroot level

(viii) Grievance redressal: Ease with which grievance can be raised and resolved

(ix) Participatory governance: Feedback and regular participation in improving governance, shift in policy (devolution of fund, function & functionaries to rural local Government) and implementation by reciprocating to the actual needs of the locality. If devolution is of fair degree, the governance & services of local people is likely to be met by local Government unit and dependence on ICT is considerably reduced since geography gets shirked within a village so is gap between ruler/provider and ruled/consumer. Therefore, participatory & decentralised governance is indirectly reducing ICT intervention from certain perspective in local-to-local context.

(x) Inclusion : Inclusive growth by reducing the social and economic inequalities, access to e-governance services by socially backward and marginalized communities, all genders, language, region, disability, age groups or other status. It would encompass financial, business, and regulatory inclusion. This is to ensure that eGovernance measures ensure balanced transformation of Information ecology of the rural unit with maximum gains.

Contextualizing to the maturity of e-governance programmes and demographics, suitable model can be built using this framework. With these impactful dimensions, drilling them into measurable Key Performance Indicators based on actual data, an Index can be prepared.

he authors identify five actions (definition of territorial identity, involvement of internal and external supply chain actors, definition of quality standards, cooperation intra and infra supply chains, communication through technology) for collaboration in the development of rural areas that policymakers should encourage and actors in the supply chains must implement. The paper also entails both theoretical and practical implications. From the theoretical point of view, this study contributes to the literature on the relationship between agrifood, local development and the role of technologies. From the managerial point of view, this paper provides insights for policymakers to define strategies and actions aimed at developing collaborations between actors involved in the agrifood chain and leveraging digital technologies to support rural development.

A study we produced in partnership with IDC Asia/Pacific predicted that that by 2021, approximately 60% of Asia's GDP will come from products and services created through digital transformation – representing an estimated USD1.16 trillion windfall to regional economic growth. Asia Pacific's new digital landscape will be shaped by the rise of the intelligent cloud and intelligent edge. The intelligent cloud is ubiquitous computing that is enabled by the public cloud and artificial intelligence (AI). Around it is the intelligent edge, which is a continually expanding set of connected systems and devices that gather and analyse data – close to the users, the data, or both. The AI for Accessibility initiative has made a huge impact in Asia Pacific, which is home to 690 million people with disabilities. Breakthroughs in AI technologies can now enable people with vision, hearing, cognitive, learning, and

mobility disabilities to perform daily tasks more independently. They lead richer, more productive, lives and can participate more fully in society.

Agricultural Livelihoods

The objective of Madhya Pradesh State Rural Livelihood Mission is to ensure that every family has at least 2-3 livelihood options for the economic strength of these women groups. Several agricultural and non-agricultural livelihood programs have been started like the production of spices, vegetables, moringa, millet and other coarse grains through collective efforts. Coordination with departments and other entities and capacity building through livelihood collectives like RSETI, Farmer Producer Companies (FPCs) or producer groups of common producer individuals are some of the major programs. Currently, MPSRLM has promoted 130 FPCs. A total of 25.86 lakh families are supported by a variety of agriculture and livestock-based livelihood activities.

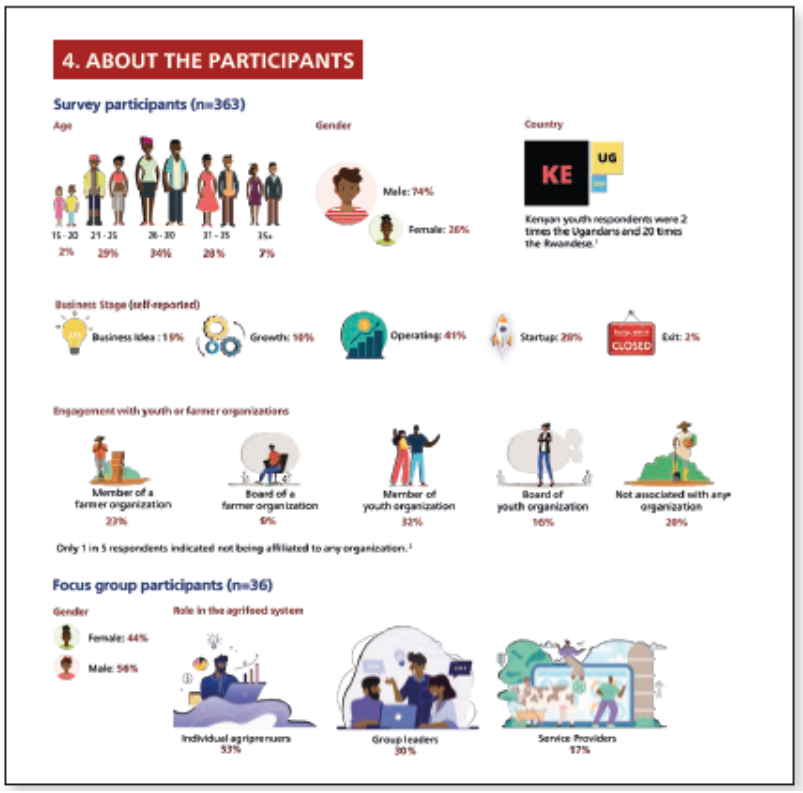
Branding also plays a major role for availing better price for their produce. In case of non-perishables or semi-perishables, the produce of the member farmers of the FPO should be branded, packaged and sold to bulk buyers; instead of selling as a commodity. CEOs and board members of FPOs must be trained on various aspects of branding, packaging and digital marketing. Each FPO must have a website, where the detail of the members, the crops produce by them, the varieties grown by them, the approximate quantity of requirement of inputs, time of requirement of input, expected quantity of production and time of production should be reflected on the website only well-resourced farmers are able to access advanced digital technologies, thus widening the rural divide and exacerbating already existing power imbalances; on the other hand (society's perspective), the promise of more sustainable production and that of transparent "farm to fork" systems rely on the assumption that all actors participate in the agricultural data value chain, and without convinced and informed participation of small-scale farmers these promises will never be realized. This is supported by research on digital agriculture adoption, which has found that factors such as lack of access to finance, lack of digital literacy and lack of information about digital agriculture technologies are major barriers for small-scale farmers. The three dimensions of the digital village: For agricultural production: e-Agriculture focuses on improving productivity by using Information and Communications Technologies and relevant digital solutions; For farmers' lives: "Digital Farmer Services" focus on enhancing farmers access to different kinds of social and economic services including financial services, social protection and employment; and For the village: Digital Services support rural transformation by enhancing delivery of public services on health, education, jobs, welfare and tourism, including eco-tourism and Agri-tourism.

In Asia and the Pacific, there are several models to develop and foster the digitalization FAO-constructed 'Digital Village Knowledge Sharing and Exchange Platform ', designed to be a one-stop 'village square' where best practices of hundreds of digital villages and their technologies could be displayed. The platform would also serve as a place for exchange and dialogue. FAO is working to develop the platform for all digital innovations, digital village initiatives, best practices, and knowledge sources to be easily accessible and publicly shared as part of efforts to achieve the SDGs, particularly to benefit those in the most inaccessible rural areas of the Asia-Pacific region.

Digital solutions have been used to empower children and young people. U-Report, powered by RapidPro, gives a voice to young people in 12 countries in EAPR on issues that matter to

them, from anti-bullying to policy feedback. Okay, a period tracker app designed for and by girls, provides girls in Mongolia, Indonesia, PNG and Philippines with crucial information about menstrual health. In Thailand the LoveCareStation is an online platform that provides over one million young people with access to information about sexual reproductive and mental health counselling. 2023 will see UNICEF EAPR continue, Digital platforms continue to expand. Many of us live a large part of our lives online. Compensate local creators for links to or Access to their content.

FIGURE 6
Infographic profiling participants of a digital readiness assessment



Digital readiness assessment is important to design rural intelligence platforms with respect to type of mobile phones, internet consecutiveness of loading etc., Access to information and knowledge is one of the main challenges hindering the active engagement of youth in agriculture and food systems. **Mapping information exchanges** in relation to agriculture, entrepreneurship, employment – or any other relevant topic of investigation – is key to identify the sources of information youth rely on and trust more. These include popular channels as well as opinion leaders and influencers who can significantly help in reaching out and mobilizing youth. On the other hand, this exercise allows us to detect bottlenecks and the so-called “gatekeepers” or actors who can in fact block or filter the information we intend to share with youth and hamper their participation in our initiatives. Complementary questions to ask include the **topics of interest**, to identify young people’s information needs and knowledge gaps, as well as the **preferred channels** to get that information. owed high assessment showed high digital access among the youth, with 90 percent using smart phones, 6, Ninety three percent using WhatsApp and 80 percent having a social network profile percent connecting to the internet regularly. However, a gender gap was recorded, with 17 percent fewer female than male youths online, using less sophisticated devices and with lower monthly expenses for

internet data. Despite the widespread adoption of social media (mostly Facebook) and instant messaging apps (mostly WhatsApp), only 22 percent of the youth reported using such tools for business digital access among the youth, with 90 percent using smart phones, 66 percent connecting to the internet regularly, 93 percent using WhatsApp and 80 percent having a social network profile. However, a gender gap was recorded, with 17 percent fewer female than male youths online, using less sophisticated devices and with lower monthly expenses for internet data. Despite the widespread adoption of social media (mostly Facebook) and instant messaging apps (mostly WhatsApp), only 22 percent of the youth reported using such tools for business

RESEARCH DIMENSIONS	KEY ELEMENTS TO ASSESS	DATA COLLECTION TECHNIQUES
DIGITAL READINESS		
Digital access	Availability of mobile/broadband coverage, ownership of digital devices, affordability of data	■ Survey questionnaire ■ Direct observation in the project area
Digital use	Patterns of online activities, content consumption behaviours and preferences, including gender-differentiated patterns	■ Survey questionnaire ■ Focus group discussions
Digital literacy	Awareness and perceived utility of existing ICT-based services (e.g. e-extension, e-commerce, online learning/mentoring, mobile-based weather or market price alerts), disposition to use, existing (self-assessed) and desired digital skills	■ Survey questionnaire ■ Focus group discussions
COMMUNICATION AND SOCIAL ENVIRONMENT		
Information flows	Trusted sources of information, opinion leaders/influencers and gatekeepers, preferred channels to get and share information, topics of interest	■ Survey questionnaire ■ Key informant interviews with agrifood system stakeholders ■ Focus group discussion and participatory techniques (e.g. trust circle, network/ power mapping)
Offline communication resources	Available communication facilities, frequency and preference of use, patterns of offline communication	■ Survey questionnaire ■ Focus group discussions and participatory techniques
Social capital	Civic engagement, involvement in formal or informal organizations (e.g. youth/farmer organizations, cooperatives, saving groups)	■ Survey questionnaire ■ Focus group discussions ■ Key informant interviews with agrifood system stakeholders
Social norms	Family and community expectations, role models, sociocultural and gender norms	■ Focus group discussion and participatory techniques (e.g. timelines, role play) ■ Key informant interviews with family and community members

Source: Author's own elaboration.

DIGITAL INCLUSION STRATEGIES

Digital inclusion strategies include the rapid and ongoing digital transformation of government, several ways that rural development actors can improve digital inclusion. The section proposes that rural development actors take a series of measures to address digital exclusion across three areas. First, digitalization should be responsive to the needs and priorities of all individuals, especially the rural poor and marginalized groups. Second, providing offline options can ensure continued participation for those with limited technology access. Third, explicitly addressing digital divides and reducing structural inequalities are crucial to preventing further exclusion and disparities. These actions are summarized below.

- Gender- and marginalized-group- responsive digitalization promote people-centred design processes with an emphasis on putting the most marginalized and hardest to reach at the centre facilitate gender and marginalized group responsiveness and mainstreaming across all digitalization efforts.
- Make digital solutions and content accessible for users with disabilities and users with lower levels of language literacy.
- Providing offline options: Offline service delivery options should complement digital solutions, and a "digital by default" approach or "digital first" strategy should be avoided.
- Promote multichannel service delivery which blends digital, hybrid and offline options for citizens to engage with the state and service providers.
- Efforts may be needed to map and address situations in which offline options are absent or have been removed.
- The capacity of both formal and informal intermediaries should be strengthened through technical support and funding.
- Provide and support the provision of digital-skills training in a way that is responsive to the needs of marginalized groups from rural areas.
- Provide technical assistance on gender mainstreaming to telecentres to help make them more inclusive of marginalized groups.
- Provide technical assistance on gender mainstreaming to Universal Service Funds to help ensure that their investments benefit all rural residents equally

Rural development organizations adopt digital-inclusion narratives based on the three factors that improve digital inclusion identified in this study: (i) marginalized-group- and gender-responsive digitalization, (ii) ensuring offline alternatives, and (iii) tackling digital divides across all levels. This narrative can assist rural development organizations and practitioners in adapting organizational practices and implementing programmes that address digital exclusion and avoid exacerbating inequalities. Once an internal normative framework is in place, digital inclusion guidelines can be developed to help partner rural development organizations improve digital- inclusion. Such a tool can help rural development organizations and digital agriculture practitioners integrate inclusive practices into programme/project design and field operations. These narratives can also help rural development organizations broaden their understanding of digital inclusion and inform the design of surveys that consider after-access barriers with data sufficiently disaggregated by gender and marginalized groups, and between rural areas with differing characteristics. This will help identify who may be left behind, and to tailor appropriate digital solutions.

In conclusion, achieving an inclusive process of rural digital transformation requires collaboration among various stakeholders. In an increasingly digital world, it is more important than ever to tackle poverty and structural inequalities alongside addressing potential digital exclusions. FAO and partners must double down efforts to address disparities between urban and rural areas, between men and women, as well as between marginalized and better-off groups within rural areas.

Conclusion

As the Agriculture and Allied sector in the Asia Pacific is on the verge of adopting modern technologies, such as IoT, AI/ML and Agri-drones for unmanned aerial surveying, Indian and foreign Agritech players can play a vital role in supplying these advanced technologies to farmers. Currently, there are few players in the market, but catering to millions farmers in Asia Pacific countries exhibits a huge opportunity for private and foreign entities to expand their footprint in the country. However, influential factors that will define the success of digital agriculture in Asia Pacific are **technology affordability, ease of access and operations, easy maintenance of systems and supportive government policies**.

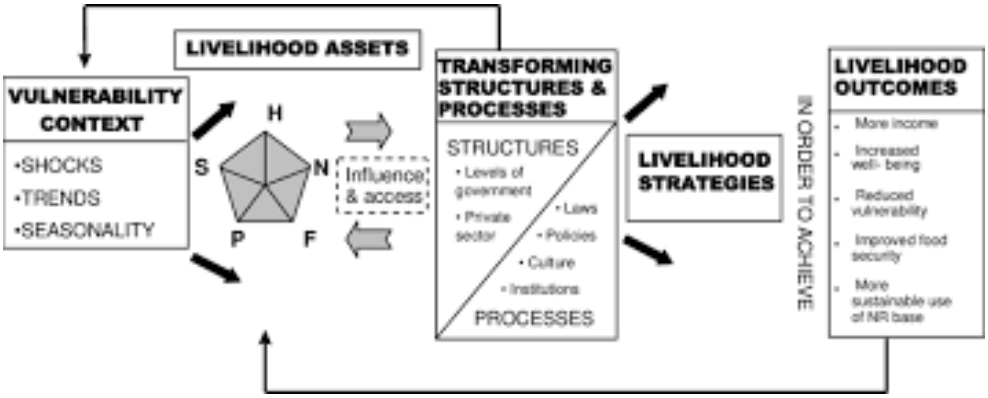
Adopting a holistic ecosystem approach to address challenges faced by the sectors of rural development in asia pacific is of global interest, to achieve objectives, like doubling farmer incomes and sustainable development. Thus, a multi-stakeholder approach will be required for the wide-scale adoption of digital agriculture in India, with the government playing a key enabler's role in the ecosystem.

Participatory Rural intelligence is to be developed through participation of communities and need assessment is to be done through PRA and to develop the village level strategy and action plan, a suitable digital interface will be developed and deployed and the extension workers and community will be trained and empowered with these tools for effective rural development across sustainable rural livelihoods as depicted in the DFID framework of sustainable rural livelihood. The Department for International Development (DFID) Sustainable Livelihoods Framework (SLF) is a tool for understanding and analysing the livelihoods of the poor. The framework is based on the idea that people need a variety of assets to achieve positive livelihood outcomes. The five components of the framework are: Vulnerability context, Livelihood assets, Transforming structures and processes, Livelihood strategies, and Livelihood outcomes.

The framework's central feature is the asset pentagon, which identifies five types of assets that are the foundation of livelihoods:

- **Human capital**: Includes skills, knowledge, health, and the ability to work
- **Natural capital**: Includes natural resources that provide services and resource flows, such as erosion protection and nutrient cycling
- **Physical capital**: Includes basic infrastructure, such as water and sanitation, roads, schools, and producer goods like tools, livestock, and equipment
- **Financial capital**: Includes savings and regular inflows of money
- **Social capital**: Another type of asset that contributes to livelihoods

The framework is a simplification, and the full richness of livelihoods can only be understood through local, qualitative, and participatory analysis. However, the framework can help stimulate debate and reflection, which can improve performance in poverty reduction.



THE PLAN

CIRDAP effectively utilizes the above systems in developing rural intelligence networks in Asia Pacific through dissemination of standardised participatory community development plans standardised by the digital initiatives and community participation as discussed in the paper. However, the impact of participatory rural intelligence framework for capture and implementation of rural development protocols demonstrated through these systems in terms of augmenting and enhancing local participation aided through digital platform support, enriching existing efforts of rural development in Asia pacific countries and augmenting them are to be documented. The main purpose is to get the feedback from the communities in use of digital initiatives for strengthening the coping mechanism, and empowering sustainable rural livelihood efforts through rural intelligence framework established is the core idea. Further upscaling the model of participatory rural intelligence framework in Asia Pacific rural development initiatives, to strengthen the existing village development plans already in vogue. Hence, this paper has been conceived to develop Rural intelligence framework on a participatory mode through improved participatory Rural intelligence protocols developed and standardised by CIRDAP and to assess the impact of Participatory Rural intelligence protocols in terms of enhanced quick actions to solve community problems like health, education, sanitation, and developing strong sustainable livelihoods among the rural communities with reduced vulnerability.

Problems to be addressed

Livelihoods are vulnerable to shocks and trends, understanding and analysing the livelihoods of the poor through existing digital interfaces and customising them further as participatory rural intelligence protocols is based on the idea that people need a variety of assets to achieve positive livelihood outcomes. Focussing on Vulnerability context, Livelihood assets, transforming structures and processes, Livelihood strategies, and Livelihood outcomes, is the key issue of this paper.

Challenges of Participatory Rural intelligence protocols to augment Rural development efforts across sectors in Asia Pacific

- Fragmented rural development efforts across institutions and processes with less participation from the community, needs to be integrated for effective rural development strategy and implementable action plans at village level

- Low personal and social responsibility among communities and stake holders leading to ineffective implementation of effective rural development strategies, concepts and skills.
- Empower the rural communities to quickly cope up, and reduce vulnerability for a better livelihood options and outcome
- Participation f stakeholders to quickly arrive at rural development strategy and realistic actin plans for implementation through the Rural intelligence platform

Weaknesses of Participatory Rural intelligence for developing sustainable rural livelihoods in Asia Pacific

- Must not over emphasise the digital platform rather than then the participatory learning and action plan for implementation
- Not enhancing the collective knowledge of the community and stake holders n using the Participatory Rural intelligence networks/protocols, needs collective learning, synthesis and joint action

Gaps in the Participatory Rural intelligence platform for developing and supporting Sustainable rural livelihood

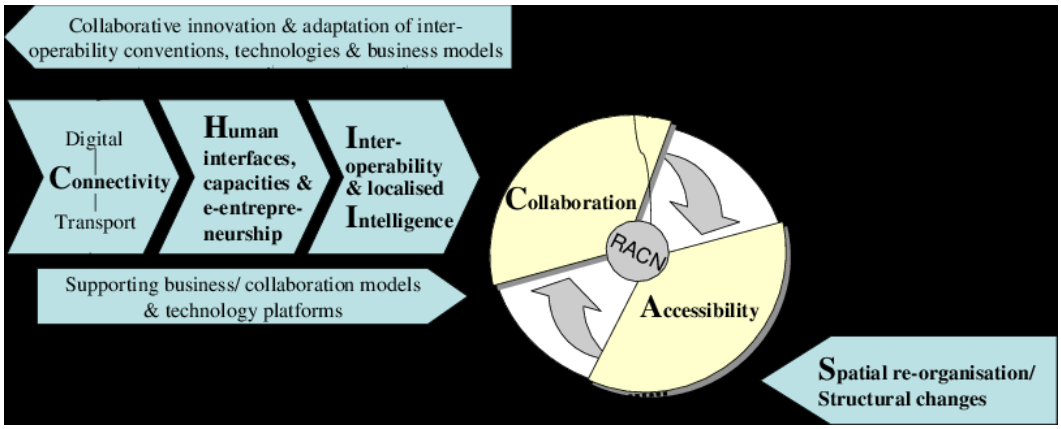
- Lack of participation among actors of rural development, stakeholders and beneficiaries
- Lack of good learning opportunities through participatory Rural intelligence platforms, must not become another digital application without participation and effectiveness in building sustainable rural livelihoods
- Lack of awareness of the digital interface its use and lack of triangulated and validated rural development problems facing the community, it needs synthesis and integration of both
- Lack of conviction that Participatory Rural intelligence framework and protocol will enhance sustainable Rural livelihoods, quickly in a cost-effective manner

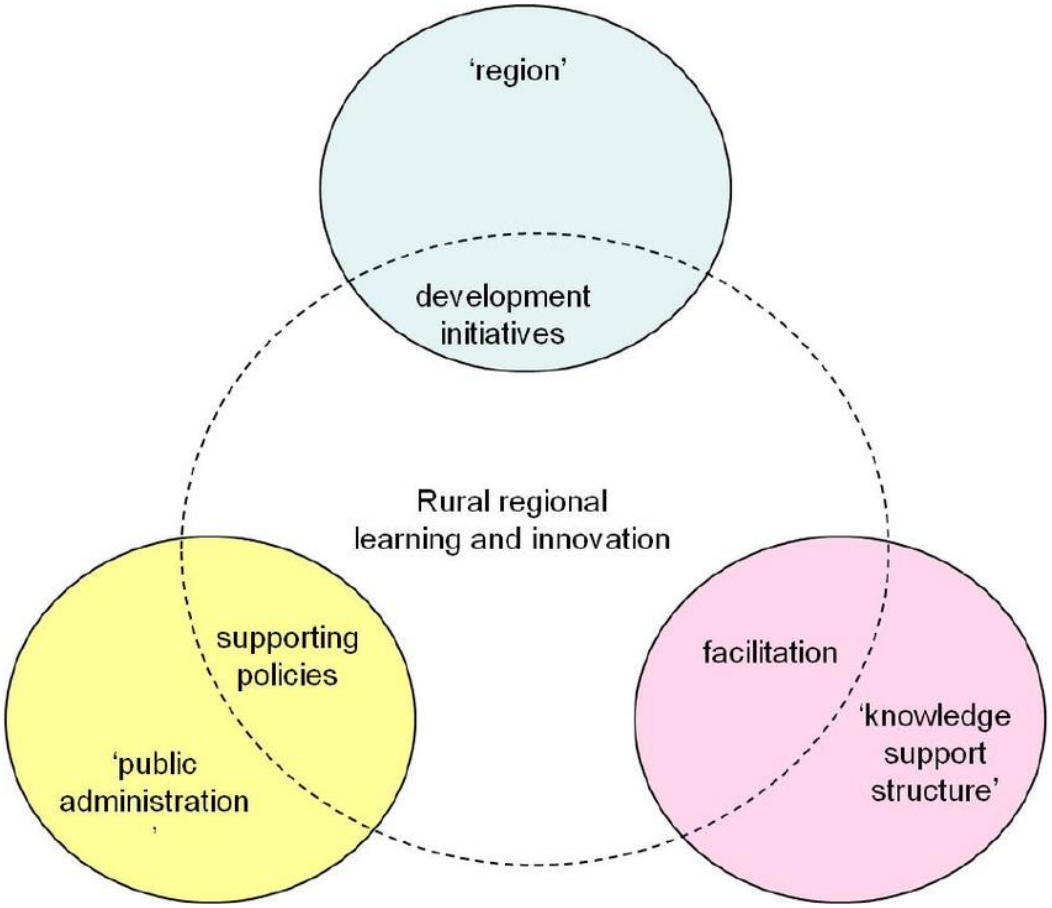
- **Aims and Objectives**

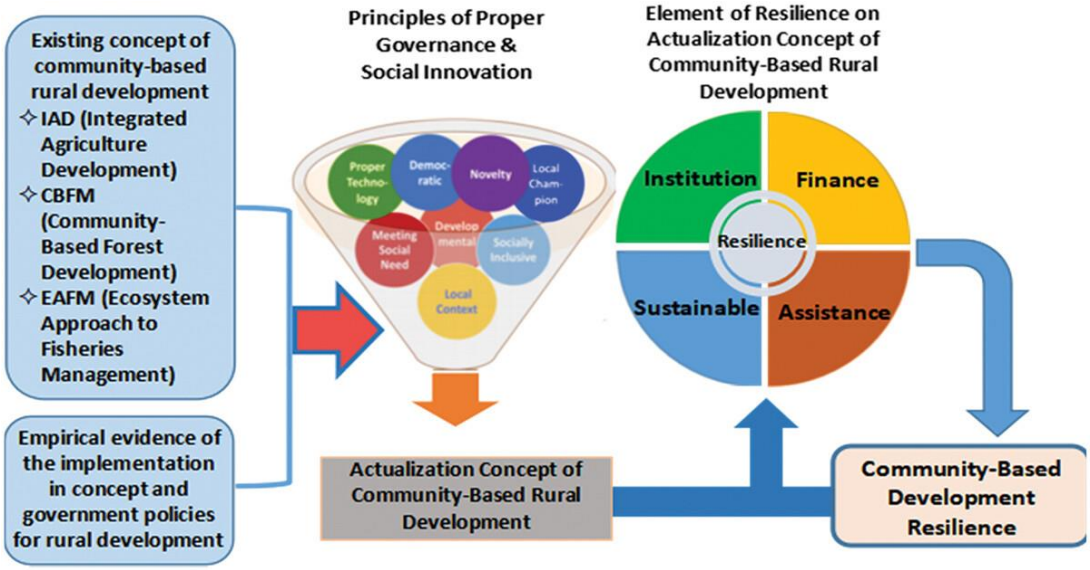
- Based on the above-mentioned background of Sustainable rural livelihood and rural development facets facing the community the participatory rural intelligence framework, protocols, procedures should augment the present rural development efforts across departments, institutions and communities' schools, the following specific objectives are proposed:
- Participatory Planning, mapping sustainable rural livelihood vulnerability
- Participatory visioning, strategizing and development of action plans for improving sustainable rural livelihood
- Demonstration of Participatory rural intelligence methodology pertaining to mapping and reducing the vulnerability in a community context
- Popularization of Participatory rural intelligence methodology augmenting efforts to build strong and sustainable rural livelihoods among the community

- Capacity building programmes for different stakeholders on Participatory rural intelligence methodology augmenting efforts to build strong and sustainable rural livelihoods among the community
- Documentation of successful cases for Participatory rural intelligence methodology augmenting efforts to build strong and sustainable rural livelihoods among the community
- Integrating existing processes and tools of rural development with Participatory rural intelligence methodology augmenting efforts to build strong and sustainable rural livelihoods among the community
- Villages in different sectors like health, sanitation, education, agriculture, animal husbandry, infrastructure will be selected for developing Participatory rural intelligence methodology and strategies for implementable action plans
- Imparting trainings on Participatory rural intelligence methodology to line department officers who in turn will train rural community to capture and map the vulnerability and arrive at consensual action plans to support sustainable rural livelihoods.

Scheme of the project implementation







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Working modalities:

- **Identification of villages and rural development problems across sectors of education, health, infrastructure, Agri, etc.,**
- **Participatory gap and need assessment:** A team of scientists will be assessing the information needs of developing participatory rural intelligence framework for mapping, strategizing and arriving at implementable action plans
- **Capacity building for stake** holder across sectors of rural development for developing participatory rural intelligence framework for mapping, strategizing and arriving at implementable action plans
- **Demonstrations:** Demonstration of selected processes and developing participatory rural intelligence framework for mapping, strategizing and arriving at implementable action plans
- **Field Days:** Field days will be organized for implementing developing participatory rural intelligence framework for mapping, strategizing and arriving at implementable action plans
- **On-campus and off campus online skill training programmes:** Need-based on-campus training programmes on developing participatory rural intelligence framework for mapping, strategizing and arriving at implementable action plans
- **Off-campus training programmes/ interface meetings:** Interface meeting/ training/
- sensitization programmes will be organized to disseminate developing participatory rural intelligence framework for mapping, strategizing and arriving at implementable action plans
- **Technical literature:** Literature on developing participatory rural intelligence framework for mapping, strategizing and arriving at implementable action plans will be done
- Tentative list of developing participatory rural intelligence framework for mapping, strategizing and arriving at implementable action plans-protocols to be disseminated
- **Target beneficiaries:**

  Rural development departments, officers across sectors, community, local leaders, beneficiaries and individuals of a target community

BIBLIOGRAPHY

- Agrawal, A., Khan, R. A., & Ansari, M. T. J. (2022). Empowering Indian citizens through the secure e-governance: the digital India initiative context. In *Emerging Technologies in Data Mining and Information Security: Proceedings of IEMIS 2022, Volume 3* (pp. 3–11). Singapore: Springer Nature Singapore.
- Avinash Kumar Rai Amandeep Ranjan, Shankar Dayal Bharti, D. R. K. Saikanth , Surender ,Sandeep Rout, and Rakhi Gautam ,2023, Agricultural Extension's Key Role in Modern Farming: A Review;Asian J. Agric. Ext. Econ. Soc., vol. 41, no. 9, pp. 475-485, 2023; Article no.AJAEES.102139, Asian Journal of Agricultural Extension, Economics & Sociology, Volume 41, Issue 9, Page 475-485, 2023; Article no.AJAEES.102139, ISSN: 2320-7027
- Asrani, C. (2022). Spanning the digital divide in India: Barriers to ICT adoption and usage. *Journal of Public Affairs, 22*(4), e2598.
- Athique, A. (2019). A great leap of faith: The cashless agenda in Digital India. *New Media & Society, 21*(8), 1697–1713.
- Banu, A. (2017). Digital India: A Program to Transform India into a Digitally Empowered Society and Knowledge Economy. Adarsh Journal of Management Research, 44–49. Barada Prasad Panigrahy, Subash Chandra Nath and Prafulla KumarPadhi, Activities, Marketing Strategies and Brand Performance of FPOS‟ in Odisha -The Eastern State of India, International Journal of Management, 11(10), 2020, pp 1266-1287.,http://www.iaeme.com/IJM/issues.asp?JType=IJM&VType=11&IType=10 ,International Journal of Management, Volume 11, Issue 10, October 2020, pp. 1266-1287. Article ID: IJM_11_10_114,Available online at http://www.iaeme.com/ijm/issues.asp?JType=IJM&VType=11&IType=10,Journal Impact Factor (2020): 10.1471 (Calculated by GISI) www.jifactor.com,ISSN Print: 0976-6502 and ISSN Online: 0976-6510DOI: 10.34218/IJM.11.10.2020.114
- Barik, R., & Sharma, P. (2019). Analysing the progress and prospects of financial inclusion in India. *Journal of Public Affairs, 19*(4), e1948.

  Barrutia, J. M., & Echebarria, C. (2021). Effect of the COVID-19 pandemic on public managers' attitudes toward digital transformation. *Technology in Society, 67*, 101776.
- Behera, J. K. (2021). Digital transformation and its impact: An analytical study. In *Digitization of economy and society* (pp. 27–49). Apple Academic Press
- Bharat Sontakki, Purushottaman Venkatesan, & Jayaraghavendra Rao V K 2019 Participatory Rural Appraisal (PRA): Tools & Techniques, in the book Challenges and emerging opportunities in Indian Agriculture ed Ch Srinivasa Rao, Senthil Vinayagam, & PC Meena, NAARM Publications, Hyd-500030
- Bhasin, N. (2016). Foreign direct investment in strategic sectors of India: A study on the role of reforms and sectoral guidelines. *Productivity, 57*(3), 227.
- Bhatt, P. (2019). Digital payments in India–A Business Perspective. *Vinimaya, 40*(2), 37–52.
- Burman, D. D. N. (2021). DIP: 18.20. 89840995.01 Changing Face of Digital India. *Fundamental Concepts of Economics*, 1.

- Bushra Faridi & Shahla Shabeeh Shahee,2024 Digital Initiatives for Empowering Women Towards a Sustainable Future www.ijcrt.org © 2024 IJCRT | Volume 12, Issue 7 July 2024 | ISSN: 2320-2882
- Chandra, S., Chang, A., Day, L., Fazlullah, A., Liu, J., McBride, L., & Weiss, D. (2020). *Closing the K–12 digital divide in the age of distance learning*. Common Sense and Boston Consulting Group.
- Chandrasekhara P, Jayaraghavendra Rao V K, Venkattakumar R and Gajanana TM 2021, Agricultural Marketing strategies of during COVID-19, KURUKSHETRA, VOL 69, NO11, PAGES 52, September 2021, pp 42-46
- Chatterjee, S., Gupta, S. D., & Upadhyay, P. (2020). Technology adoption and entrepreneurial orientation for
- Chen, W., Botchie, D., Braganza, A., & Han, H. (2022). A transaction cost perspective on blockchain governance in global value chains. *Strategic Change, 31*(1), 75–87.
- Chenoy, D., Ghosh, S. M., & Shukla, S. K. (2019). Skill development for accelerating the manufacturing sector: The role of 'new-age skills for 'Make in India.' *International Journal of Training Research, 17*(sup1), 112–130.
- Chunekar, A., & Sreenivas, A. (2019). Towards an understanding of residential electricity consumption in India. *Building Research & Information, 47*(1), 75–90.
- Cooksey, R. W. (2020). *Illustrating statistical procedures: Finding meaning in quantitative data*. Springer Nature.
- Davey, S., & Davey, A. (2014). Assessment of smartphone addiction in Indian adolescents: A mixed method study by systematic-review and meta-analysis approach. *International Journal of Preventive Medicine, 5*(12), 1500.
- Deininger, K. (2017). Toward more evidence-based decision-making in the land sector: Can it help to close implementation gaps? In *Agriculture and Rural Development in a Globalizing World* (pp. 161–180). Routledge.
- Demmou, L., & Sagot, Q. (2021). Central Bank Digital Currencies and payments: A review of domestic and international implications.
- Dhal, S. (2020). Situating Digital India Mission in pursuit of good governance: A study of electronic governance initiatives in the Indian province of Odisha. *Indian Journal of Public Administration, 66*(1), 110–126.
- Dixit, S., Bhatia, V., Khanganba, S. P., & Agrawal, A. (2022). Digital divide and its current state. In *6G: Sustainable Development for Rural and Remote Communities* (pp. 1–15). Singapore: Springer Nature Singapore.
- Dutta, A., & Fischer, H. W. (2021). The local governance of COVID-19: Disease prevention and social security in rural India. *World Development, 138*, 105234.
- Dutta, G., Kumar, R., Sindhwani, R., & Singh, R. K. (2020). Digital transformation priorities of India's discrete manufacturing SMEs–a conceptual study in perspective of Industry 4.0. *Competitiveness Review: An International Business Journal*.

- Easterby-Smith, M., Thorpe, R., & Jackson, P. R. (2012). *Management research*. Sage.
- Elliott, C., Mavriplis, C., & Anis, H. (2020). An entrepreneurship education and peer mentoring program for women in STEM: Mentors' experiences and perceptions of entrepreneurial self-efficacy and intent. *International Entrepreneurship and Management Journal*, *16*, 43–67.
- ElMassah, S., & Mohieldin, M. (2020). Digital transformation and localizing the sustainable development goals (SDGs). *Ecological Economics*, *169*, 106490.
- ESCAP, U. (2018). Fibre-optic co-development along the Asian highways and Trans-Asian railways for e-resilience: the cases of India and Bangladesh.
- Fabregas, R., Kremer, M., & Schilbach, F. (2019). Realizing the potential of digital development: The case of agricultural advice. *Science*, *366*(6471), eaay3038.
- Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research and Development*, *68*, 2449–2472.
- Fennell, S., Kaur, P., Jhunjhunwala, A., Narayanan, D., Loyola, C., Bedi, J., & Singh, Y. (2018). Examining linkages between Smart Villages and Smart Cities: Learning from rural youth accessing the internet in India. *Telecommunications Policy*, *42*(10), 810–823.

  Gangotia, A., & Pradhan, B. (2022). Social entrepreneurship and cow tourism: exploring the new vistas of experiential economy. *Journal of Enterprising Communities: People and Places in the Global Economy*, (ahead-of-print).
- Ghobakhloo, M., & Iranmanesh, M. (2021). Digital transformation success under Industry 4.0: A strategic
- Gielens, K., & Steenkamp, J. B. E. (2019). Branding in the era of digital (dis) intermediation. *International Journal of Research in Marketing*, *36*(3), 367–384.
- Girijesh Singh Mahra, Pardeep Kumar, Chandan Solanki, S.K. Kaushik, Rekha Tewari, V. K. Jayarqaghavendra. Rao 2015 Identifying Grass Root Problems and Generating Sustainable Solutions through Participatory Rural App, Indian Research Journal of Extension Education 11/2015; 15(4 (Special Issue)):198-208.
- Godha, A., Sharma, P. K., & Godaraa, R. L. (2019). Notion of startup India initiative policy framework: insights for startup to scale-up. *Journal of Economic Policy and Research*, *15*(1), 16–28.
- Goedhart, N. S., Broerse, J. E., Kattouw, R., & Dedding, C. (2019). 'Just having a computer doesn't make sense': The digital divide from the perspective of mothers with a low socio-economic position. *New Media & Society*, *21*(11–12), 2347–2365.

  Gond, R., & Gupta, R. (2017). A study on digital education in India: scope and challenges of an Indian society. *Anveshana's International Journal of Research in Regional Studies, Law Soc Sc J Manag Prac*, *2*(3), 12–18.
- Gowd, K. K. (2022). Network governance, food security, and public service delivery: Functioning of Chhattisgarh's centralized online real-time electronic public distribution system (CORE-PDS). *Journal of Public Affairs*, *22*(3), e2549.

- Gupta, R., Pal, S. K., & Muttoo, S. K. (2020). Data analytics for better branding of e-governance and e-business systems: Case of "Digital India" campaign. In *Leveraging digital innovation for governance, public administration, and citizen services: Emerging research and opportunities* (pp. 51–78). IGI Global.
- Gurumurthy, A., Chami, N., Babbar, A., Vasudevan, M. P., & Sudharma, N. (2014). Digital technologies and gender justice in India. *IT for Change*, 202014–202011.
- Hassan, M. M., & Rather, G. M. (2020). Free space optics (FSO): a promising solution to first and last mile
- Holl, A., & Rama, R. (2023). Spatial patterns and drivers of SME digitalisation. *Journal of the Knowledge Economy*.
- https://doi.org/10.1007/s13132-021-00853-3
- https://doi.org/10.4060/cc9216en
- https://www.fao.org/family-farming/detail/en/c/1683163/
- https://www.fao.org/digital-villages-initiative/asia-pacific/resources/publications/en
- https://www.fao.org/digital-villages-initiative/asia-pacific/en
- https://youtu.be/2F91pKx542g
- https://youtu.be/1SkbSl5y8Bw
- https://youtu.be/y_WdI9I5E3s
- https://www.adb.org/what-we-do/topics/digital-technology
- https://www.telecomreviewasia.com/news/featured-articles/3889-asia-pacific-s-remote-areas-embrace-new-technologies/
- https://apt.int/apt/ICT-research
- https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1847506
- https://www.ibef.org/blogs/digital-agriculture-the-future-of-indian-agriculture
- https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/India/Digital%20India%20Technology%20to%20transform%20a%20connected%20nation/Digital-India-Technology-to-transform-a-connected-nation-full-report.ashx
- https://openknowledge.fao.org/server/api/core/bitstreams/a86d257f-8d27-4091-bf34-dd40bdedc040/content
- https://www.thehinducentre.com/publications/policy-watch/article34777275.ece/binary/Draft-ODR-Report-NITI-Aayog-Committee.pdf
- https://doi.org/10.1007/978-3-030-81085-6_4
- https://doi.org/10.1007/s13132-022-00896-0
- https://doi.org/10.2139/ssrn.3956623

- https://doi.org/10.1186/s13731-024-00380-w
- (https://www.scribd.com/document/308113066/Kaglabamori-Village_)
- **https://www.nic.in/blogs/measuring-rural-e-governance/**
- https://www.ifad.org/en/w/publications/digital-agriculture-in-asia-and-the-pacific-region-a-synthesis-of-ongoing-work-2024

  https://www.itu.int/wtsa/2024/

  https://news.microsoft.com/apac/features/microsoft-in-asia-2/
- https://doi.org/10.1108/JRIT-10-2020-0052
- https://www.ifad.org/en/w/publications/digital-agriculture-in-asia-and-the-pacific-region-a-synthesis-of-ongoing-work-2024
- https://arya.ag/arya-shakti
- https://arya.ag/arjun
- https://prakshep.arya.ag/
- https://disabilityinsider.com/2022/06/29/events/asia-pacific-nations-on-accelerated-push-for-rural-digitalization-to-achieve-sdgs/
- https://doi.org/10.1108/TG-12-2022-0162
- **https://www.emerald.com/insight/1750-6166.htm**
- https://news.microsoft.com/en-my/2019/02/11/empowering-asia-pacifics-digital-ambition/
- https://www.linkedin.com/pulse/contribution-primary-sector-madhya-pradeshs-economy-chances-pastor-edngf/https://www.apaari.org/regional-collective-action-on-inclusive-digital-transformation-of-agriculture-in-asia-pacific/
- https://www.unicef.org/eap/media/14086/file/%20EAPR%202022%20DX%20Annual%20Report.pdf
- https://www.hinrichfoundation.com/research/wp/digital/emergent-digital-fragmentation-the-perils-of-unilateralism/
- Iivari, N., Sharma, S., & Ventä-Olkkonen, L. (2020). Digital transformation of everyday life–How COVID-19 pandemic transformed the basic education of the young generation and why information management research should care? *International Journal of Information Management, 55*, 102183.
- Ingrams, A., Kaufmann, W., & Jacobs, D. (2022). In AI we trust? Citizen perceptions of AI in government decision making. *Policy & Internet, 14*(2), 390–409.
- James, J. (2020). The smart feature phone revolution in developing countries: Bringing the internet to the bottom of the pyramid. *The Information Society, 36*(4), 226–235.
- Jamil, S. (2021). From digital divide to digital inclusion: Challenges for wide-ranging digitalization in Pakistan. *Telecommunications Policy, 45*(8), 102206.

- Jani, J., & Tere, G. (2015). Digital India: A need of hours. *International Journal of Advanced Research in Computer Science and Software Engineering, 5*(8), 317–319.
- Jayaraghavendra Rao V. K., R. Venkattakumar, C. K. Narayana & Vasanthi C. 2022,Farmers Empowerment and Entrepreneurial Development through FPOs and Startups- NIPA® GENX ELECTRONIC RESOURCES & SOLUTIONS P. LTD. New Delhi-110 034P-, ISBN: 978-81-19215-51-5,P-240, NIPA® GENX ELECTRONIC RESOURCES & SOLUTIONS P. LTD.,101,103, Vikas Surya Plaza, CU Block,L.S.C.Market, Pitam Pura, New Delhi-110 034,Ph : +91 11 27341616, 27341717, 27341718,E-mail: ,ewindiapublishingagency@gmail.com,www: www.nipabooks.com,For customer assistance, please contact,Phone: + 91-11-27 34 17 17,Fax: + 91-11-27 34 16 16,E-Mail: feedbacks@nipabooks.com
- Jayaraghavendra Rao V K. 2016 'Organizing Market led extension in Horticulture for less favoured areas (NEH): in Trends in Sustainable Horticulture-diversity, production and crop improvement (Volume 1) eds Debashish Mandal, Amritesh C. Shukla, Wasim Siddiqui, Apple Academic Press USA
- Jayaraghavendra Rao V K 2022 NATURAL FARMING, AGRICULTURE & INDUSTRY SURVEY JULY 2022, pp 24-26
- Jayaraghavendra Rao V K 2021 "NEW FARM BILLS 2020" - Panacea for assured income and market driven Agriculture- Volatility approach- AGRICULTURE & INDUSTRY SURVEY December 2021, p-14-15
- Jayaraghavendra Rao V.K.2016 'Organizing Market led extension in Horticulture for less favoured areas (NEH): in Trends in Sustainable Horticulture-diversity, production and crop improvement (Volume 1) eds Debashish Mandal, Amritesh C. Shukla, Wasim Siddiqui, Apple Academic Press USA
- Jayaraghavendra Rao V.K. & N. Sandhya Shenoy, 2006 PARTICIPATORY KNOWLEDGE MANAGEMENT- A Case of Participatory Peoples' Media, *., ISEE National Seminar-2006 on 'Information and Communication Technologies: opportunities and Challenges for revitalizing extension system, December 27-29, 2006, held at Navsari Agricultural University, Navsari, Gujarat-396450- received the best paper award
- Jayaraghavendra Rao V. K., R. Venkattakumar, C. K. Narayana & Vasanthi C. 2022, Farmers Empowerment and Entrepreneurial Development through FPOs and Start-ups-resource compendium for ICAR short course on Farmers Empowerment and Entrepreneurial Development through FPOs and Start-ups conducted at IIHR from Dec 05-14th 2022, IIHR Publications P-198-presently being published as a book from NIPA
- Jayaraghavendra Rao, V. K., Ramya H. R., Attuluri Srinivasa charyulu, Sharath Kumar P., & Navaneetha R., 2024., Training manual on Mobile Journalism, Manage, India. Copyright © 2024 ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru & National Institute of Agricultural Extension Management (MANAGE), Hyderabad, India. ISBN: 978-81-19663-33-0,P-91
- Jayaraghavendra Rao V. K. 2022, Supply Chain Management: Issues & Success with Reference to Horticultural Crops, Chapter 8, in Advances in Agricultural Marketing and Value Chain Management Edited by: Ujjwal Kumar, A. Mukherjee, D.K. Singh, R.K. Raman and

Kumari Shubha International Books & Periodical Supply Service, Page 83-93, International Books & Periodical Supply Service, (Publisher of Scientific Books)38, NISHANT KUNJ, PITAM PURA MAIN ROAD, DELHI-110034 (India)

- Dr. V.K Jayaraghavendra Rao, Dr. R Venkattakumar, Dr C K Narayana, Dr. Shahaji Phand, 2021 Opportunities for Value addition in Horticulture for Hortipreneurs Published by: ICAR-Indian Institute of Horticultural Research, Bengaluru & National Institute of Agricultural Extension Management (MANAGE), Hyderabad, India. Publisher's Address: National Institute of Agricultural Extension Management (MANAGE), Rajendranagar, Hyderabad – 500 030, Telangana State, India. Printer's Details: e-Book from MANAGE, Hyderabad. Edition's Details: First Edition 2021. All rights reserved. ISBN: 978-81-950446-8-9Copyright © 2021 ICAR- Indian Institute of Horticultural Research, Bengaluru & National Institute of Agricultural Extension Management (MANAGE), Hyderabad, India. P-76
- Jia, X., & Desa, G. (2022). Social entrepreneurship and impact investment in rural–urban transformation: An orientation to systemic social innovation and symposium findings. In *Social Innovation and Sustainability Transition* (pp. 283–305). Cham: Springer Nature Switzerland.
- Kamath, S. (2021). Digital India Initiatives with Special Reference to Digital Locker.
- Kar, S., Chakravorty, B., Sinha, S., & Gupta, M. P. (2018). Analysis of stakeholders within IoT ecosystem. *Digital India: Reflections and Practice, 2018*, 251–276.
- Karine, H. A. J. I. (2021). E-commerce development in rural and remote areas of BRICS countries. *Journal of Integrative Agriculture, 20*(4), 979–997.
- Kud, A. (2023). Decentralized information platforms in public governance: Reconstruction of the modern democracy or comfort blinding? *International Journal of Public Administration, 46*(3), 195–221.
- Kumar, S. (2019). From digital India to skill India or vice versa. *ZENITH International Journal of Multidisciplinary Research, 9*(6), 1–8.
- Kumar, S. K. A., Ihita, G. V., Chaudhari, S., & Arumugam, P. (2022, January). A survey on rural internet connectivity in India. In *2022 14th International Conference on Communication Systems & Networks (COMSNETS)* (pp. 911–916). IEEE.
- Kumar, S., J. Kolassa, R. Reichle, W. Crow, G. de Lannoy, P. de Rosnay, N. MacBean, M. Girotto, A. Fox, T. Quaife, C. Draper, B. Forman, G. Balsamao, S. Steele-Dunne, C. Albergel, B. Bonan, J.-C. Calvet, J. Dong, H. Liddy, and B. Ruston, 2022: An agenda for land data assimilation priorities: Realizing the promise of terrestrial water, energy, and vegetation observations from space. *J. Adv. Model. Earth Syst.*, 14, no. 11, e2022MS003259, doi:10.1029/2022MS003259 Sindakis and Showkat, Journal of Innovation and Entrepreneurship (2024) 13:29
- Lama, S. (2019). The Impact of FDI Policy Reforms on The Retail Sector in India.
- Laurent, M., Denouël, J., Levallois-Barth, C., & Waelbroeck, P. (2015). Digital identity. In M. Laurent (Ed.), *Digital identity management* (pp. 1–45). Elsevier.

- Lema, R., Kraemer-Mbula, E., & Rakas, M. (2021). Innovation in developing countries: Examining two decades of research. *Innovation and Development, 11*(2–3), 189–210.
- Lorenzi, N. M., Kouroubali, A., Detmer, D. E., & Bloomrosen, M. (2009). How to successfully select and implement electronic health records (EHR) in small ambulatory practice settings. *BMC Medical Informatics and Decision Making, 9*, 1–13.
- Lythreatis, S., Singh, S. K., & El-Kassar, A. N. (2022). The digital divide: A review and future research agenda. *Technological Forecasting and Social Change, 175*, 121359.
- Mahapatra, S. K., & Anderson, J. (2023). Languages for learning: A framework for implementing India's multilingual language-in-education policy. *Current Issues in Language Planning, 24*(1), 102–122.
- Malhotra, C., & Anand, R. (2020, September). Accelerating public service delivery in India: application of internet of things and artificial intelligence in agriculture. In *Proceedings of the 13th International Conference on Theory and Practice of Electronic Governance* (pp. 62–69).
- Malodia, S., Dhir, A., Mishra, M., & Bhatti, Z. A. (2021). Future of e-Government: An integrated conceptual framework. *Technological Forecasting and Social Change, 173*, 121102.
- Manda, M. I., & Ben Dhaou, S. (2019, April). Responding to the challenges and opportunities in the 4th Industrial revolution in developing countries. In *Proceedings of the 12th international conference on theory and practice of electronic governance* (pp. 244–253).
- Maxensius Tri Sambodo, Syarif Hidayat, Atika Zahra Rahmayanti, Felix, Wisnu Handoyo, Chitra Indah Yuliana, Achsanah Hidayatina, Purwanto Hinayana, Joko, Suryanto, Umi Karomah Yaumidin, Mochammad Nadjib & Ernany Dwi Astuty (2023) Towards, a new approach to community-based rural development: Lesson learned from Indonesia, Cogent Social Sciences, 9:2, 2267741, DOI: 10.1080/23311886.2023.2267741
- McKinsey Global Institute. (2019). Digital India: Technology to Transform a Connected Nation. Retrieved from
- Mishra, S. R., Yidakis, C., Neupane, D., Gyawali, B., Uwizihiwe, J. P., Virani, S. S., & Miranda, J. J. (2019). Combating non-communicable diseases: potentials and challenges for community health workers in a digital age, a narrative review of the literature. *Health Policy and Planning, 34*(1), 55–66.
- Montgomery, A. W., Dacin, P. A., & Dacin, M. T. (2012). Collective social entrepreneurship: Collaboratively shaping social good. *Journal of Business Ethics, 111*, 375–388.
- Mueller, M., Knop, M., Reßing, C., Freude, H., Oschinsky, F. M., Klein, H. C., & Niehaves, B. (2020). Constituting factors of a digitally influenced relationship between patients and primary care physicians in rural areas.
- Mukherjee, S., & Narang, D. (2022). Digital economy and work-from-home: The rise of home offices amidst the COVID-19 outbreak in India. *Journal of the Knowledge Economy*.
- Mukhopadhyay, S., & Upadhyay, P. (2022). Institutional intervention in technology innovation: The struggle to increase mobile payment adoption. *Digital Policy, Regulation and Governance, 24*(1), 74–92.

- Nair, P. (2019). The emerging concept of an inclusive mHealth ecosystem in India. In P. Nair (Ed.), *Emerging trends and innovations in privacy and health information management* (pp. 116–141). IGI Global.
- Nayak, B., Bhattacharyya, S. S., & Krishnamoorthy, B. (2019). Democratizing health insurance services; accelerating social inclusion through technology policy of health insurance firms. *Business Strategy & Development*, *2*(3), 242–252.
- Nayak, R. (2018). A conceptual study on digitalization of banking-issues and challenges in rural India. *International Journal of Management, IT and Engineering*, *8*(6), 186–191.
- Nedungadi, P. P., Menon, R., Gutjahr, G., Erickson, L., & Raman, R. (2018). Towards an inclusive digital literacy framework for digital India. *Education + Training*, *60*(6), 516–528.
- Neelam Shekhawat, Gauri Jairath, Pooja Kumari, Kirti Saurabh, Pradip Basak & Raghunandan, K 2016, FET Report Sirohi ,from 09.08.2016 to 29.08.2016, at KVK Sirohi, Rajasthan ,104 FOCARS(unpub),National Academy of Agricultural Research Management, Hyderbad-500030, p-122

- Monda, A., Feola, R., Parente, R., Vesci, M. and Botti, A. (2023), "Rural development and digital technologies: a collaborative framework for policy-making", *Transforming Government: People, Process and Policy*, Vol. 17 No. 3, pp. 328-343.
- Pafumi, M. 2024. *Assessing the digital readiness and communication ecosystem of rural youth – Methodological guidelines*. Rome, FAO.
- Nugroho, A. D., Bhagat, P. R., Magda, R., & Lakner, Z. (2021). The impacts of economic globalization on agricultural value added in developing countries. *PLoS ONE*, *16*(11), e0260043.
- Ordanini, A., & Pol, A. (2001). Info mediation and competitive advantage in B2B digital marketplaces. *European Management Journal*, *19*(3), 276–285.
- Pal, D., & Vanaja, V. (2020). Perceived usability evaluation of Microsoft teams as an online learning platform during COVID-19 using system usability scale and technology acceptance model in India. *Children and Youth Services Review*, *119*, 105535.
- Paolucci, E., Pessot, E., & Ricci, R. (2021). The interplay between digital transformation and governance mechanisms in supply chains: Evidence from the Italian automotive industry. *International Journal of Operations & Production Management*, *41*(7), 1119–1144.
- Parmar, M. S., & Sharma, A. (2020). Beti Bachao Beti Padhao Campaign: An attempt to social empowerment. *Journal of Critical Reviews*, *7*, 13.
- Phillips, T. B., Parker, A., Bowser, A., & Haklay, M. (2021). Publicly generated data: the role of citizen science for knowledge production, action, and public engagement. *Closing the Knowledge-Implementation Gap in Conservation Science: Interdisciplinary Evidence Transfer across Sectors and Spatiotemporal Scales*.
- Prabhakar, T., & Weber, S. (2020). Alternative lending in a digital age: A comparative case study in regulation across India and the United States. *Available at SSRN*.

- Raj, K., & Aithal, P. S. (2018). Digitization of India-impact on the BOP sector. *International Journal of Management, Technology, and Social Sciences (IJMTS), 3*(1), 59–74.
- Rama Rao D., G.R.K. Murthy and V.K.J. Rao, 2008, Technological Options for Orienting IT towards Farming Community National Academy of Agricultural Research Management (NAARM), Hyderabad 500407, India Paper presented at the National Seminar on "Information Technology in Agriculture and Rural Development" at BAU, Ranchi during November 21-22, 2008, p-12
- Ramya H R, V.K. Jayaraghavendra Rao, K. Sai Maheshwari, Sushrirekha Das and UdayKumar G (2023). Livelihood Opportunities in Horticulture: Promoting Women Hortipreneurs [E-book] Hyderabad: IIHR, Bengaluru & National Institute of Agricultural Extension Management, Hyderabad, India, Edition: 2023 ISBN: 978-93-91668-78-5, P-110
- Raut, R. K., Kumar, R., & Das, N. (2021). Individual investors' intention towards SRI in India: An implementation of the theory of reasoned action. *Social Responsibility Journal, 17*(7), 877–896.
- Ravindranath, V., & Sundara Kumar, J. S. (2021). Changing demography and the challenge of dementia in India. *Nature Reviews Neurology, 17*(12), 747–758.
- Reddick, C. G., Enriquez, R., Harris, R. J., & Sharma, B. (2020). Determinants of broadband access and affordability: An analysis of a community survey on the digital divide. *Cities, 106*, 102904.

  Rêgo, B. S., Jayantilal, S., Ferreira, J. J., & Carayannis, E. G. (2021). Digital transformation and strategic management: A systematic review of the literature. *Journal of the Knowledge Economy*.
- Rizvi, Y. S., & Nabi, A. (2021). Transformation of learning from real to virtual: an exploratory-descriptive analysis of issues and challenges. *Journal of Research in Innovative Teaching & Learning*.
- Rosales, A., & Blanche-T, D. (2022). Explicit and implicit intergenerational digital literacy dynamics: How families contribute to overcome the digital divide of grandmothers. *Journal of Intergenerational Relationships*, *20*(3), 328–346.
- Roy, M. (2018). E-governance in the age of globalization: Challenges ahead for India. *SOCRATES., 5*, 88.
- Ryba, T. V., Wiltshire, G., North, J., & Ronkainen, N. J. (2022). Developing mixed methods research in sport and exercise psychology: Potential contributions of a critical realist perspective. *International Journal of Sport and Exercise Psychology*, *20*(1), 147–167.
- Sandhya Shenoy, V.K. Jayaraghavendra Rao, and Kalyani, 2016, Media Research and strategies for efficient utilization of Information and Communication technologies for bridging Knowledge gaps of farm women, Int.J. Res in commerce, IT, Engg and Social sciences, Vol 4(8) pp 1-6, ISSN(P-2349-7798)
- Saxena, P., Sharma, A., & Fulzele, R. (2019). E-governance initiatives in India: Acceptability and Challenges. *Think India Journal, 22*(14), 1769–1784.

- Sein-Echaluce, M. L., Fidalgo-Blanco, A., & García-Peñalvo, F. J. (2019). *Innovative trends in flipped teaching and adaptive learning*. IGI Global.
- Sekhri, D. G., & OSD, N. (2020). Designing the future of dispute resolution: The ODR policy plan for India
- Sharma, P. K. (2021). E-Governance in India: Concept, initiatives and challenges. *ACADEMICIA an International Multidisciplinary Research Journal, 11*(4), 1022–1028.
- Smith, C. (2015). An analysis of digital inclusion projects: Three crucial factors and four key components. *Journal of Information Technology Education. Research, 14*, 179.
- Soja, E. (2017). Information and communication technology in active and healthy ageing: Exploring risks from multi-generation perspective. *Information Systems Management, 34*(4), 320–332.
- Sreekanth P. D, S.K. Soam, N. Sandhya Shenoy and V.K. Jayaraghavendra Rao, 2018. Climate Smart Villages: GIS for Mera Gaon Mera Gaurav (My Village My Pride), Proceedings of the 105 Indian Science Congress-Section of Agriculture and Forestry Sciences. This is the lead paper presented in 105 Indian Science Congress during 16-20 March 2018 at Imphal, Manipur.
- Sreekanth, P.D. Sandhya Shenoy & V.K. Jayaraghavendra Rao 2017, Poster paper on 'Climate smart Agriculture at Village level information system, in: XIII Agriculture Science Congress organized b by UAS Bangalore at GKVK from 21-24 Feb 2017(PAPER NO B029, P-142
- Surya Rathore, V K Jayaraghvendra Rao and B. S. Sontakki 2022 Chapter 2 Sprouting Start-Up Culture among Agri- Graduates: Way Forward IN AGRI-BUSINESS OPPORTUNITIES IN NORTH EAST INDIA Edited by Govindasamy Kadirvel, Subhra Saikat Roy, Sandeep Ghatak and Vinay Kumar Mishra Editorial Assistance: Dr. Abul K. Azad, Er. Thameridus B. Marak and Mr. H. Naresh Singh Copyright © 2022, Publisher. All rights reserved.
- Tate, R., & Perdices, M. (2018). Quantitative data analysis for single-case methods, between-groups designs,
- Thomas, P. N. (2019). *The politics of digital India: Between local compulsions and transnational pressures*. Oxford University Press.
- Tiberious, M., Mwania, J. M., & Mwinzi, J. (2016). The influence of financial resources on the integration of the national goals of education. *International Journal of Education and Research, 4*(9), 51–62.
- Tripathi, M., & Dungarwal, M. (2020). Digital India: Role in development. *International Journal of Home Science, 6*, 388–392.
- Venkattkumar R. 1, C. Vasanthi2, V.K. Jayaraghavendra Rao3, G.A. Atheequlla4 and H.R. Ramya5-2022, Organizational Capacity Assessment of Community-based Organizations – A Theoretical Orientation Indian Res. J. Ext. Edu. 23 (1), January-March, 2023 (Received: 10.09.2022 Accepted: 26.12.2022 Online published: 01.01.2023 https://doi.org/10.54986/irjee/2023/Jan_mar/1-5

- Veerabhadraiah, V. and Jayaraghavendra Rao, V.K. 1991. Role of low cost and No cost technologies in dry farming international conference on Extension strategies for minimizing risk in rain fed Agriculture, New Delhi, Vigyan Bhavan March 4-5, 1991.
- Vij, D. (2018). Digital India: A vision to empower rural India. *Asian Journal of Multidimensional Research (AJMR), 7*(9), 402–413.
- Vijayan, A. (2019). Digital India-A roadmap to sustainability. *International Journal of Innovative Technology and Exploring Engineering, 8*(5), 571–576.
- Warf, B. (2019). Teaching digital divides. *Journal of Geography, 118*(2), 77–87.
- Warner, M., & Sullivan, R. (2017). *Putting partnerships to work: Strategic alliances for development between government, the private sector and civil society*. Routledge.
- Williamson, O. E. (2010). Transaction cost economics: The natural progression. *American Economic Review, 100*(3), 673–690.