EMERGING TRENDS IN AGRICULTURAL ECONOMICS AND EXTENSION

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Editors By: **Nitu Kumari, Dr. Shital Pravin Shinde, Shaurya Sharma, Dr. K. Harishankar, Dr. A. Devivaraprasad Reddy**

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PREFACE

"Emerging Trends in Agricultural Economics and Extension" is a groundbreaking book that delves into the dynamic and evolving field of agricultural economics and extension. This comprehensive volume explores the latest developments, challenges, and opportunities in agriculture, shedding light on the critical role of economics and extension services in shaping the future of farming and food security. It provides a comprehensive and up-to-date exploration of the multifaceted field of agricultural economics and extension. This book is essential reading for students, researchers, policymakers, and anyone interested in the future of agriculture and the critical role that economics and extension services play in ensuring food security and sustainable farming practices. It offers valuable insights into the evolving challenges and opportunities in agriculture, paving the way for a more resilient and prosperous agricultural sector.

Economics, often referred to as the "dismal science," is the study of how societies allocate their scarce resources to meet their diverse needs and desires. It forms the intellectual foundation for understanding how individuals, businesses, governments, and societies make choices in the face of limited resources. Economics is not just about numbers and graphs; it's about the fundamental decisions that shape our world. Extension, on the other hand, is the conduit through which knowledge and innovation flow from experts, researchers, and institutions to the grassroots level. It is the bridge that connects the latest advancements in various fields, including agriculture, community development, health, and education, to those who can benefit most from these innovations. Extension professionals are the unsung heroes who empower individuals and communities to make informed choices, adapt to change, and improve their quality of life.

We extend our gratitude to the experts, practitioners, and scholars who have contributed their knowledge and insights to make this book a valuable resource. Our hope is that it serves as a source of inspiration and guidance, empowering you to make meaningful contributions to the ever-evolving field of economics and extension. So, without further ado, let us begin our exploration of the "Emerging Trends in Agricultural Economics and Extension."

CONTENT

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1. Agri-Preneurship and Its Challenges and Opportunities in India

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Abstract:

Agri-preneurship as generally sustainable, community oriented, directly marketed agriculture. Demanding global structure, India, in order to remain a front runner needs to primarily focus on the agriculture sector. There are a different opportunity in agripreneurship just like a agro produce processing units, agro produce manufacturing units, agro inputs manufacturing units, agro service centers and off farm vocations. Agripreneurship face various challenges during time of work and implementation serious threats from established corporate players, lack of knowledge/market awareness, lock of knowledge in branding management, accounting, lack of information source, required skill sets and training.

Keywords:

Agri-preneurship, Sustainable Agriculture, Entrepreneurs.

1.1 Introduction:

Agriculture remains one of the key sectors of the Indian economy, comparising overall 18-20 percentage share in the gross domestic product. Near about 70 percent of the rural population depends on agriculture and allied aspects for their livelihood. It is also an important source of raw material and demand for many industrial products, particularly fertilizers, pesticides, agricultural implements and a variety of consumer's goods. Relatively poor infrastructural facility is one of the key push factors, while better job opportunities in urban areas lead to rural-urban migrations. Amidst the changing paradigms and demanding global structure, India, in order to remain a front runner needs to primarily focus on the agriculture sector. This specialization will develop agri-preneurs with distinct traits and skills to exploits opportunities galore in the field of agriculture. In this backdrop, one of the option which mitigates the burden on agriculture is agripreneurship i.e. entrepreneurship in agriculture and its allied sectors which is known as cornerstone of self-reliance.

A. Agripreneurship:

Agripreneurship is the profitable confluence of agriculture and entrepreneurship brought in by the people with innovative ideas to develop the existing practices for better productivity as well as establishment of new ventures in agriculture and allied fields. Expressing it in a structural way we can define **"Agripreneurship as generally sustainable, community**

oriented, directly marketed agriculture". Sustainable agriculture denotes a holistic systems oriented approach to farming that focuses on interrelationship of social, economic and environmental process.

B. Need for Agripreneurship:

- Increasing demand of organic and quality food both in India and abroad.
- Competitive advantages for many primary production activities in agriculture eg. Rainfed farming, livestock and wild craft production is through low cost production technologies only.
- Private sector is willing to enter in to agribusiness at levels of operations.
- To reduce mall nutrition as majority of women and children in the country are mall nourished.

In facts, developing entrepreneurs in agriculture can solve problems by –

a. Reducing the burden of agriculture
b. Generating employment opportunities for rural youth
c. Controlling migration from rural to urban areas
d. Increasing national income
e. Supporting industrial development in rural areas
f. Reducing the pressure on urban cities.

1.2 Opportunities in Agripreneurship:

In India, these days a combination of excess technology, emergence of micro financing, liberalized government rules, awareness and training programmes on agriculture and allied sectors and a growing tribe of open minded qualified professionals who are looking for independent and self employment opportunities are a sure shot recipe for the rise of agripreneurs.

Technologies those reduce the cost of production and increase the benefit of the farmers will open new opportunities for agri-entrepreneurship. New technologies that are simple and time saving and keep away farmers from drudgery of labour will also provide opportunity for entrepreneurship in agriculture.

Technologies that provide social and psychological benefits to farmers will also provide opportunity for entrepreneurship in agriculture.

The country offers on enviable array of choices for such entrepreneurs that include follow activities:

A. On farm activities:

a. **Argo produce processing units:** These units do not manufacture any new product. They merely process the agriculture produce e.g. Rice mills, Dal mills etc.

b. **Agro produce manufacturing units:** These units produce entirely new products based on the agricultural produce as the raw material e.g. Sugar factories, Bakery etc.
c. **Agro inputs manufacturing units:** These units produce goods either for mechanization of agriculture or for increasing productivity e.g. Fertilizer manufacturing plants, insecticides production units, food processing units, agriculture implements etc.
d. **Agro service centers:** These include the workshops and service centers for repairing and serving the agricultural implements used in agriculture.

B. Off farm Vocations:

Entrepreneurship development is also profitable in different off farm activities like cloth stitching, knitting, embroidery, cloth printing [tie and dye] carpet making, dori making, envelope and plastic bag making, agarbati, candle, rope, basket making, bamboo work, distilled water, oil extraction, chalk making, biogas mechanic, solar machine & other rural crafts.

The possible areas of Entrepreneurship in allied activities of agriculture:

This includes the activities like, Dairying, Sericulture, Goat rearing, Rabbit rearing, floriculture, fisheries, shrimp farming, poultry farming, sheep rearing, vegetable cultivation, nursery farming, grafting/budding farm forestry etc…

Agripreneurship thus transforms agriculture into an attractive and profitable ventures as it is evident that there is a tremendous opportunity in agripreneurship in India.

1.3 Challenges in Agripreneurship:

Agripreneurship faces several challenges. One of the main challenges is lack of access of funding for agri enterprises, particularly in early stage. Although the government has launched various funding schemes, accessing funding is still a challenge. Another challenge is the lack of skilled manpower. Many enterprises struggle to find skilled employees with relevant expertise and experience.

Even though the agripreneurship are using their creativity, ability and hard work to prove their skills and competencies in current day of competition and volatility, they are facing more challenges and problems while starting agri enterprises and also during their management and growth phases. Agripreneurs face various challenges during time of work and implementation, serious threats from established corporate players, lack of knowledge/market awareness, lack of knowledge in branding, management, accounting, lack of information source, required skill sets and training. In addition to this, the fear of failure, low risk taking capacity also act as deterrent to their growth.

The infrastructural challenges including storage, warehousing, electricity and credit facility and finance, especially formal finance [for both investment credit and working capital financing] continue to daunt the agripreneurs. As it is known, the dependency on money lenders leads top exploitation, when the institutional credit is not forthcoming for managing their business enterprises.

However next challenge agripreneurs face is legal challenge. The regulatory framework for enterprises in India is complex and often cumbersome, making it difficult for agripreneurs to comply the regulations. There is a lack of clarity which creates confusion and ambiguity in the regulatory framework.

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2. Agri-Tourism in India and Its Potential to Increase Farmer Income

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Abstract:

Agri-tourism refers to an actively participating in a rural lifestyle that combines agricultural activities with tourism for the entertainment and recreation of tourists. Also, agro-tourism is a close connection with nature and the experiencing of direct agricultural activities on farm. It provides the local farmers with a window to generate additional income and a channel for direct marketing to consumers.

This is creating economic pressure on some villages, which in turn causes young people to move towards rural areas and develop their agricultural land in such a way to generate income. There is a segment of the urban population that is interested in visiting the rural areas and understanding the lifestyle. Besides this, it helps to preserve agricultural lands and allows states to develop business enterprises. Currently, agri-tourism is to have a little bit of success on account of its ability to revitalize rural economies, provide employment opportunities to local residents, and educate the masses about agricultural practices.

Agro-tourism is a way of alternative tourist development and multi-activity in rural areas through which the tourist has the opportunity to get experience with agriculture farm to allow a person to view them growing, harvesting and processing locally grown foods, cooking traditional food, agricultural occupations and the daily life of the rural people, as well as the cultural norms, ethics and traditions. Moreover, this activity brings tourist closer to nature and rural activities in which they can participate, be entertained and feel the pleasure of touring. Agro-Tourism is helpful to farmers as well as urban peoples.

It has provided an additional income source to the farmers and employment opportunity to the local people and rural youth. But, there are some problems in the process of the development of such centers. Hence, the government and other related authorities should try to support these activities in India for the rural development and doubling income level of the farmers. The farmers should also try to establish their co-operative society for the development of agro-tourism centers. The agro-tourism may become a cash crop for the farmers in India and also an instrument of the rural employment generation.

Keywords:

Agri- Tourism, Rural Tourism, Rural Economy.

2.1 Introduction:

Agriculture is considered to be the backbone of the Indian economy. Around 85 percent of the India's population is directly or indirectly dependent on agriculture and allied activities and almost 26 percent of India's GDP comes from agriculture. 90 million farmers are dwelling in 0.625 million villages producing more than 20 Metric Tonnes (MT) of food grains feeding the country. More than a profession or a business, agriculture is deeply rooted in the Indian culture. Farmers are now exuberant to try newer methods away from the typical and orthodox patterns to build relations with the consumers directly and earn extra income. Hence, adding on to the agricultural income with some touristic activities is bringing in new hopes and better lives. Serious efforts are now being made in this direction and Agri-Tourism is one such activity that fits the bill.

Agri-tourism as a concept is not very new although its reach is limited to only some places. Agri-tourism with its small steps and the amulet of research can definitely bring changes in the life of farmers and consumers shall also reap the benefits of it. India is a country that possesses an abundance of riches, including wealth, power, and beauty bestowed by nature. It is a place where some regions are considered a paradise on earth. If one were to search the entire world for such a place, India would be the country they should look to.

A country whose geographical journey begins from the snow-covered Himalayan mountains in the northern region, passes through the desert landscapes of Rajasthan, and then crosses the lush forests of Madhya Pradesh, the western upturned rims rising to form the Sahyadri Range and the Konkan coastal strip abutting on the Arabian Sea in Maharashtra. Next, it sails through the extensive backwaters of Kerala before culminating in the crystal-clear waters of the Andaman and Nicobar Islands. This journey offers a thrilling experience through high-altitude terrains and peaceful lowlands.

2.2 Concept of Agri-Tourism:

Agro tourism can be defined as a "range of activities, services and amenities provided by farmers and rural people to attract tourists to their area in order to generate extra income for their business" (Joshi *et al.*,2001).

Pandurang Taware, Father of Agri-Tourism Concept, India, says "Agro tourism is that agri-business activity, when a native farmers or persons of the area offer tours of their agriculture farms to allow a person to view them growing, harvesting and processing locally grown foods, such as coconuts, pineapple, sugarcane, corn or any agriculture produce the person would not encounter in their city or home country. Often the farmers would provide a home stay opportunity and education"

Che *et al.* (2005) mentioned that "agri-tourism is another consumptive use of farmland and may help preserve farms".

Agri-tourism is where agriculture and tourism meet to provide us with an amazing educational experience, whether it is a tour of a farm or ranch, a festival or cheese-making class. Farmers turn their farm lands into a destination and open their doors to the public in order to teach more about what they do. A growing number of farmers are turning entrepreneurs and earning big bucks from something they offered unique experience to friends and relatives – a healthy and relaxing weekend to unwind in lush green farms, drive a tractor, ride a bullock cart, milk a cow, cooking local foods, transplanting of rice, pluck fresh fruit from orchards and many other operations done by the local people.

The plate is full with offerings like dairy practices, bird watching, wine trails, hay making and local handicrafts to woo the consumers with the simplicity of villagers hooked to it in the background. There are tons of unique activities waiting to be explored. Agri tourism farms in India offer tours to allow a person to view the growing, harvesting and processing of locally grown foods, such as corn, coconuts, sugar cane and pineapple etc. Often the farmers provide a home-stay opportunity and general education on the workings of the farm. It was considered in many locations to be a low-investment, low-risk strategy as farms mainly made use of their existing resources.

Agri Tourism is however not all about staying in a village and enjoying the food, this is an opportunity to be close to where the 75% of Indians live. One of the best things about staying on a farm is that guests can contribute to the place through their involvement. The idea is to make tourists live life like a villager. It gives you the opportunity to experience the pleasant and authentic contact with the rural life, taste the local genuine food and get familiar with the various farming tasks during the visit. It provides people the welcome getaway from the daily hectic life in the peaceful rural environment. It gives the chance to relax and re-energize in the pure natural environment, surrounded by magnificent setting. Explore the real India and have the experience of the lifetime on the farm stay holidays.

2.3 History of 'Agri-Tourism:

The term 'agri-tourism' was initially used in the US, but it originated from an Italian National Legal Framework passed in 1985. This law promotes overnight farm stays to diversify the incomes of Italian farmers and support the landscape of farming operations. The fundamental concept of agri-tourism was entrepreneurial diversification of a farm. This was later amended to 'Regulations of Agri-tourism', which privatised and extended the concept of agri-tourism to agricultural firms.

The seeds of agri-tourism in India were first sown by the formation of the Agri Tourism Development Corporation (ATDC) located at Baramati in Maharashtra. The ATDC was founded in 2004 by Pandurang Taware, an entrepreneur from the farming community. It is a company that encourages agricultural tourism in Maharashtra and promotes it as a means of diversifying business opportunities and securing a feasible livelihood for farmers.

Following a phase of research and an initial pilot programme in a village of Baramati district in 2005, the ATDC has grown, with some trained farmers and agri-tourism locations across the state of Maharashtra. Since its inception, farmers across the state have gained a 25% growth in their incomes.

Further, it has a policy of employing local youth as agri-tourism guides and specifically contracts women for food preparation services through organised women's self-help groups. The Government of India has come up with a vision of doubling farmers' incomes by 2022. However, economic indicators do not show equitable and egalitarian growth in this. To supplement and enhance farmers' incomes, agri-tourism can be implemented as a secondary sector. But policies and guidelines for this concept are still insufficient in India.

2.4 Need for and Importance of Agro-Tourism in India:

Agri tourism is becoming an increasingly popular industry globally and even in almost every state in India. It is said that agro-tourism is a better way to know about the traditional agricultural farming activities which brings us very close to mother-nature and it is also very essential thing for a sustainable living on this planet. Today, Indian cities are facing the problem of overcrowd and environment pollution. Now, it has become an assumed fact that agro-tourism can give us a relief from the hectic life of urban areas. That is why; agro-tourism, eco-tourism and rural tourism are emerging as key sectors of tourism business in India.

Agro-tourism is an innovative agricultural activity related to agriculture and tourism both. India is one of the major tourist centers and there is great potential to encourage farmers to establish small and viable business such as agro-tourism in rural India. Urban population is increasing day by day in India. Today urban children's world has become limited in the closed-door school, classes, cartoon programs on the television, video games, chocolates, soft drinks, spicy fast food, computer, internet and so on, they see mother nature only on television screen. Now it has become very necessary that children know the traditional way of agricultural farming activities and other businesses dependent on agriculture.

Here children come very close to Mother Nature and learn many new things in life for a sustainable living. As commercialism and mass production become the standards by which we live, agri-tourism has given people who work in the agricultural and horticultural sectors a chance to share their work with the masses. Some agri-tourism experiences allow guests to buy food products grown on the farm or hand-crafted products made by the farmers' families; purchasing these goods helps provide farmers who rely on their land with another source of income. Home and consumer education has given way to technology courses in middle and high schools and many children grow up without ever really knowing what the countryside is or what it's like to interact with live farm animals. Agri tourism, therefore gives parents the opportunity to introduce their children to something other than the city life.

It is eco-friendly which is very essential in the present environmental scenario. It makes tourists familiar with the rural life and roots of early civilization. Provides an affordable and easily accessible family outing that individuals and families can participate in without much planning. It has a vast scope in the present scenario of tourism business in India. It is less expensive gateway of tourism and the cost of accommodation, food, travel and recreation is very less in Agro-Tourism when compared to any other type of tourism. It widens the tourist base by widening the scope of tourism due to its cost effectiveness. It has a strong demand in the contemporary world scenario.

It provides all opportunities to all age groups i.e. children, young, middle and old age, female, male, in total to the entire family at a cheaper cost. It makes tourists familiar with rural games, traditional dresses, festivals and food. It brings tourists close to the nature and provides variety of entertainment to them. It is a source of knowledge to get information about plants, animals, raw materials like handicrafts, woods, rural lifestyle and their languages, culture, tradition. Agro-Tourism which generally revolves around farmers, villages and agriculture has the potential to satisfy the curiosity of this segment of population. It is a way for tourists to look towards agro-tourism as a means for searching peace. It provides tourists an opportunity to visit villages and spend time with family. It creates awareness about rural life and agriculture science among urban children and it can effectively be used as educational and training tool to train urban tourists. It provides variety of recreation to urbanites through festivals and handicrafts. These peoples want enjoy rural life but there is problem of such type of facilities. Hence, it is opportunity to the farmers for development of the agro-tourism centers and serves them and creates additional income sources. In the world of climate change and pandemic, people are now more keen towards finding their roots and going back to nature. This is why farmstays are now blossoming in India. These places offer authentic village and farm life by providing interactive experience of rural life. Fresh air is all we seek today and these are places where we can repair our polluted lungs!

2.5 Principles to be followed in Agri Tourism:

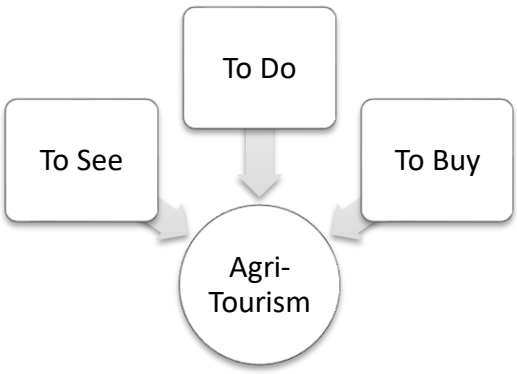

Figure 2.1: Agri Tourism

To see: - Birds, animals, farms and nature are the few things which Agri- tourism could offer to the visitors to see. Apart from these, culture, dress, festivals and rural games could create enough interest among forest in Agri-tourism.

To do: - Participating in agricultural operations and swimming, camel riding, buffalo riding, bullock cart riding, cooking and participating in the rural games are the few activities to quote in which tourist can take part and enjoy.

To buy: -Hand-made crafts, farm gate fresh agriculture products, dress materials, processed foods are the few items which tourist can buy a memory of a place.

Who can start agro-tourism centers?

The individual farmer can start agro-tourism who has minimum two hecteres land, farm house, water resource and is interested to entertain the tourists. Apart from the individual farmer, agricultural co-operatives institute, Non-government organizations, Agricultural Universities, and Agricultural Colleges may start their centres. Even *Grampanchayats* can start such centres in their operational areas with the help of villagers and farmers.

2.6 India Agri-Tourism Market Needs:

The widespread adoption of agri-tourism to support farmers' incomes and create novel tourism forms, thereby contributing to the economic, social, and environmental dimensions of sustainability, is primarily driving the India agri-tourism market. In addition to this, the growing curiosity about rural and farm activities, particularly among the millennial and urban population, is also moving the growth of the market. Furthermore, the popularity of agri-tourism as it provides business opportunities for the local tourism operatorsor local farmers and offers family-oriented recreation surroundings is creating a positive outlook for the regional market. In line with this, agri-tourism also offers several farm activities, including fishing, horseback riding, harvest festivals, wildlife photography, wagon or sleigh rides, sheep shearing, cooking classes, guided animal tours, historical re-enactments, etc., at a meager cost. This, along with the rising utilization of farms for events, such as weddings, gatherings, and private parties, is acting as a significant growth-inducing factor. Moreover, the expanding health-conscious population, which seeks pro-nature ways to escape the stress of hectic lifestyles, is also stimulating the market growth.

Additionally, numerous favorable initiatives by the Indian government aimed at promoting and developing the agri-tourism sector in the country are further catalyzing the market. For instance, the Ministry of Tourism and Culture has launched the ‘Swadesh Darshan Scheme’ for the integrated development of theme-based tourist circuits and instituted a national award in the category of 'Best Rural/Agri/Plantation Tourism Projects' to motivate the stakeholders. Apart from this, the emergence of community-based agri-tourism, which emphasizes on sustaining rural livelihoods, protecting traditional agricultural practices, and preserving cultures via sustainable land use planning, is projected to fuel the India agri-tourism market in the upcoming years. It provides the farmers with an opportunity to generate additional income and a channel for direct marketing to consumers. Agri-tourism also offers communities the potential to increase their local tax bases. Besides this, it helps to preserve agricultural lands and allows states to develop business enterprises. Currently, agri-tourism is gaining immense traction across India on account of its ability to revitalize rural economies, provide employment opportunities to local residents, and educates the masses about agricultural practices.

2.7 Agri-tourism Increasingly Significant:

Sustainable Tourism:

For escaping from climate change and tourism induced pollution level and Greenhouse Gas (GHG) emissions have resulted in rising demand for natural and rural destinations as

tourist attractions and that can bring eco-friendly tourism experiences such as agri-tourism into the mainstream business.

Addresses Rural 'Decline'

India's agriculture has been under stress due to increased input costs, volatile returns, climatic adversaries, land fragmentation, and so on.

- Although it is a mainstay of the economy, farmers have shifted to other industries in search of alternative livelihoods and income diversification.
- Agri-tourism can address the 'hollowing out' effect of rural decline and restore farmers' confidence in agriculture and ecosystem-based services.

Benefits to Farmers:

Agri-tourism helps in supporting incomes of farmers.

- It also acts as a motivator to changing farmers' attitudes or preferences to farming.
- to use the land which would be left fallow or uncultivated.
- In contrast, it also prevents a portion of farmland available to a farmer engaged in agri-tourism from cultivation, and instead uses it for tourism activities.

Benefits for Communities: From a community perspective, agri tourism can be a vehicle for:

- generating additional income for local businesses and services from tourists;
- upgrading community facilities for residents tourist,
- increasing protection of rural landscapes and natural environments for tourists and residents;
- helping preserve and to give a new identity to local traditions, art and craft;
- promoting inter-regional, inter-cultural communication and understanding.

Benefits for Tourism Operators:

- diversifying the mix of tourism products and services available to visitors;
- increasing tourism flows into attractive rural regions;
- increasing season length during traditionally off-peak business periods;
- uniquely positioning rural regions in key tourism markets;
- Bringing more non-local currency to local businesses.

Potential to increase farm Income.:

Agri-tourism can fuel rural economies through the multiplier effect and the acquired benefits will be shared amongst different businesses within the community. Rural tourism help in employing local youth as agri-tourism guides and specifically local women for food preparation services through Self-Help Groups (SHG's). The Government of India had a

vision of doubling farmers' income. To supplement and enhance farmers' incomes, agri-tourism could be implemented as a secondary sector. But policies and guidelines for this concept are still insufficient in India.

Even for smart farmers and small businessmen, there are some barriers due to the lack of familiarity with visitors' expectations and language problem. The transition from traditional agriculture to agri-tourism is quite a challenging job for local people. Further development of agri-tourism provides profitability for agricultural products and services, especially for small farms in distress.

2.8 Major Challenges in Agro- tourism:

a. Compared to urban populations, rural populations are not only impoverished but also less familiar with the concept of agri-tourism. Additionally, lack knowledge about how to market their cultural, artistic, hand-made ornaments and craft-related services to tourists.
b. Accommodation facilities or inadequate lodging as per visitors' expectation was not developed. Poor transportation, insufficient infrastructure, further prevent these areas from being recognised as tourist destinations.
c. In rural areas, the main problem is that most people rely on agriculture or traditional artisanal businesses that do not provide sufficient income to them. This results in migration of the rural youth towards urban areas. As a result, rural to urban migration has become a major issue in India.
d. One solution to this problem is to develop agri- tourism, which can create new economic activities and increase demand for services., it ultimately increases competition and crime. Therefore, it is important to carefully plan rural tourism development to ensure that local communities benefit and the environment and natural resources are protected.
e. To achieve this, education and proper understanding of both tourists and local people are essential. There also needs to be a democratic movement that allows people at all levels to participate in tourism development and decision-making. Overall, agri-tourism has the potential to provide economic opportunities for rural communities, but it must be carefully managed to ensure that it benefits everyone involved.
f. Major challenges faced in Agri-tourism development in India are the lack of digital literacy, marketing, and proper tourism infrastructure. While technology can increase travellers' confidence to travel, the low level of digital literacy in rural areas hinders the adoption of technology-based solutions. Despite having a higher number of internet users in rural areas than urban areas, almost 60 percent of the rural population does not actively use the internet. To address this issue, Indian tourism startups can provide digital literacy and simplified digital solutions to improve the livelihoods of local communities.

2.9 Conclusion:

Agro-tourism has the capability to boost the existing Indian farming and shape emerging farming industry by stimulating the agricultural and general economy, protecting rich environmental heritage, natural wealth and promoting climate resilient and sustainable agriculture. It helps to protect the bond between a people and soil through different products

and services like educational tours, farm tours, special agriculture related events and festivals and other value added farm products. The farmer entrepreneurs, who are only limited by their creativity, can be the torch bearers of twenty-first century Indian agriculture by diversifying their products and services while educating the world a great deal about their strong agricultural heritage. In return, agro-tourism can ensure income and respect to the most valuable citizens of the mother earth.

Hence, the agriculture departments of the India, Agriculture Universities should try to give orientation or training about it and provide some innovative ideas regarding to the Agro-Tourism. The government should try to provide optimum financial aids to the agro-tourism activities by the grants and institutional finance. Policies and subsidies directly targeting agri-tourism are important. Regional development policies and models are equally necessary for the sound utilisation of local resources and creation of essential services to tourists in a specific region to increase agri-tourism income. Thus, farmers can turn their farm lands into a tourist destination and open their doors to the public in order to share more about what they do. Simultaneously, they can gain income and their farm produce may also fetch better value. This highlights the innovative nature of agri-tourism that can attract a young generation of farmers, offer new opportunities for youth development in rural areas and boost rural economy.

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3. Atmanirbhar India: A Case Study of Edible Oil and Government Initiatives to Promote Oilseeds

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Abstract:

The vast gap between the demand and production of edible oil forces India to import humongous quantities of edible oil. This import bill puts negative pressure on our economy for its development. To fill this gap between demand and production and getting self-reliance in the field of edible oil import, the Government of India has implemented various measures such as promoting oilseed cultivation with various schemes and financial support to the farmers and increment in import duties on crude edible oil. These measures will impact the livelihood of farmers as well as the people of the nation. This chapter will emphasize the current and future strategies which include various measures on supply-side interventions as well as demand-side interventions, investment scenarios in research and development, innovation, and technology adoption, and collaboration among stakeholders. In this chapter, some of the successful case studies are discussed which serves as an example of how targeted interventions and collective efforts can lead to transformative change and a self-reliant nation.

Keywords:

Atmanirbhar Bharat, oilseed, import, vegetable oil, farmer, NMOOP, PMKSY, Adani Wilmar, Saffola, Patanjali Ayurved Limited.

3.1 Introduction:

As we know that India is the most populous nation on the earth which makes it one of the biggest markets in the world also. This market has a huge demand for edible oil. This huge demand is partially fulfilled by domestic production and largely relies on imports. This large import creates a huge import bill which hurts the nation's economy and also makes us

dependable on various external powers which makes our nation susceptible to various external causes and decreases the sovereignty of our nation.

To address these issues this problem government of India started National Mission on Oilseed and Oil Palm (NMOOP) in 2014. This mission has goals for encouraging the local production of edible oil. Under NMOOP, the government offers various incentives including financial support to the farmers for encouraging the production of oilseeds and oil palm production and productivity. To increase productivity the NMOOP promotes the use of high-yielding varieties and best agronomic practices. In addition to this government also introduced various schemes.

These schemes include PMFBY (Pradhan Mantri Fasal Bima Yojna) which ensures farmers' crops by an insurance coverage program which saves them in case of crop failure, RKVY (Rashtriya Krishi Vikash Yojna) which ensures the overall development by providing financial assistance for various activities for the cultivation of oilseed and PMKSY (Pradhan Mantri Kisan Sampda Yojna) which focuses on providing modern infrastructure for the food for oilseed processing industry.

In addition to this reducing the import bills on edible oil import government increased the import duties on refined and crude edible oils. This increases the cost of imports. Thus, the import of edible oil would be reduced consequently and increased domestic production.

What are Edible oil and its importance:

What is Edible oil and its importance: Oils which are safe for human consumption are called edible oils which are also known as cooking oils which are of liquid or semisolid consistency at room temperature and are generally obtained from various sources like animals, plants and microorganisms.

With uniqueness in taste and variety, there are numerous types of edible oils available in the market. In which the most common ones are soybean oil, rice bran oil, sunflower oil, corn oil, olive oil, coconut oil etc. Out of this soybean oil is the most popular due to its low price, high smoke point and neutral taste and the olive which is known for its heart-related benefits.

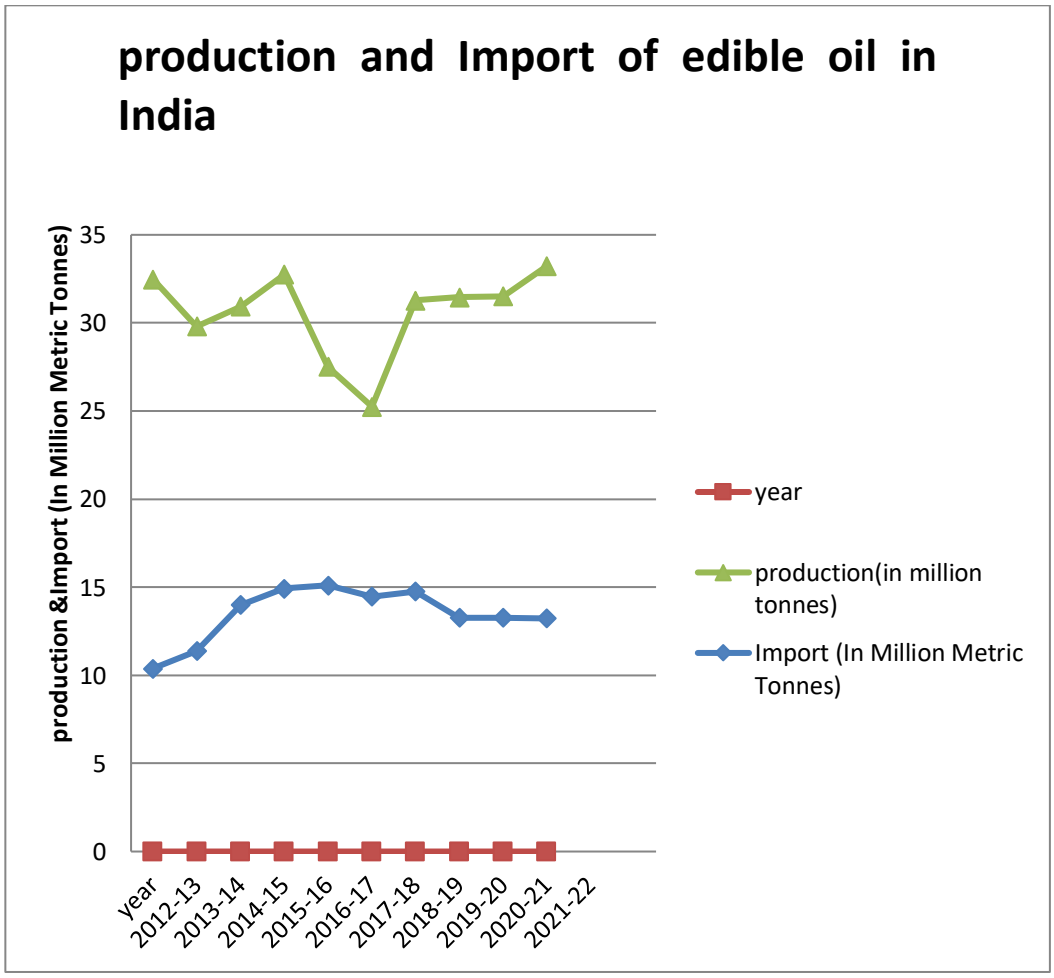
The high consumption of oil in Indian cuisine increases its significance in Indian culture. Due to the high consumption of oil, our country has ranked top in the per capita consumption rate of oil. To fulfil this huge demand our own production is not sufficient so we rely highly on imports for fulfilling our demand. This import creates very large import bills which impose varieties of risks on our economy. Besides, economic risk, it also poses a risk to the food security of our nation.

As we know that our large proportion of the population is dependent on agriculture and is poor so for increasing the income of these underprivileged people, the production of edible oilseed will help a lot and will also help in the diversification of agriculture and also helpful in encouraging the sustainable farming practices by farmers. For promoting this government has taken various measures the provision of subsidies and incentives.

A large portion of our diet consists of edible oils which are not only a rich source of essential nutrients and also have various health benefits, the anti-inflammatory properties of olive oil and coconut oil which is believed to be helpful in weight loss and improving the function of brain. There are various health benefits which are hard to count in general.

Overview of Edible Oil Market in India: Nearly 60% of the total requirements of edible oils are imported into India. The vastness of the nation and its dependency on imports makes it the largest importer of edible oils in the world. Besides the vastness, the diversity in the population has different preferences on the regional level also.

The South and West Indian people prefer groundnut and coconut oil, while Vanaspati and a partially hydrogenated mixture of edible oils such as soybean, sunflower, rice bran, and cottonseed oils, are preferred by people of northern plains and the peoples of east and north Indian people prefers mustard or rapeseed oil.



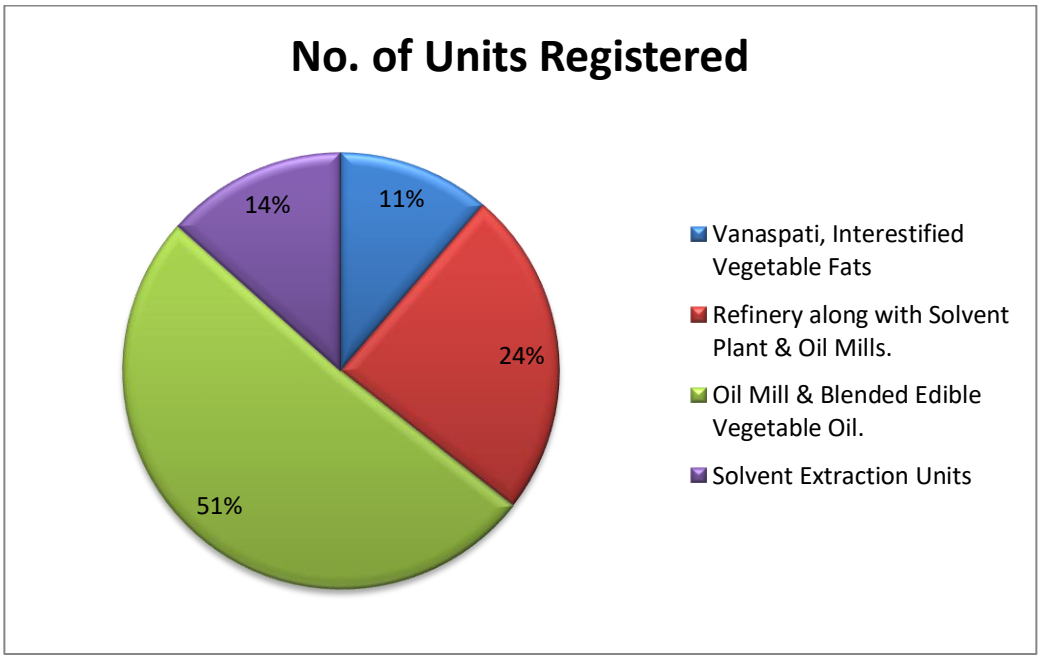
Source: Indian Vegetable Oil Producers' Association. Govt. of India

Thanks to advancements in technology, oils can now be refined, bleached, and deodorized, making them colourless, tasteless, and odourless. Consequently, different oils such as soybean, cottonseed, sunflower, rice bran, and palm oil (specifically, its liquid fraction known as palmolein) are widely used in the Indian kitchen. Refined palmolein, in particular, has become increasingly popular in hotels, restaurants, and the preparation of various food products.

According to estimates, roughly 35% of the Indian edible oil market comprises raw oil, 60% comprises refined oil, and 5% comprises Vanaspati. Of the total domestic demand for edible oils, approximately 56% is satisfied through imports, with palm oil/palmolein accounting for about 54% of those imports.

3.2 Status of the Vegetable Oil Industry:

Vegetable Oil Industries registered under VOPPA(R) Order, 2011, with the Directorate



Challenges and Solutions: despite the fact that the steps taken by the government have been productive, boosting the commercialization of oilseeds remains confronted with an assortment of obstacles. Farmers' struggle to obtain financial assistance is an important barrier that prohibits them from undertaking investments in the cultivation of oilseeds. The government may resolve this problem through offering economic assistance to farmers through a variety of programs, including the Pradhan Mantri Fasal Bima Yojana, offering crop protection and support against the possibility of crop failure.

Lack of infrastructure, such as transportation and storage systems, is another problem that could lead to the loss of crops like oilseeds. To resolve this problem and enable farmers to

receive higher prices for their commodity, the government should act to build storage facilities and improve the transportation system.

Another problem is that farmers don't understand the benefits and drawbacks of farming sustainably and of cultivating oilseeds. By offering farmers opportunities for education and training that would encourage them to transition to environmentally friendly farming practices and increase agricultural output, the government may be able to address this issue.

3.3 Impact of external dependence on edible oil:

Current Account Deficit: India has been one of the biggest consumers of edible oil worldwide, with a $19 billion import bill for the commodity. This significantly impacts the nation's current account deficit.

Impact on Economy: The high import bill for edible oil negatively impacts the economy of the country. It puts pressure on the Indian rupee, which may lead to devaluation of the currency.

Dependence on Other Countries: India is more sensitive to alterations in the price and gaps in supply as a result of its reliance on foreign nations for its edible oil. This might outcome in a shortage of edible oil, which might have a consequence on a nation's capacity to sustainably feed itself.

Competition for Local Producers: The local producers of edible oil are additionally opposed by the imports from abroad. The demand for locally generated edible oil could drop as an outcome of rising affordable imports from other nations.

Adverse Environmental Impact: Transporting edible oil to India generates a sizable amount of carbon emissions, which contribute to climate change. Additionally, it's possible that other nations' edible oil production doesn't follow the same environmental norms as it does in India.

Health Concerns: In India, vegetable oil is a essential component of the eating habits, and the oil's composition is critical to preserving human health. Medical problems could occur if foreign oil is not manufactured to the same standards as native oil.

3.4 Government Initiatives to Promote Oilseeds:

A. National Mission on Oilseeds and Oil Palm (NMOOP):

The NMOOP is a government initiative in India to boost oilseed and oil palm production, reduce import dependence, and achieve self-sufficiency in edible oil. Launched in 2014, it focuses on expanding cultivation areas, enhancing productivity, and rejuvenating the oil palm sector. It provides farmers with high-yielding varieties, quality seeds, and technological support. Advanced agricultural practices, mechanization, and irrigation techniques are promoted. Financial assistance is given for oil palm planting material and

processing units. The mission conducts training, capacity building, and farmer education programs. Public-private partnerships are encouraged. The NMOOP aims to increase oilseed production, decrease oil imports, enhance food security, and uplift rural livelihoods. It is implemented through state agricultural departments, with funds allocated based on production potential.

B. Pradhan Mantri Kisan Sampada Yojana (PMKSY):

Pradhan Mantri Kisan Sampada Yojana (PMKSY) is a scheme by the Indian government to strengthen the food processing value chain. It was announced in 2016 under the Ministry of Food Processing Industries (MoFPI). Its goal is to increase farmers' income by reducing post-harvest losses and creating value-added opportunities. PMKSY focuses on establishing modern infrastructure like Mega Food Parks and cold chain facilities. It promotes agro-processing clusters near farms, fosters linkages between farmers and stakeholders, and emphasizes skill development. Quality assurance measures are encouraged to ensure safe and high-quality processed food products. Financial assistance is provided to state governments, cooperatives, farmers' organizations, and entrepreneurs. PMKSY aims to enhance food processing, minimize wastage, add value to agricultural products, and generate employment in the sector.

C. Technology Adoption:

The government stimulates the implementation of innovative techniques in agriculture for the production of oilseeds. This includes the spread of high-yielding varieties, the use of superior seeds, as well as modernized farming methods, efficient drip irrigation methods, and integrated control of pests.

D. Subsidies and Financial Assistance:

Farmers obtain an array of grants and subsidies that support the farming and cultivation of oilseeds. Subsidies for commodities like seeds, fertilizer, herbicides, and irrigation technology are all included in this. Farmers are additionally provided with access to loans and credit facilities at discounted rates. Farmers will benefit economically from this.

E. Price Support Mechanism:

Price support mechanism involves the government purchasing the surplus produce from farmers at a pre-determined minimum price, which is often higher than the prevailing market rate. By this the main commodities are procured and protect the farmer against economic loss.

To make sure there is an equitable price for farmers' produce and protect them from market fluctuations, the government provides a Minimum Support Price (MSP) and procurement mechanism for oilseeds. They are given an assured marketplace and income security as a result. 7 oilseeds are covered under MSP (groundnut, rapeseed-mustard, soyabean, seasmum, sunflower, safflower, nigerseed)

Research and Development: The government provides financial assistance to research and development organizations to produce improve oilseed varieties that have high oil content as well as develop innovative technologies for oilseed cultivation. Research institutions and agricultural universities play a significant role in these efforts. e.g. The Indian Institute of Oilseeds Research is located at Rajendranagar, Hyderabad.

3.5 Case Study: Success Stories of Atmanirbhar Bharat in Edible Oil:

A. Groundnut Oil: Empowering Farmers in Gujarat:

Groundnut oil serves an essential part in Gujarat in strengthening local farmers. This is because there's an enormous demand for the oil, which offers farmers lucrative possibilities to sell what they grow. Additionally, groundnut growing and oil manufacturing facilities provide farmers with a stable source of income that supports their families. Farmers can earn greater profits by transforming groundnuts into oil rather by selling it raw, offering up new prospects for earnings. Groundnut farming stimulates the adoption of superior agricultural techniques, which raises agricultural understanding and fosters environmentally friendly farming practices.

In addition to providing support through various programs, subsidies, and financial aid, the government and Farmer Producer Organizations (FPOs) play critical roles in empowering groundnut producers by supporting collective marketing, bulk input purchases, value addition, and market connections.

B. Adani Wilmar Limited:

A partnership comprising the Adani Group and Wilmar International Limited, has achieved outstanding accomplishments in the Indian edible oil industry. Their market value hovers around 603 billion INR. The company offers an extensive array of edible oils to satisfy the preferences and needs of different customers. Various cooking oils can be purchased under their brand name Fortune, namely refined oils, groundnut oil, rice bran oil, and soybean oil. They have been able to have an impact in numerous sectors of the edible oil market because to their wide variety of products.

Adani Wilmar is devoted to producing outstanding goods as well as creating unique edible oil products. To attain flawlessness, they adopted modern production processes and exacting standards for quality control. They were among the first to bring branded, sealed edible oils to India, giving clients access to dependable commodities.

Their products are now obtainable in rural as well as urban parts of India because to the extensive distribution network they have built there. They have been able to effectively reach their consumer base and keep a strong presence across the country through their established connections with merchants, wholesalers, and retailers.

The organization implements an approach that prioritizes customers, acknowledging and responding to the ever-evolving requirements and tastes of consumers. They make expenditures in research and development to produce revolutionary products that fulfill

customer demands for more nutritious and sustainable oils to use for cooking. Adani Wilmar has been able to engage customers and build trust in their products thanks to their strong brand positioning and effective advertising strategies.

In the cooking oil industry, Adani Wilmar places a high priority on sustainability. They place a strong emphasis on ethical raw material sourcing, assist farmers through agricultural programs, and finance renewable energy initiatives. This dedication to environmentally and socially responsible business practices not only contributes to the company's success but also reflects the rising demand for such products among consumers.

C. Marico Limited:

Since their brand "Saffola," has become a market leader in edible oil. Their success has been credited with a number of variables such as the emphasis on health and wellness, the requirement of healthier cooking oils like Saffola Gold, Saffola Active, and Saffola Total, and appealing to consumers searching for cooking oils that enhance health. They have made investments in research and development to promote the medical advantages of saffola oils with information gathered from the scientific community. Saffola oils have been shown in studies to contribute to heart health, cholesterol control, and general health.

Because of its scientific foundation, the brand has been able to attract the attention of both consumers and physicians. Thanks to their approach to promoting health, scientifically proving their products, using effective advertising, beginning innovative products, and maintaining a well-established distribution chain, they achieved enormous success in the Indian edible oil market. Their devotion to both product quality and client satisfaction has been an important variable in their success.

D. Patanjali Ayurved Limited:

Since its establishment in 2006, by Baba Ramdev and Acharya Balkrishna Patanjali Ayurved Ltd. has broadened its sales channels to include dedicated stores, hypermarkets, and even the premises of its ashram. Casual conversations with shopkeepers and retailers show how major FMCG corporations are altering their marketing techniques and even significantly reducing prices in order to compete with the Patanjali trend. With its brand name “Pantanjli”, it has achieved tremendous achievement in the vegetable oil industry.

This company utilizes organic components in its oil products and has focuses on Ayurvedic principles. They encourage the use of traditional approaches and herbal extracts to produce oils that are thought to have beneficial impacts on health. This Ayurvedic positioning has received favorable reviews from individuals seeking natural and holistic health cures. By providing edible oil products at affordable prices when compared to other organizations on the market, Patanjali has gained popularity. Cost-conscious consumers have been enticed to this strategy, which has given them access to a substantial chunk of the market. A broad spectrum of edible oils is available from Patanjali to satisfy various customer tastes and preferences.

There are many success stories on processing and marketing side but rare success stories are available at production level. But recent government policies and intervention may lead to numerous success stories in future.

3.6 Conclusion:

This chapter which is entitled "Atmanirbhar India: A Case Study of Edible Oil and Government Initiatives to Promote Oilseeds" will give an insight view of the various steps and efforts which are made by the Government of India in the process of making the nation self-reliance in the sector of edible oil. This chapter provides a comprehensive analysis of various challenges faced by India in filling the gap in domestic demand and supply with a limited amount of domestic production and ways of reducing the import bill thus removing the hard nail from the economy, which is the promotion of oilseed cultivation and other remedies for it. One of the key findings of the chapter is the large import bill for meeting the demands of the nation which costs a drain of foreign exchange reserves. Putting the Indian economy at a vulnerable financial risk and also may put forward a risk of food security due to the fluctuation in the price at international markets. To address this issue, the Indian government has introduced several policy measures and initiatives to boost the cultivation of oilseeds within the country. The chapter highlights the implementation of schemes such as the National Food Security Mission (NFSM) and the Pradhan Mantri Kisan Sampada Yojana (PMKSY) that aim to increase oilseed production and improve the overall productivity of the sector. These initiatives involve providing financial assistance, promoting modern farming techniques, enhancing research and development efforts, and creating infrastructure facilities for oilseed growers. In addition to this, the chapter also signifies the technological advancement and research & development in the field of high-yielding and disease-resistant varieties of edible oilseeds. It also focuses on the need for effective coordination among various stakeholders' farmers, agricultural research institutions, and policymakers, to achieve the desired objectives. While the various government-led initiatives have shown good results in boosting local oilseed production, it is also important to acknowledge that achieving complete self-sufficiency in edible oil production will require consistent and sustained efforts, long-term planning, and continuous monitoring of this important sector. In addition, to these addressing challenges such as fragmented and small land holdings, access to credit, and market linkages for small and marginal farmers will be crucial to ensure the success of these very initiatives. In conclusion, the case study on Atmanirbhar India's efforts in the edible oil sector demonstrates the government's commitment to reducing dependence on imports and promoting self-reliance. The initiatives implemented so far have laid a strong foundation for the growth of the oilseeds sector. However, ongoing efforts and innovative approaches will be necessary to achieve long-term sustainability, enhance productivity, and make India truly self-sufficient in edible oil production.

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4. Potential of Agritourism in Revitalizing Rural Communities

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Abstract:

Recently, agrotourism has come up as a promising and sustainable enterprise, combining both tourism and agriculture to provide some unique experiences in rural areas. This form of tourism gaining popularity all over the world specially in India. India has both rural and urban population and agrotourism works as a connecting link between them. Agrotourism offers a solution by inviting visitors to experience the charm of rural life, immerse themselves in agricultural activities, and connect with nature.

Tourists can engage in activities such as farm tours, harvesting crops, participating in traditional festivals, and even staying in farm accommodations. This not only generates supplemental income for local farmers but also stimulates the growth of ancillary businesses such as local food markets, handicrafts, and transportation services. Additionally, agrotourism promotes cultural exchange, preserves traditional practices, and provides educational opportunities about food production and sustainability. Agrotourism market has been showing substantial growth potential. In India, states like Maharashtra, Kerala, Rajasthan and others successfully implementing agrotourism as a business enterprise which not only boosts farmers' income but also provides a road map for cultural exchange, education and sustainable development.

Keywords:

Agrotourism, Enterprise, Income generation, Sustainable development.

4.1 Introduction:

Agro-tourism is a relatively new area of the tourism industry which evolved into an economically viable venture in its own right. Agro-tourism is a method of sustainable tourist development and multi-activity in rural areas that aims to improve rural communities' living standards, particularly through increased income for agricultural workers.

Agro-tourism combines tourism and agriculture to give us an incredible educational experience, whether it's a celebration, a cheese-making session, or a visit to a plantation or farm. Farmers develop their plantation grounds into tourism hotspots and welcome visitors into their homes, to better inform the public about what they do. Agro-tourism is growing in importance both globally and in practically every Indian state. Agro-tourism provides a one-of-a-kind opportunity for activities such as choosing our own fresh fruit from a garden, trying our hand at calf roping, or taking a farm hayride. There are numerous unusual pastimes simply waiting to be found. Agrotourism is a strategy for sustainable tourism growth and multi-activity in rural areas that seeks to raise the standard of life in these communities, especially through boosting the income of agricultural workers.

Agro-tourism first appeared in the late 20th century. It contains farms engaged in agriculture and tourism. The goal of agrotourism is to improve rural society's standard of living and farmers' incomes. Rural tourism is defined by the World Tourism Organisation (WTO) as tourism that provides tourists with a personal encounter, a taste of the natural environment, and, to the greatest extent possible, enables them to engage in the customs, traditions, and way of life of the locals (Aref and Gill, 2009). Rural tourism is defined by the Government of India (GoI) as any type of travel that highlights rural life, art, culture, and heritage in a rural setting, thereby enhancing tourism while also enhancing the local community's economic and social well-being. The Organisation for Economic Co-operation and Development (OECD) stated that “it is tourism that take place in the countryside” (Reichel *et al.*, 2000).

4.2 Agro-Tourism at Global Level:

The market for agro-tourism was estimated to be worth $42.46 billion globally in 2019 and is anticipated to increase to $62.98 billion by 2027, rising at a CAGR of 13.4% between 2021 and 2027. Numerous activities and services are offered as part of agro-tourism, which is generally regarded as a low-risk, low-investment industry. Through the multiplier effect and the benefits distributed among various businesses in the community, it can support rural economies. The National Legal Framework for Agro-tourism was adopted by Italy's house and senate in 1985, making agro-tourism a recognised industry in the nation. A farm's entrepreneurial diversification was the core idea behind agro-tourism. Later, this was changed to "Regulations of Agro-tourism," privatising and extending the definition of agro-tourism to include agricultural businesses.

Some nations, like Spain, regulate agro-tourism at the regional level rather than the national level or through a national framework regulation. This is because the local autonomous communities in the region are skilled at managing tourism. Agro-tourism regulations that have been passed by many US states may offer a strong defence against claims of client injury.

A. Agro-Tourism in India:

Agriculture is the backbone of India and that it accounts for a significant portion of our economy. Having said that, agro-tourism is the most recent trend gaining traction in the country. People are becoming more interested in finding their roots and returning to nature

in the face of climate change and pandemics. Agro-tourism encourages visitors to experience rural life, including milking cows, plough fields, take well baths, climb trees, and pick fruit from trees. As a result, it is a novel idea in the Indian tourist industry that usually takes place on farms and offers visitors the chance to experience true, enchanted rural life while also tasting regional cuisine and being familiar with a variety of farming duties. India is an agricultural nation, and since 2004, agrotourism has been carried out under the leadership of Pandurang Taware, who received the National Tourism Award from the President of India for the most inventive tourism product. Agro-Tourism Creation Corporation in India, which has 218 affiliated farmers and operates agro-tourism centres in each of their distinct villages in the state of Maharashtra, was a pioneer in the development and marketing of the agro-tourism concept in India in 2014.

B. Indian Agrotourism Market Size:

Agrotourism offers the chance to experience real rural life, sample regional organic food, and gain knowledge about diverse farming activities. The backbone of the Indian economy is agriculture. 75% of the population works in agriculture either directly or indirectly, and it contributes 26% of India's GDP. 90 million ranchers live in 6.25 need communities, giving food grains to help the country. Farming is more than a profession or a business in India. Adding more pay creating exercises to existing agribusiness would surely increase farming's contribution to the public GDP in the future. Agro-tourism is one such movement that is making genuine efforts in this direction.

The travel sector is referred to be a tool for working people, poverty alleviation, and human development. In 1999-2000, the travel industry provided 15.5 million direct jobs. Furthermore, the travel industry promotes public participation, global cooperation, and local crafted works and social activities. In 2000, there were 26.41 international tourists that came to India. India's share of the global tourism market is only 0.38 percent. The unfamiliar trade obtained with this small proposal is INR 14,475 crores. Turnover in domestic travel is substantially higher than this. Improvement of the foundation, item development and expansion, improvement of eco-experience sports, social introductions, providing affordable convenience, streamlining help procedures at airports, human resource improvement, cultivating public interest and mindfulness, and assistance of private area support are the push areas identified by the Government of India to advance the domestic travel industry. Revenue from agro-tourism is growing at an annual rate of 20 percent.

The tourism industry's fastest-growing segment is thought to be agro-tourism. The idea has been successfully used in states like Maharashtra, Kerala, Rajasthan, Jharkhand, Gujarat, and Himachal Pradesh. It has developed into a totally new way for farmers in remote areas to make money.

The nation's first state to develop and promote agro-tourism is the state of Maharashtra. Agro-Tourism Development Corporation was established in 2005 and is the owner of the 28-acre pilot agro-tourism project at Palshiwadi, Tal Baramati, Dist. Pune, which is about 70 km from the city of Pune. Operating the agro-tourism facility, encouraging more farmers to engage in Agro-tourism, running training and research programmes are among the key operations. The majority of travel reservations are made on this umbrella platform, after

which travellers are routed to various locations. Farmers can reduce their marketing expenses by doing this. They may accept reservations themselves. All ATDC does is lend a hand. By effectively running its own pilot Agro-tourism project, ATDC, the organisation that oversees the industry, demonstrates what it preaches. 52 farmers were initially chosen in Maharashtra when ATDC initiated training and skill-development programmes with the Maharashtra State Agro- Tourism Vistar Yojana in 2007. In 328 agro-tourism facilities spread across 30 districts in Maharashtra, this agro-tourism model has been adopted, helping to preserve and improve the village life, village arts and handicrafts, customs, and village traditions and culture. The agro-tourism approach provides visitors with unique experiences by highlighting village culture, agriculture, and customs, which has helped create a sustainable secondary income source and created jobs in the area. These agro-tourism destinations in the State saw 17.9 lakh visitors in 2018–20, which helped farmers make 55.79 crore. In addition, it gave young people and women in rural areas 100,000 jobs.

The policy of Karnataka addresses two important issues that are necessary for the growth of agri-tourism in the State: capacity building and public awareness. Additionally, the policy looks to collaborate with various institutions and departments. Agro-tourism initiatives are eligible for incentives, subsidies, and concessions, according to the policy paper.

Kerala has chosen to create the Kerala Agro-tourism Network in order to provide financial gains for the farming community by fusing farming with tourism.

The need for an agro-tourism development strategy was stressed in the committee report on Doubling of Farmers' Income (DFI). The Ministry of Tourism recently released a "Draft National Strategy for Promotion of Rural Homestays - An Initiative towards Atmanirbhar Bharat". With this in mind, agro-tourism has been covered by this.

C. Sustainable Agro-Tourism:

Agrotourism encourages sustainable rural development, boosting the income of agricultural workers and fostering the economic, social, and environmental sustainability that is advantageous to rural communities. Agrotourism is a form of multi-activity and sustainable tourism in rural areas that aims to raise the standard of living for rural residents, especially by boosting the pay of agricultural workers. Agrotourism may help farmers support their families while simultaneously creating novel forms of tourism for tourists, advancing sustainability on the economic, social, and environmental fronts. Farmers' attitudes and proclivities towards farming are influenced by agrotourism in both favourable and unfavourable ways.

Agrotourism contributes to the sustainability of resources since visitors to this type of tourism, both from inside the country and abroad, come to enjoy the nature and greenery. Agrotourism can promote sustained growth in a location. It improves farmers' financial status by giving them extra income at a low cost of investment. It also gives the farmer a chance to be acknowledged for his field of work. Agrotourism encourages environmentally beneficial travel by luring domestic and foreign tourists who value nature and the outdoors, providing eco-friendly activities, giving farmers more money and respect, and fostering the long-term development of rural communities.

E. A Way to Increase Farmer Income:

Agro-tourism gives farmers a chance to potentially boost their revenue. In order to attract tourists, a farmer must develop farm operations. Arrangements for selling farm products as farm fresh as soon as they are harvested, processing food in front of tourists, adding value to the items, and on-farm marketing also provide the farmer with immediate money in addition to garnering attention. Direct sales of farm products create new market segments in that region. Creating opportunities for visitor's interest and participation in farming pursuits, including harvesting farm produce, parks with gardens, food parks, agri-museums, etc. By starting an agri-preneurship and employing farm products as resources, chances for agribusiness and employment are created. As a result, agro-tourism can generate additional revenue in a variety of ways, including

a. farmers' markets from where tourists can purchase farm products,
b. picking up own products, where visitors harvest farm produce by their own,
c. local and regional cuisine, where visitors choose to eat breakfast, lunch, and dinner with a local flavour,
d. visitor involvement in a variety of agricultural operations as well as other leisure pursuits like animal rides, bird gazing, etc.
e. travelling to experience rural life

4.3 Advantages of Agro-Tourism:

The economic landscape of conventional agriculture could shift as a result of agro-tourism. Development of agro-tourism has numerous advantages. The farmers and rural residents would gain much from it, both directly and indirectly:

- Agro-tourism is a way to make urban residents' lives less stressful as they turn away from the busy city and towards nature.
- Opportunities for employment for farmers, especially farm families and young people.
- The capacity of the agriculture sector to accommodate tourism sector expansion.
- Farmers' additional revenue source as a form of protest against income volatility.
- People of all ages can enjoy recreational possibilities where the entire family can take part in rural games, festivals, food, and attire.
- Children in urban areas may become more aware of rural living and educated about agriculture science thanks to agro-tourism. It presents a unique opportunity for education through play, which makes learning effective, straightforward, and entertaining.
- Due to the fact that agro-tourism occurs in a natural setting, the cost of food, lodging, entertainment, and transit is low.
- It is the best alternative for city-based school picnics currently on the market. It offers urban college students the option to work in agriculture in a realistic setting. It serves as a means of educating future farmers. Agricultural and line department personnel could learn and be trained using it. This is a unique opportunity for learning through enjoyment, where learning is fun, effective, and straightforward. Seeing is believing, and doing is learning.
- It encourages farmers to cultivate land that might otherwise be fallow or left fallow.

- The 'hollowing out' effect of rural decline can be addressed by agro-tourism, which can also re-establish farmers' faith in their industry and ecosystem-based services.
- Agro-tourism has the potential to benefit both tourists and farmers in a win-win situation.

4.4 Challenges in Agro-Tourism:

- If farmers' attention and focus shift to agro-tourism and it becomes a more lucrative source of income, they may start to neglect their farming activities.
- One of the challenges to increasing the area's tourism potential has been identified as the language barrier. For interactions with tourists, people often lack the necessary competence in Hindi, English, or even the local dialect.
- A lack of funding could limit the region's tourism potential, which would aid in the preservation of the people's culture, traditions, heritage, art forms, etc.
- Some areas have a lot of potential to become popular agro-tourism destinations. However, another significant roadblock in the way is a lack of business planning expertise.
- In rural communities, the concept of tourism as a whole is extremely ingrained. The local kids have tried to take the initiative, but professionalism is still absent. They lack the necessary training to make projects from a tourism standpoint.
- Agro-tourism businesses are situated in rural areas with limited access to roads, healthcare services, and telecommunications, as well as the occasional fear of theft and wild animals.

4.5 Principles in Agro-Tourism:

Agro-tourism should make sure that some fundamental rules are fulfilled.

a. **Have something that guests can see:** The best thing provided by agri-tourism is nature, farms, animals, and birds, all of which should be visible. To generate interest in agro-tourism, local culture must be promoted through dress, festivities, and rural games.
b. **Have something that guests can do:** Visitors should be able to participate in certain activities in addition to the things to see. Activities available for visitors to partake in and enjoy include farming, swimming, riding in a bullock cart, cooking, and playing rural games.
c. **Have something for guests to buy:** There should be something for visitors to buy, such as processed foods, clothing, farm fresh things, and rural crafts, in order to entice them to visit again.

4.6 Agro-Tourism Opportunities in India:

a. **The Indian tourist sector is expanding at a rate of 10.1%:** The World Tourism Organisation projects that by 2010, there will be more than one billion tourists visiting to various parts of the world, with the business growing at a rate of 4% yearly. However, the Indian tourist industry is growing 212 times faster than the global average, at a pace

of 10%. The current growth rate is not only maintained but significantly encouraged by the incorporation of the concept of agro-tourism.

b. **One of the biggest travel publications in Europe, Conde Nast Traveller, has listed India among the top ten tourist destinations in the world.** India is already well-known as one of the world's most popular tourist destinations. By offering innovative products like agro-tourism, the Indian tourism industry will become more competitive on the international market.
c. The geography and culture of India are diverse, which offers a wide range of cultural and geographic opportunities for the expansion of this firm. India offers a variety of agro-climatic conditions, crops, people, and cultures, as well as deserts, mountains, and island-like coastal systems, all of which present prospects for the marketing of year-round, multi-location tourism offerings.
d. A growing proportion of visitors prefer non-urban tourist destinations to urban tourist destinations (financial express). There is room for promoting rural tourist destinations in interior communities by setting up Agro-tourism hubs. To promote these centres, however, proper infrastructure and exposure are required.
e. The amount allotted for government activities and policies in the Xth five-year plan has increased from 525 crore to 2900 crore. Increased funding demonstrates the government's ongoing dedication. The six-fold increase in funding might be applied to infrastructure development, public relations, and service providers' capacity growth.

4.7 Promotion of Agro-Tourism:

The promotion of agro-tourism requires conceptual alignment with rural tourism, ecotourism, health tourism, adventure tourism, and culinary adventures.

In the context of resolving farmers' concern, this approach will increase agriculture's viability in three ways: first, training must be made available, preferably to farmers with small land holdings; second, agro-tourism centres must be developed using on-site resources with the assistance of locals and artisans; and third, and most crucially, field staff must be educated and equipped with the necessary infrastructure to assist farmers in marketing, running, and operating their businesses. To increase the number of leads for tourists coming from metropolitan areas, a comprehensive tourism marketing programme must be created. For a period of 36 months, once every three months visits from agro-tourism consultants and experts to the farmer running the centre helps the farmer maintain and learn from experts.

ATCs, which are administered by local farm owners and employees and promote their products in the target markets, act as the umbrella body for the required agro-tourism organisations. The initiative provides training and capacity building for farmers, regional tour guides, and communities in the fields of small business setup and tourism product development through topic specialists and experts.

Some of the urban government's policy efforts will undoubtedly aid in the promotion of agrotourism. They are:

- The states support public-private partnerships in the tourism industry.

- The proposed budget for rural tourism is Rs. 50 lakhs per village.
- Xth five-year plan budget increased from Rs 525 to 2900 crores.
- Rs. 60 crore budgets for promoting brand.
- Building brand identity "Incredible India".

One of the commercial operations is agro-tourism. Therefore, for success, farmers need a commercial mindset and some marketing strategies. Farmer should follow the following instruction for the better success in agro-tourism:

- Promote your tourist destination widely by using media like newspapers and television. Use all available advertising channels.
- Make connections with NGOs, clubs, unions, schools, colleges, and other organisations.
- Teach your family members or employees how to welcome and host agro-tourists.
- Recognise the needs and expectations of your clients, and then cater to those needs.
- Charge the most reasonable rent and fees for the amenities/services on a commercial basis.
- Avoid manipulating local resources to provide entertainment or services to tourists.
- Create and regularly update your website to draw in foreign visitors.
- Consider their suggestions for improvement and further development as well as their comments and feedback on the service.
- Establish a positive relationship with the visitor to increase future sales and chain visibility.

4.8 Entertainment in Agro-Tourism:

While residing in a rural setting, agro-tourism offers the visitor many enjoyable experiences. Agri-tourist participation in activities such as coconut shooting, fishing, tree climbing, bullock cart races, harvesting competitions, edible adventures, buffalo races in wet fields, etc. could bring about a great deal of fun for the least amount of money. There is ample room to charge farmers an entrance fee, offer food and lodging on a fee basis, and allow Agri-tourists to participate in rural games, all of which would bring in money for the farmers.

Through international experiences, one can learn about some productive agri-tourism practises and entertainment farming businesses. Many developed countries have agro-tourism as a viable source of income, which could inspire us to promote it with adjustments that are appropriate for our circumstances. As follows:

- Arts and crafts demonstrations
- Farm store
- Exhibition of farm equipments
- Processing of farm products and sale
- Sheep Shearing
- Horseback riding
- Wool processing
- Farm vacation

- Picnic grounds
- Camping
- Educational tours for school children

Ways to Expand Agro-Tourism:

Increasing tourists at your farm can increase revenue and help market it. With so many alternatives available, it's crucial to assess which kind of activity would be most beneficial for your farm.

Farmers are advised by Cornell Cooperative Extension to determine the clients they wish to draw and then cater to their interests. Each audience that farmers hope to attract will have different needs and expectations; therefore, they must employ particular strategies to appeal to them.

The collaboration and support of the government and financial institutions are necessary for the promotion of agro-tourism. Important steps include lowering setup costs through the use of inexpensive construction materials, providing loans and subsidies, offering advice from agricultural departments and universities, and establishing support networks for service providers. Through extensive study and case studies, low-cost construction materials may be introduced, lowering the initial expenditure to the point where even small and medium-sized farms might consider the project. The availability of loans from PACS/commercial banks under the MUDRA or starting plan will encourage young, motivated farmers to take on this venture. Low-cost agro-tourism agricultural subsidies would benefit the sector as a whole.

4.9 Agro-Tourism Destinations in India:

a. Vanila County, Kottayam District, Kerala
b. Dudhsagar Plantation and Farmstay, Goa
c. Destiny farmstay, Ooty, Tamil Nadu
d. Green Dreams, Coorg, Karnataka
e. Prakriti Farms, Rupnagar, Punjab
f. The Goat Village, Garhwal district, Uttarakhand
g. The Country Retreat Farmstay, Pali, Rajasthan
h. Citrus Country, Hoshiarpur, Punjab
i. Bhavani Retreat, Vadali District Sabarkantha, Gujarat
j. Mepra: The Hidden Roots, Kuttanad District, Kerala

4.10 Conclusion:

India's rich terrain and cultural heritage offer a wide range of opportunities for the expansion of the agro-tourism industry. India offers a variety of agro-climatic conditions, crops, people, and cultures, as well as deserts, mountains, coastal systems, and islands, all of which offer opportunities for the promotion of year-round, multi-location tourism products. Tourist destinations outside of major cities are becoming more and more popular. There is therefore room to build agro-tourism centres in remote areas.

Agro-tourism is currently expanding significantly. Before it begins to take a sizable chunk of the money made from tourism-related activities, it might take some time. India is a very diverse country, thus there is a lot of room for establishing different Agro-tourism areas there. There will be numerous benefits accruing for both the people and the government as a result of the enterprise, which will assist eco-system sustainability and sustainable development while boosting the agrarian economy.

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5. E-NAM (Electronic National Marketing): Direct Link Between Farmers and Consumers

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Abstract:

e-NAM is an online marketplace for trading agricultural products in India. Online commodity trading is made possible by the market for farmers, traders, and purchasers. The National Agriculture Market (e-NAM) is an electronic trading platform that aims to create a standardized national market for agricultural commodities. It functions by connecting the existing Agricultural Produce Market Committee (APMC) mandis across India. Small Farmers Agribusiness Consortium (SFAC), operating under the direction of the Ministry of Agriculture and Farmers' Welfare, implemented e-NAM, which was introduced on April 14th, 2016, with full support from the Central Government. The e-NAM system facilitates enhanced marketing opportunities for farmers to vend their agricultural products via an internet-based system that ensures competitive and transparent price discovery, with an online payment mechanism. The market facilitates the efficient selling of commodities and aids in improved price discovery. By January 2018, the market saw largely intra-market transactions totaling 36,200 crore (410 billion or US$5.2 billion in 2020). Currently, its list of commodities available for trade includes over 90 items, such as common food grains, vegetables, and fruits.

Keywords:

online, trading, National Agriculture Market, APMC, mandis, price discovery.

"Computerization eliminates the middleman"

~ Isaac Asimov.

5.1 Introduction:

A nationwide market for agricultural commodities would be created by connecting the existing APMC marketplaces through the nationwide Agriculture Market (e-NAM), a pan-Indian electronic trading network. The e-NAM platform provides a comprehensive range of information and services linked to the Agricultural Produce Market Committee (APMC), serving as a centralized hub for all relevant needs.

The APMC markets facilitate the movement of agricultural produce, providing valuable information on commodity arrivals, prices, trade offers for buying and selling, responsiveness to trade offers, payment settlements, and grievance resolution, among other services. The asymmetry of information and transaction costs is decreased via the Internet market. Over time, the goal of e-NAM has been to lower transaction costs by separating the physical transportation of goods from trade operations utilizing warehouse receipts and grades (Coulter & Onumah, 2002).

According to their agril-marketing regulations, the states oversee agriculture marketing. The management of each market region within the state is overseen by an Agricultural Produce Market Committee (APMC) market, which establishes its own regulations pertaining to marketing practices. These regulations encompass market fees as well as the permissible commission fees that are levied by commission agents. The state is divided into several market regions, each of which is supervised by an Agricultural Produce Market Committee (APMC) market. The presence of market fragmentation within a state hinders the unrestricted flow of agricultural goods between different market areas.

The involvement of several intermediaries in the processing of agricultural goods, along with diverse market charges, contributes to the escalation of prices, resulting in a larger proportion of profits being accrued by middlemen, sometimes to the detriment of farmers.

The eNAM addresses these challenges by creating a unified market through a national trading platform and promoting standardization of established procedures throughout the integrated marketplaces. According to Schmitz (2000), the transparent automatic auction procedure and price discovery facilitate seamless information flows between buyers and sellers. Farmers have access to customers across the country through e-NAM, and a price is established depending on the caliber of the crop and its level of demand across the country.

It also guarantees instantaneous online payment. The farmers' ability to use e-NAM, however, is dependent on a number of factors, including how well the available e-market options meet their needs as well as those of traders, other stakeholders, and other farmers (Lee, Shin, and Lee, 2009). Additional elements to consider encompass the punctuality of auctions and remittances, the reliability of transactions and payment mechanisms, the extent of operations and potential for wider engagement, universal accessibility for all farmers and merchants, as well as user-friendly interface and navigational convenience.

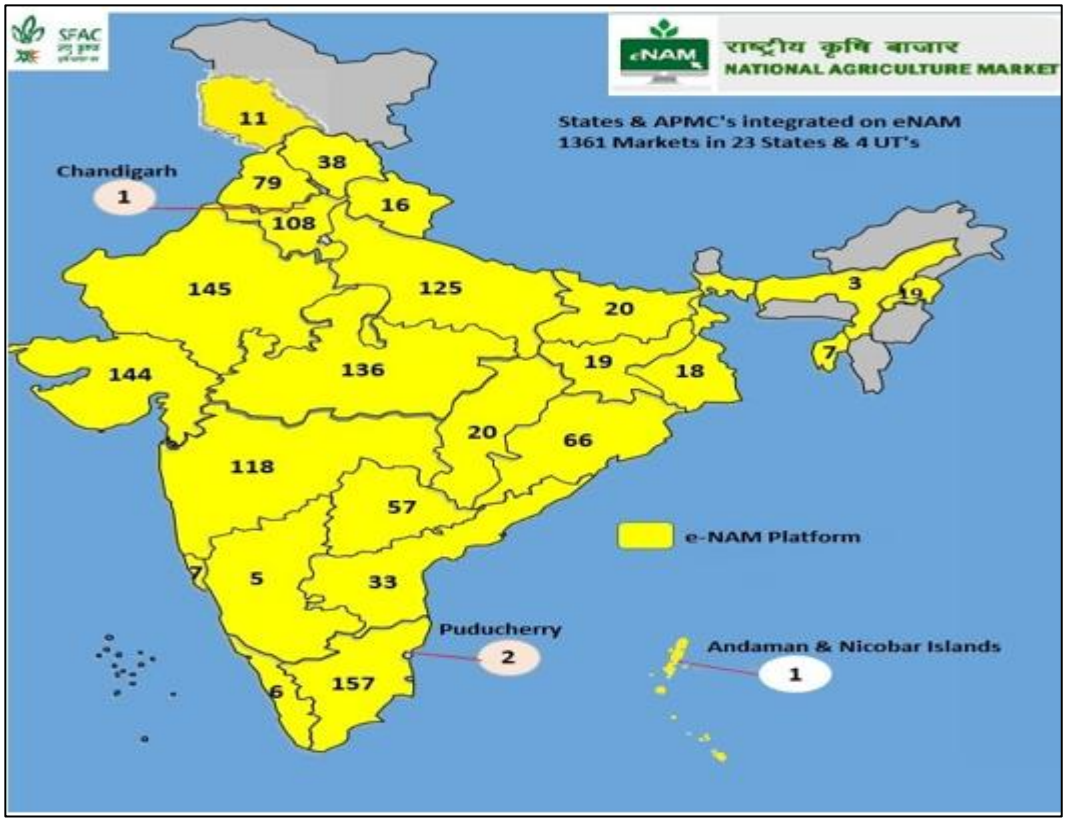


Figure 5.1: States & APMC's integrated to e-NAM in 2023 (Source: https://www.enam.gov.in)

5.2 Implementation Phases of e-NAM:

As of May 2020, 18 states implemented e-NAM, which replaced physical commerce with electronic trade in all 585 mandis. To facilitate the establishment of e-NAM as a fully functional nationwide market for price discovery, there are plans to electronically connect all individual e-markets. This will enable traders from diverse geographical places to participate in the process of bidding. As of now, the e-NAM platform has garnered participation from over 7.3 million farmers, 54,000 commission agents, and over 100,000 dealers. Given the prevailing circumstances, it is noteworthy that the total count of farmers in India exceeds 120 million, a figure that may be perceived as relatively diminutive. The introduction of e-NAM, which was intended to be a single nationwide electronics agriculture market, was fraught with difficulties.

The progress achieved via the introduction of the electronic National Agriculture Market (e-NAM) can be succinctly stated as follows:

The pilot phase, which started on April 14th, 2016, encompassed a total of 21 markets across 8 states. By September 2016, the initiative had expanded its coverage to include 10 states and a total of 250 markets.

By March 2017, a total of 13 states and 417 markets were included.

By May 2018, a total of 13 states and 455 markets were included.

By July 2019, a total of 16 states and 2 union territories were encompassed, resulting in the coverage of 585 markets.

By May 2020, the company had expanded its operations to encompass a total of 18 states and 3 union territories, effectively reaching a network of 1000 markets. conducted by Renu and Goswami (2021).

The progress achieved via the introduction of the electronic National Agriculture Market (e-NAM) can be succinctly stated as follows:

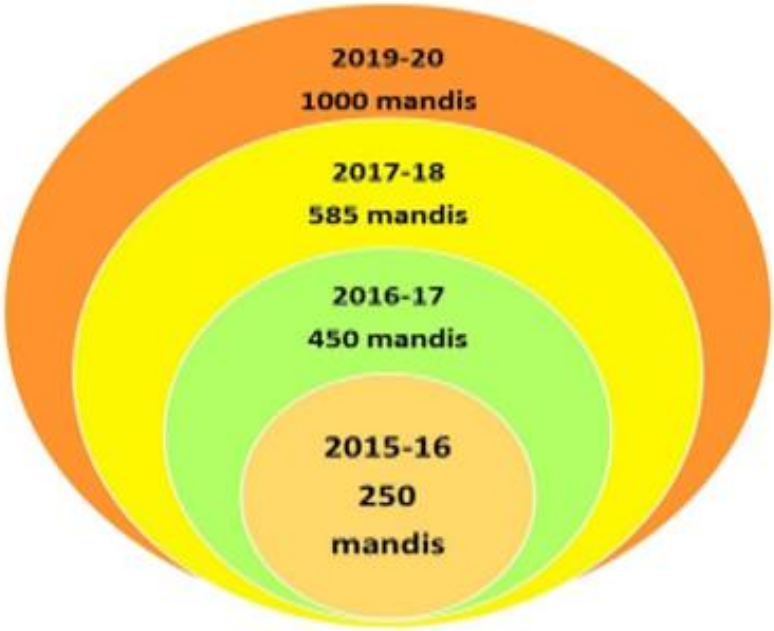


Figure 5.2: Current status of e-NAM (Source: Ghosh *et. al.*, 2021)

Compared to the 279 million tonnes of grain produced in 2017–2018, only 11 million tonnes of agricultural products were traded on e-NAM. When contrasted with According to Reddy (2018), the value of agricultural commodities in India was estimated to be 13 lakh crores. However, the transacted value in 2017-2018 was significantly lower, amounting to just 29,000 crores.

The reason for this analysis is the e-NAM implementation's acknowledged challenges and poor progress. The article's primary focus is on the influence of e-NAM, and it does so by selecting the 585 e-NAM with the best performance by looking at its prices and market arrivals. Then it looks into how market committees, commission agents, farmers, and dealers feel about its execution.

5.3 The Adoption of e-NAM Poses Several Challenges:

The establishment of the electronic National Agriculture Market (e-NAM) has encountered several challenges. The primary obstacles in the implementation of e-NAM can be categorized into three main areas, sometimes referred to as the "3 I's": Infrastructure, the topic of discussion pertains to the institution and the information it encompasses. Infrastructural One of the obstacles that can hinder progress is the presence of inadequate back-end infrastructure, such as the rural road has substandard quality, while the scientific storage facilities are insufficient. In the context of logistics, it is worth noting that there exists a restricted availability of cold storage facilities for the purpose of storing goods, alongside the broader operations of warehousing. Due to the absence of chilled transportation vehicles, and limited market concentration, the availability of grading facilities is restricted to certain markets. The ability of these devices to effectively handle large quantities During the peak season, there is a significant increase in the production and availability of agricultural commodities. There exist varying criteria and benchmarks for evaluating agricultural commodities. The presence of fragmented Agricultural Produce Market Committees (APMCs) and the absence of coordination between them. Marketing organizations and service providers are entities that engage in activities related to the promotion and provision of goods and services. The participation of traders in the marketing of agricultural products in the current situation is characterized by a lack of sufficient internet connectivity, resulting in a suboptimal number of available resources. In the current market, there exists a variety of computing devices, including computers, servers, and kiosks. The occurrence of an interrupted power supply and related issues, the presence of institutional barriers the subject matter can be further categorized into two distinct divisions: a) legal and b) The obstacles related to human resources. The absence of proper orienting is recommended that states undertake the adoption and amendment of their Agricultural Produce Market Committee (APMC) Acts. The implementation of a single-point levy in the market is being considered. The topic of discussion pertains to a solitary trading license, electronic trading, and the issue of latency. The primary legal challenges revolve around the notice of identical occurrences.

The implementation of the e-NAM system. Conversely, the APMCs suffer from a deficiency in skilled labour, which is constrained in its availability. The number of proficient traders engaged in electronic trading. Two factors that contribute to the challenges faced by farmers are the limited access to technological platforms and the relatively low levels of literacy among this population. The significant constraints in human resource management. One of the challenges that can hinder the acquisition and dissemination of information is a lack of sufficient understanding of a certain subject or topic. The farmers possess a weak understanding of the electronic National Agriculture Market (e-NAM). The e-tendering process is hindered by a lack of information regarding its implementation and benefits. The advantages of the Electronic National Agriculture Market (e-NAM) and the concerns expressed by farmers the price of their produce will be lower if their produce is found of a lower standard. In an empirical investigation (Agarwal, 2016) conducted by the Indira Gandhi Institute according to a study conducted in the field of developmental research, it was documented that farmers perceive that the penalties associated with substandard quality will be reduced. When employing visual inspection. Notwithstanding the initial When experiencing hiccups, there are various strategies available to address such issues.

5.4 Multiple Stakeholders' Theory:

Farmers, dealers, commission agents, and market committee members are among e-NAM's stakeholders. Meeting the requirements of all market players is essential to e-NAM's success. The market as a whole cannot function well if a single category is not satisfied. For a market to be profitable, it must guarantee greater prices, prompt payments to farmers, incentives for traders, and lower transaction costs. To enable remote traders to engage in the bidding, the e-market should offer trustworthy assaying tools. The needs of farmers, dealers, and commission agents should be easier for market authorities to meet. The overall efficacy of an electronic marketplace is contingent upon its ability to attract a larger number of market participants, as well as its capacity to remunerate farmers equitably for their agricultural goods in a prompt way, while minimizing transaction costs and the need for extensive learning efforts. Farmers, traders, and other players won't be able to invest in the hardware, software, and skills they'll need until after then (Ghosh *et al*., 2021).

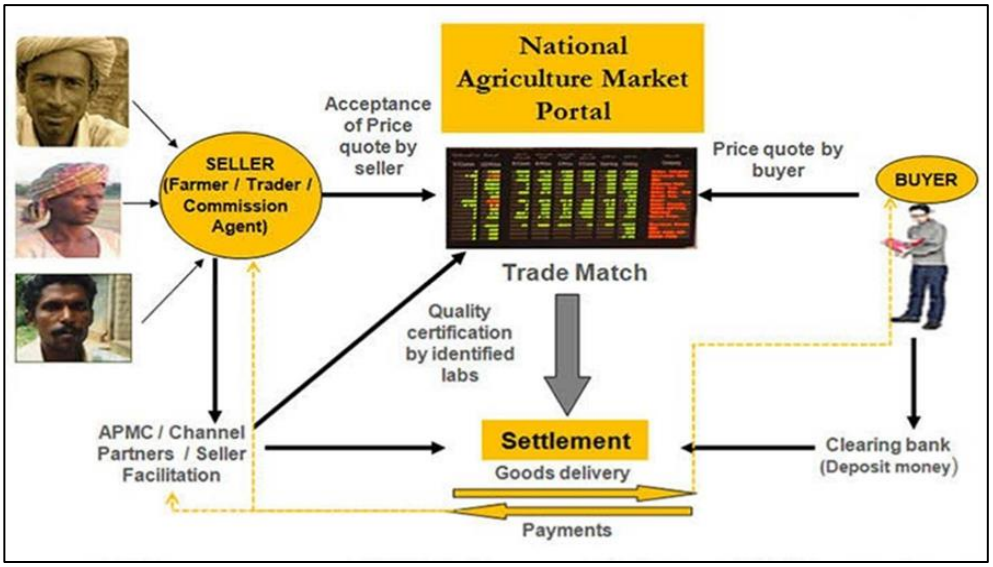


Figure 5.3: Multiple Stakeholders and transactions. (Source: http://sfacindia.com)

5.5 Agricultural Produce Marketing Committee Acts:

The country's main agricultural markets are overseen by the APMC Acts. The segmentation of the agricultural markets in the nation that results in inefficiencies in price discovery is generally caused by the way the markets are currently operating under the APMC Acts. Throughout APMC mandis in India as well as among the states, Chatterjee and Kapur (2016) examined the geographical variability in wholesale prices of the major commodities. They examined the respective roles of various factors in determining this price variance using Shapley-Shorrocks decomposition. They discovered that both time and location-changing factors (39%), as well as time-invariant site-specific factors (37%) are to blame for the significant overall difference in costs among mandis. The farmers profit from market power since there is little competition in the geographically remote mandis where they sell their produce at discounts of up to 5%.

The APMC Acts enhanced agricultural markets in a number of ways, but over time, the power dynamic in transactions shifted back in favour of traders and middlemen. The political influence of the trading class on market reform measures of the state governments has been negatively impacted by the special interest groups of dealers and other middlemen (Chand, 2012). Additionally, it enabled them to prevent new competitors from entering the market, suppressing market competition (Acharya 2004).

Aggarwal, Jain, and Narayanan (2017) highlighted the significance of institutional reforms and the establishment of a legal framework, developing incentive structures for stakeholders, and providing market infrastructure, such as physical as well as financial payments infrastructure, dependent on their qualitative survey of different mandis in Karnataka.

A nationwide or even a state-level common market creation clause was absent from the model APMC Act. e-NAM is an advance in that regard and ought to directly aid in raising the level of efficiency and competition in the agricultural markets. Additionally, e-NAM should aid in lessening the price differential between producers and consumers as well as in the dismantling of local trading groups' cartels and price-fixing practices.

In the states of Punjab and Haryana, e-NAM is anticipated to encourage market-driven crop pattern diversification and lessen farmers' reliance on MSP and governmental procurement. If new APMC reform proposals don't give farmers more options to get higher pricing, they are doubtful to serve their interests and are low on ambition. e-NAM initiatives can be improved by treating the entire nation as a single market, including fruits and vegetables in the scope of 4 mandatory trading in APMC market yards, attracting private investment in alternative marketing facilities, and weakening the Essential Commodities Act (ECA), as well as by pushing APMC reforms (Pravesh Sharma, 2017).

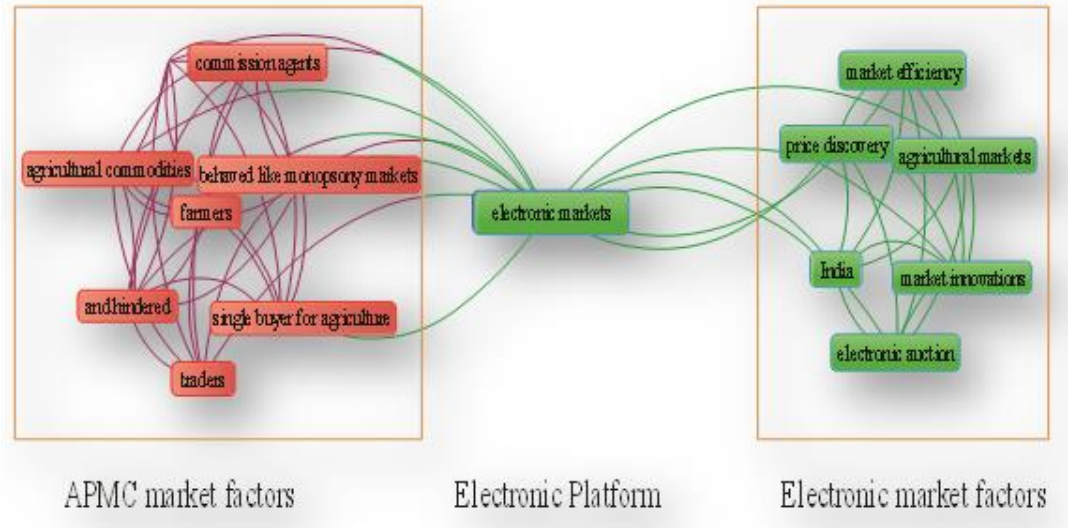


Figure 5.4: Interaction of the APMC Factors and the Digital Factors (Yadav *et al.*,2020)

5.6 Objectives of e-NAM:

The e-NAM portal seeks to bridge the gap between producers and consumers through the use of technology, with the goal of transforming the agricultural-marketing system in the country.

In order to facilitate pan-India trade, e-NAM is working with the primary goal of integrating the State level markets initially, and in the long run, the markets across the nation through a common online platform.

Along with promoting the effective operation of the markets, e-NAM will also help to streamline the marketing and transaction processes, create uniformity across all markets, and do so.

The establishment of a quality assaying system, which examines the quality guarantee of the commodities and will assist buyers in making better offers, is another objective of this portal. The efficiency of marketing is also influenced by factors like price stability, accessibility of high-quality produce to consumers, transparency during auctions, online payment options, etc.

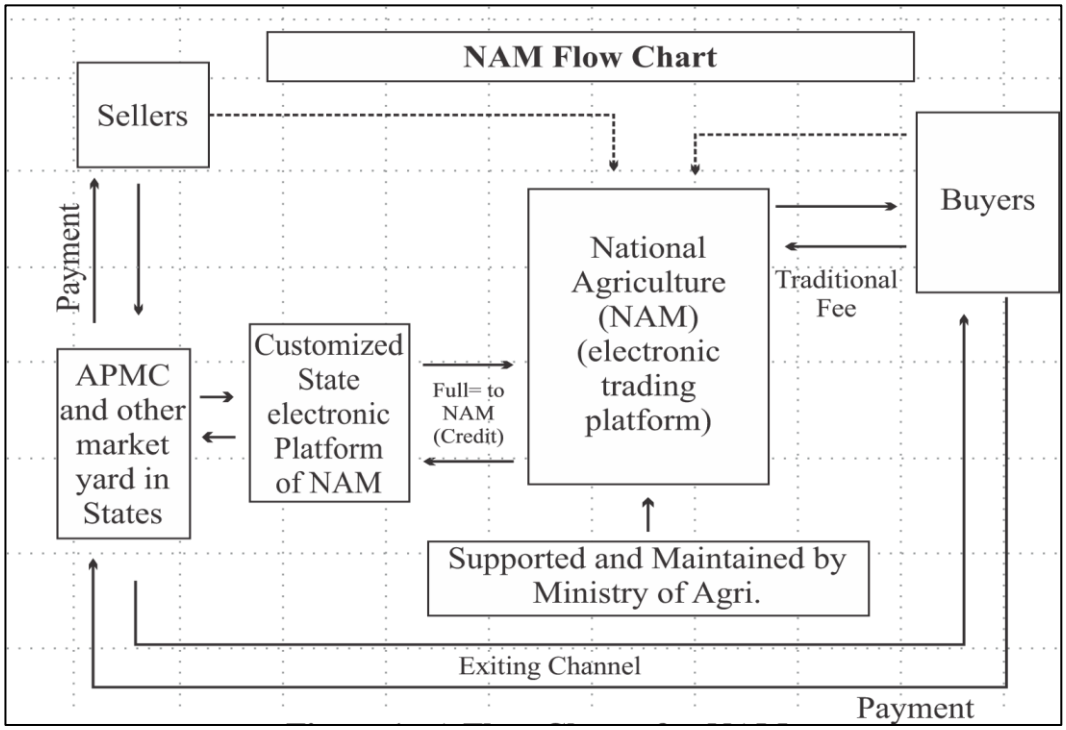
5.7 Features of the Scheme:

The national e-market platform, known as e-NAM, facilitates equitable transactions, price discovery, and regulated trading in various marketplaces such as kisan mandis, warehouses, and private markets. It is imperative for states to demonstrate their willingness by incorporating an e-trading provision inside their Agricultural Produce Market Committee (APMC) Act. The government is providing complimentary software and financial support of Rs. 75.00 Lakh per mandi for the procurement of related hardware, including quality-assurance tools, as well as for the enhancement of infrastructure, such as the establishment of facilities for maintenance, grading, sorting, packing, and composting. Emerging economies are seeing an increase in the promotion of food and agriculture through digital media.

This also applies to India. On July 14, 2022, the Ministry of Agriculture and Farmer Welfare released a mobile application in 12 different languages for (e-NAM)-Platform of Platforms (PoP). The PoP dashboard encompasses a range of services, such as trading, assaying, transportation, storage, financial services, agri-advisory/extension services, market data, institutional buying and selling, and services related to agricultural inputs.

The agricultural market has gone through a gradual progression, starting with the implementation of e-NAM 1.0 as a first step towards e-NAM 2.0. The latter aims to facilitate warehouse-receipt (e-NWR) trade and direct marketing of farmer products through the APLM Act, 2017.

Furthermore, e-NAM 3.0 is anticipated to include the PoP app-based module. By incorporating the remaining APMCs, it is yet to make a significant impact on the agriculture industry (MoAFW, 2021).



5.8 Trade Performance in the e-NAM Platform:

In order to evaluate the level of acceptance among participants, an analysis was conducted on the trade performance of the electronic National Agriculture Market (eNAM).

This analysis focused on the volume and monetary worth of commodities that were exchanged over the eNAM platform.

Table 5.1: From 2016–17 to 2019–20, the volume of commodity trades on the eNAM platform. Quantity: Metric Tons (Source: https://e-NAM.gov.in/)

Year	Food Grains	Oilseeds	Fruits	Vegetables	Spices	Miscellaneous
2016-17	4247151.72	326332.80	36008.73	274885.19	111472.16	5576.73
2017-18	6797886.89	787654.52	161714.88	713327.10	590019.81	674156.04
2018-19	4754556.4	958727.75	137674.81	944103.63	763995.30	711643.93
2019-20	6453645.99	991645.07	141366.57	981917.94	743672.09	1227013.01
CAGR (%)	**9.39**	**42.35**	**48.32**	**50.68**	**81.34**	**407.10**

Table 5.1 shows the volume of commodities traded over the eNAM platform under various headings from 2016–17 to 2019–20, along with the accompanying Compound Annual Growth Rate (CAGR) of the same.

What eNAM (the Electronic National Agriculture Market) Can Do for Farmers?

Farmers from all around India have tremendously profited from the government's eNAM (Electronic National Agriculture Market) program, which has resulted in profound transformations in the agricultural business. eNAM stands for Electronic National Agriculture Market. These advantages are crucial for increasing farmers' access to markets, decreasing the number of middlemen involved, guaranteeing reasonable pricing, and bettering farmers' standard of living.

Key Advantages That Farmers Get from Using Enam Include the Following:

- **Increased Opportunity to Sell to Potential Customers**: The eNAM platform helps farmers connect with potential customers on a worldwide scale. As a consequence of this, farmers may be able to broaden their customer base and locate new markets outside the mandis that are located in their local region.
- **Real-time commodities prices**: eNAM. Farmers can monitor current market pricing, giving them the advantage in deciding when and where to sell their commodities.
- **Direct Engagement with Buyers**: Because eNAM eliminates the need for several intermediaries, farmers are now able to bargain with buyers directly, which significantly increases the possibility that they will get a portion of the selling price that is equitable to them.
- **Efficient Trading**: The platform simplifies the selling procedure by letting farmers post their goods online, where traders can then place bids on it and the deal can be closed electronically. Time is saved, money is saved on transactions, and losses are kept to a minimum after harvest because of this efficiency.
- **Fast and efficient transactions**: Because farmers can sell their goods soon after harvest, they incur less losses due to spoilage and waste as a result of storage thanks to eNAM's fast and efficient transactions.eNAM gets rid of payment delays and ambiguities by making direct payouts into the bank accounts of farmers.
- **certification and testing**: It ensures certification and testing services to make sure that the products sold by farmers are quality standards set out by the relevant industry. Increased marketability as a result of quality assurance methods, which in turn inspires more customer confidence.
- **Market information**:Real-time market information is made available to farmers via eNAM so that they may make more informed decisions about their crop planning, production, and marketing efforts.
- **Economic Empowerment:** and Inclusivity via the Establishment of Level Playing Fields Small and marginal farmers are able to compete on a level playing field when they access a bigger market thanks to eNAM, which increases their financial independence.
- **Reduce the number of intermediaries:** eNAM has the given opportunity for the farmers will be paid a reasonable price for their goods by reducing the number of intermediaries that are engaged in the supply chain.

- **Improve digital literacy**: Digital literacy of farmers who utilize eNAM are able to improve their level of digital literacy, which in turn increases their ability to flourish in the contemporary digital world.

When everything is taken into account, eNAM has fundamentally altered the manner in which farmers do business in the agricultural market. Small farmers are able to maintain a higher level of living and develop a food system that is more egalitarian and sustainable as a result of the various advantages made available to them by Enma.

5.9 Outcomes of e-NAM:

- The integration of 1000 markets across 18 States and three Union Territories has resulted in improved market connectivity through the implementation of e-NAM.
- The e-NAM platform has witnessed registration of over 1.69 crore farmers and 1.55 lakh dealers.
- The e-NAM platform has registered a total trading volume of 4.13 Crore MT of bulk commodities and 3.68 crore numbers of Coconut and Bamboo, with an estimated value of about Rs 1.22 lakh crore.
- In the fiscal year 2020-21, a cumulative count of 3.773 million farmers utilized the National Agriculture Market (e-NAM) platform to vend their agricultural products. Similarly, in the fiscal year 2021-22, up to June 30, 2021, a total of 0.878 million farmers had availed themselves of the e-NAM platform to market their agricultural yields.
- The primary agricultural commodities that farmers trade on the e-NAM platform include paddy, wheat, cotton, chilli, soybeans, maize, potato, chana, tomato, groundnut, mustard seeds, gaur seeds, onion, turmeric, arhar (tur/red gram), bajra, moong whole (green gram), castor seed, lentil (masur), and sweet lemon, among others.
- The technology has facilitated the implementation of direct payment to farmers.
- The e-NAM portal has been made accessible in both English and 11 Indian languages, including Hindi, Bengali, Marathi, Gujarati, Tamil, Telugu, Punjabi, Odiya, Dogri, Malayalam, and Kannada. This provision aims to enable farmers to utilize the e-NAM platform in their preferred language.
- The National Agriculture Market (e-NAM) platform has recently introduced the Farmer Producer Organisation (FPO) trading module. This module aims to enable FPOs to engage in trading activities for their agricultural output directly from local collection centers, eliminating the need to transport the goods to the Agricultural output Market Committee (APMC) marketplaces. The e-NAM platform has introduced a trading module that is centered around warehouses, allowing farmers to sell their agricultural products from warehouses that are registered with the Warehousing Development and Regulatory Authority (WDRA) and designated as recognized markets.

5.10 Conclusion:

In India, the eNAM (Electronic National Agriculture Market) platform has proven a game-changer for agricultural commerce. Utilizing digital technology, eNAM has since started making significant contributions to minimizing and upgrading the agricultural marketing

system. It has altered the way farmers sell their produce, giving them access to a countrywide, efficient, and open market.

The agricultural marketing environment in India has undergone a fundamental shift because to eNAM. Farmers, merchants, processors, and consumers benefit collectively from the increased inclusion, transparency, and efficiency of the market that technology has helped to establish. eNAM has the ability to completely transform the agriculture industry and support the overall expansion and advancement of the Indian economy with additional improvements and coordinated efforts.

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6. Farmer Producer Organization [FPO$_s$] Origins, Development and Future Challenges

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Abstract:

Farmer producer organization is the recognized organization which is formed for improving standard of living and increasing agriculture production, income better condition for higher profits of farmers. A farmer producer organization [FPO] is a group of small and marginal farmer [more than 10] who come together to pool their resources and negotiate better prices for their producer.

Government of India has developed a special central sector initiative called "formation and promotion of 10,000 FPOs" for implementation nationwide. The some challenges for the FPOs is lack of professional management, weak finance, lack of risk mitigation mechanism and inadequate access to infrastructure was observed.

Keywords:

Farmer producer organization, Self help group [SHG], farmer club [FC], farmer interest group.

6.1 Introduction:

The economy of India is an agrarian economy. About 60 percent of people for their livelihood depend on agriculture and allied aspects. The most important challenge in agriculture sector at present is to organize the farmers, especially to organize small farmers for accepting value chain management not only to get adequate returns but also to sustain them permanently in agri-business.

In various states of our country the institutions were formed for the benefit of farmers through co-operative but it is seen that co-operative societies were unable to achieving the welfare of the farmers because of the peoples under whose leadership the institution were working forgot the working objectives of co-operatives which leads to ruins the institutions.

To bring out farmer from such situation an expert committee led by noted economist, Y.K.Alagh recommended setting up of producer companies in 2002 by incorporating a new part IXA into the companies act of 1956. The objective of the committee was to frame a legislation that would enable incorporation of co-operatives in agriculture as producer companies and conversion of existing cooperatives into producer companies.

6.2 Development:

A. Concept and meaning:

A farmer producer organization [FPO] is a group of small and marginal farmer [more than 10] who come together to pool their resources and negotiate better prices for their producer. FPO is basically a corporate body registered as a producer company under companies Act,1956 [As amended in 2002], It main activities consists of Production, Harvesting, Processing, Procurement, Grading, Pooling, Handling, Marketing, Selling, Export of primary producer of the members or Import of goods or services for their benefit. It also includes promoting mutual assistant, welfare measure financial services, insurance of producer or their primary produce.

B. Definition:

Farmer producer organization is define as the recognized organization which is formed for improving standard of living and increasing agriculture production, income better condition for higher profits of farmers.

According to company Act 1956, producer organization can be establish with minimum 10 or more peoples two organization or more, a group of people [10 people or two organization] having following common objective.

- Input purchase
- Crop production
- Harvesting
- Grading
- Pooling
- Handling
- Processing & valve addition
- Marketing
- Import of good & services
- Producer sale & export
- Converting existing corporative in companies

C. Objectives of FPOs:

The specific objectives of FPOs are as follow:

a. Production, harvesting, procurement, grading, pooling, handling, marketing, selling, export of primary produce of members or import of goods or services for their benefit.
b. Processing including preserving, drying, brewing, venting, canning and packaging of produce of its members.
c. Rendering technical services, consultancy services training, education, research and development and all other activities for the promotion of the interests of its members.

d. Generation, transmission and distribution of power, revitalization of land & water resources, their use, conservation and communications relatable to primary producer.
e. Manufacture, sale or supply of machinery, equipment or consumable mainly to its members.
f. Promoting mutual assistance, welfare measure, financial services, insurance of producers or their primary produce.

D. Promotion of FPOs:

The promotion of FPOs, was launched as a pilot programme during 2011-2012 by the department of Agriculture, co-operation and farmers welfare, Ministry of Agriculture and farmers welfare through two sub schemes of the Rashtriya Krishi Vikas Yojana [RKVY], namely the national vegetable initiative for urban clusters and the programme for pulses development for 60,000 rainfed villages. Government of India formulated & issued national policy and process guidelines for FPOs in 2013.

Government of India has developed a special central sector initiative called **"formation and promotion of 10,000 FPOs"** for implementation nationwide. The establishment and promotion of FPO are based on the producer cluster area approach and the strategy based on specialized commodities. To develop product specialization, FPOs will be formed using a cluster area approach and the strategy based on specialised commodities. To develop product specialization, FPOs will be formed using a cluster based approach focusing on "One district one product" Formation and promotion of FPO will be based on the produce cluster area, which includes a geographical area where in agricultural and allied products are grown. A minimum of 300 farmers need to be the members of a FPO to quality for this scheme in the plains & 100 farmers for hilly areas.

About 15-20 farmers located in adjacent area with similar interest area to be mobilized to form a group like. Self help group [SHG], farmer club [Fc], farmer interest group [FIG] etc representing a produce cluster area aggregate together to form a FPO. Developing FPOs is the responsibility of three implementing agencies, notably the small farmer's agribusiness Consortium [SFAC], National Co-operative development corporation [NCDC] and National bank or Agriculture and Rural Development [NABARD].

6.3 Future Challenges for FPOs:

The future challenge is to optimize benefits through effective and efficient means of aggregation models. An ideal model of aggregation assumes significance mainly due to transformation of Indian agriculture towards high value commodities which is a result of agri food market caused by liberalization, globalization, improved purchasing power, demand for safe & quality food, expansion of niche market etc. The size of operational holdings in India is continuously declining further with every successive generation.

The big challenge under these conditions would be to integrate there small holders with the agricultural markets so that benefits from transforming agriculture, trade environment and growing economy may be optimized and help in realizing higher income of small and marginal farmers and lead to more inclusive growth.

6.3.1 Associated Challenges:

A. Lack of Professional Management:

FPOs are required to be efficiently managed by experienced trained and professionally qualified CEO and other personnel for supervision and control. However such trained manpower is presently not available in the rural space to mange FPO business professionally.

a. **Weak finances** – FPOs are mostly represented by small and marginal farmers with poor resource base and hence, initially they are not financially strong enough to deliver vibrant products and services to their members and build confidence.
b. **Lack of Risk mitigation mechanism –** Presently, while the risks related to production at farmers level are partly covered under the existing crop/livestock/other insurance schemes, there is no provision to cover business risks of FPOs.
c. **Inadequate Access to Infrastructure –** The producer collectives have inadequate access to basic infrastructure required for aggregation like transport facilities, storage, value addition and processing, brand building and marketing.

Beside these some issues and challenges like managerial issues, financial issues, Legal issues, operational issues, Human rights, mechanical & technical issues, natural hazard issue etc would be act as barriers in FPOs.

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7. Integrated Farming System: Key for Economic Stability of A Farm

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Abstract:

IFS is an effective interdisciplinary whole-farm approach for tackling the problems encountered by small and marginal farmers. By integrating numerous agricultural enterprises and reusing crop by-products and leftovers on the farm itself, the method seeks to increase income and employment from small holdings. The farmers need to be guaranteed a consistent income to live at least slightly above the poverty line. Production must advance or output must steadily rise to address the challenges posed by the current economic, political, and technological environment. Farming practices and ways of thinking are always evolving. Productivity improvement could be a key factor in ensuring food and nutrition security for a huge population. This entails implementing cutting-edge agronomic practices and technology that promise to increase the productivity of conventional agricultural systems. Agronomic practices like the liberal application of inorganic pesticides and fertilizers during the 20th century significantly increased productivity, however adverse environmental degradation and rising operating costs in agriculture raised questions about the viability and sustainability of the agricultural industry. Around 75% of the households reside in rural areas of emerging countries where their means of livelihood are reliant on agriculture and related activities, either directly or indirectly. Unsustainable agriculture affects the livelihood of millions of small farmers and causes environmental damage. In order to increase income and food and nutrition security in developing nations, agricultural production systems must be strengthened for greater sustainability and higher economic returns.

Keywords: *Small and marginal farmers, consistent income, diversification, sustainability, increased productivity, livelihood.* *"Agriculture is the most healthful, most useful and most noble employment of man."*

– George Washington

7.1 Background of Integrated Farming Systems:

Technical scientists and social scientists did not communicate much in the middle of the 1960s. As a result of the adoption of better varieties of wheat, rice, and maize that were quite responsive to fertilizer, good climate (i.e., favourable temperature) and soils, and very homogeneous and favourable environment of production, and these factors, the Green Revolution was starting to have a significant amount of success in Asia and Latin America (Grote, 2021). Additionally, improved inputs were easily accessible, and the products could find a market. There hasn't been a Green Revolution, nevertheless, across the majority of Sub-Saharan Africa and several regions of Latin America and Asia. This is due to the fact that the climate is frequently unfavourable.

Farmers in Green Revolution regions were able to profit from the better technologies even if they did not do things exactly as they should have and their inputs were highly scalable (for example, they could use a small amount of enhanced fertilizer or seed or a large amount). To succeed, farmers must follow exact procedures (such as planting in moist soil) and use lumpy inputs (such as control over traction) in less hospitable environments, such as the low rainfall regions found in many African and Latin American nations. Additionally, yield increases are not ideal because they frequently involve minor adjustments in yields rather than major (i.e., revolutionary) ones. Thus, experiment station-based technical scientists had great success in their work in the regions of the Green Revolution due to the technology's amazing capabilities. The FSR approach, which involves close collaboration between technical and social scientists, was developed as a result of the failure to use a similar strategy in agriculturally underdeveloped regions (i.e., with resource-poor farmers) (Norman, 1993).

Integrated farming systems (IFS) appear to be a promising remedy for small and marginal farmers with limited resources to meet the demand for food production's sustainability, income stability, and improvement in nutrition (Korikanthimath, 2009). With crop activity as the foundation, the integration of various agriculturally related enterprises will offer ways to reuse the output and waste of one component as an input for a connected component, improving soil health and lowering production costs, ultimately increasing the farm's overall income.

A farming system is a method of managing resources that aims to produce agricultural products economically and sustainably in order to satisfy a variety of farm household needs while preserving the resource base and upholding the good quality of the environment (Oberč *et. al.,* 2022).

The benefits of integrated farming systems include the sharing and pooling of resources and inputs, the effective use of household labour, the preservation, use, and conservation of agricultural biomass, including the effective application of FYM, the control of soil fertility and health, the creation of income and employment for a large number of people, and the improvement of economic status through the efficient and profitable use of underutilized resources. Finding and implementing acceptable farming systems is necessary due to population pressure on the land which is causing division and fragmentation of land holdings (Korikantimath and Manjumath, 2008).

The main objective of the farming system approach is to raise the income and living standards of marginal and small farmers by integrating agroforestry, horticulture, dairy, sheep and goat rearing, fishery, poultry, pigeon, biogas, apiculture, sericulture, mushroom and crop by-product utilization (Kumar *et. al.,* 2012).

The difficulty comes in continuously improving social and technological disciplines and integrating them to fit the region and homestead families in a way that can guarantee higher production with stability, ecological sustainability, and equity.

The technical viability and financial viability of integrated farming systems have been proved in experiments conducted in a variety of environments, including low land, irrigated upland, and upland. IFS can be practised in a variety of ways with varying degrees of intensity depending on socioeconomic structure, soil characteristics, farmer choice, and, most crucially, farmer resource availability (Rahman and Sarkar, 2012).

In addition to making it easier to earn money, these farming system models create more jobs for family members and reduce the risk connected with traditional cropping systems.

7.2 Introduction:

Any nation's wealth is directly correlated to its population's wealth. The fundamental necessities of today include food, clothes, health, housing, education, security, roads, power, and clean water. Produced by farmers. In India, agriculture accounts for more than 60% of all employment. India's economic growth would therefore be reliant on the well-being of its farmers. The use of superior technology and the wise distribution of resources (land, labour, money, machinery, etc.) are necessary for this. In accordance with the Economic Survey of India, between 1990 and 2007, the food grain's growth output slowed to 1.2%, which is less than the 1.9% population growth. By 2030, 1370 million people are expected to live in our country, and by 2050, 1600 million people. We must produce 289 and 349 mt of food grains throughout the corresponding periods in order to meet the demand for the future. According to the country's current situation, by 2030, non-agricultural uses might replace existing agricultural uses, causing the area under cultivation to decline by more than 20% (Gill *et al*., 2005).

An Integrated Farming System (IFS) is a mutually dependent and interconnected system of production based on various crops, livestock, and allied subsidiary innovativeness to amplify the utilization of nutrients from each system of farming. It limits the negative impact of these enterprises on nature (Vikaspedia, n.d.). It imitates the natural ecosystem by maintaining the concept of a food chain, creating a food web and agro-ecosystem in a specific, confined area.

This whole-farm management method, which is based on the nutrient cycle, strives to provide more sustainable agriculture. It is a diversified approach applied to any farming system worldwide. It includes consideration of detail and continuous enhancement in all areas of farming production through well-versed administrative measures. Integrated farming combines the best contemporary equipment and methods with regionally appropriate traditional techniques.

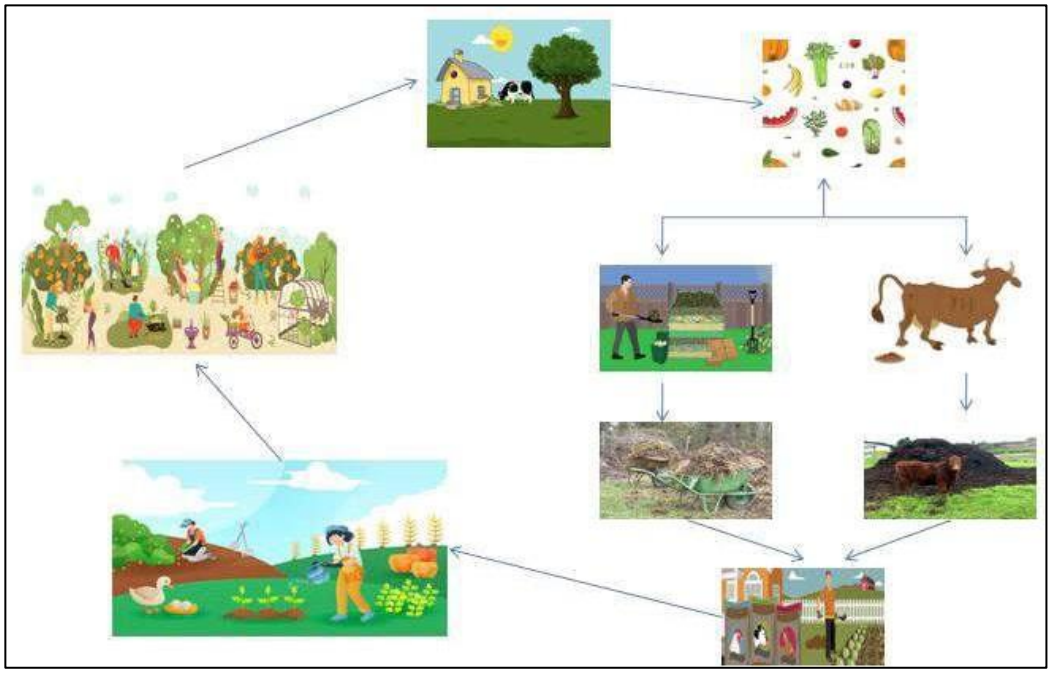

Figure 7.1: Integrated Farming system plan. ***(Source: Haobijam, et. al., 2022)***

7.3 Concepts of Integrated Farming System:

According to Okigbo (1995), an IFS is a mixed agricultural system made up of at least two autonomous but conceptually linked components of a crop and livestock enterprise. According to Jitsanguan (2001), the IFS is a system of aquaculture that is integrated with livestock and in which fresh animal waste is used to feed fish.

Additionally, there are synergies and complementarities between enterprises that comprise a crop and animal factor that serve as the foundation of the IFS concept. The phrase "farming arrangement" refers to a grouping of agricultural businesses where the owners distribute funds for the effective use of definite activities to increase farm output and profitability. Some of these farm enterprises include agriculture, agroforestry, livestock, aquaculture, horticulture, and sericulture. (singh, 2004).

IFS is described as a farming system component by (Radhamani *et al.*, 2003) that improves the utilization of organic wastes and crop residues from the field while also enhancing productivity and reducing risk and profit.

According to (Jayanthi, 2006), IFS is a part of FRS (agricultural System Research), which introduces a change in agricultural practices for boosting crop yield and ensuring excellent resource utilization. According to (Panke et al., 2010), the product, With a high degree of complementarity effects, the input or output of one enterprise or component should be the output for the other enterprises.

7.4 Goals of Integrated Farming System:

The four primary goals of IFS are.

a. Maximising the output of all component companies to provide consistent and sustainable revenue is the first of IFS's four main goals.
b. Reaching agroecological equilibrium and revitalizing/improving the productivity of the system.
c. Use cropping techniques to naturally control weeds, and disease, and reduce the number of insect populations and their intensity.
d. reducing the usage of chemicals (fertilizers and pesticides) to give the community healthy food and a chemical-free environment (Manjunatha, 2014).

7.5 Basic principle of Integrated Farming System:

Farming was practiced in conjunction with livestock animals, and the use of the land, water, and plants was maximized. A more connected manner of farming than one-way farming techniques is referred to as an integrated farming system. The term "integrated bio-systems" can refer to a system of agriculture that manage the output of fish and livestock, as well as livestock and crops.

In this system, "waste" is inputted from one component to another through a network of connected businesses. Costs are decreased, while productivity and/or income are increased. Farmers achieve a general rise in the production of the whole farming system by using trash as a resource, in addition to eliminating waste.

New integrated farming techniques include Crop rotation, zero tillage, site-specific nutrient management, conservation technology, usage of bio-fertilizers, integrated nutrient management, and agricultural systems are some examples of nutrient management techniques. that enable farmers to monitor their operations in relation to a farm's productivity and profitability as well as the profitability of entire farms.

By utilizing the right cropping techniques, such as rotation of crops, mix cropping and intercropping, there will be less competition for water, food, and space, which is the primary objective of an integrated agricultural system.

Additionally, ecologically friendly practices will be used. by employing a multi-story design that maximizes the use of all available space and fosters strong interactions between both abiotic and biotic components.

The elements influencing the execution of IFS:

- Characteristics of the soil and climate in particular locations; Availability of resources and labour on the land.
- The present rate of resource consumption.
- The economics of premeditated integrated farming.
- Farmer's leadership skills.

7.6 Essentials of Integrated Farming System:

In regions with only one crop grown annually, regions with little irrigation, and regions with little precipitation, agriculture combined with livestock raising not only gives family members extra sources of income and career prospects throughout the year, but also reduces the cost of fertilizers by using livestock excrement as manures. increased agricultural yields; soil fertility was preserved. Feed costs will be brought down by using crop waste as livestock fodder. By integrating agriculture with the production of fodder and Azolla, we can increase the advantages of growing animals. Small and marginal farmers make up more than 80% of all farmers in our country who own less than one hectare of land. Therefore, small and marginal farmers can grow legumes like Pillepesara and Stylo as well as fodder like millet, corn, and forage grasses like Co-4 and guinea grass as well as to feed animals on portion of their property. Crop rotation allows small-scale farmers with one hectare of land to divide it into 0.8 hectares for farming and 0.2 hectares for the production of fodder, resulting in greater profits from farming, meat, and milk, allowing them to make a greater profit.

7.7 Advantages of an Integrated Farming System:

The IFS method modifies farming practices to enhance crop productivity and make the best use of available resources. Assures that agricultural trash is recycled in a coordinated manner for industrial uses. Depending on the agroclimatic conditions and socioeconomic position of the farmers, a practical mix of agribusinesses, such as fishery, poultry, piggery, dairy, silk farming, etc., can bring prosperity to agricultural operations (Kumar, 2012). Increasing food production to meet the demands of our nation's rapidly expanding population. Relatively active recycling of animal waste from dairy, pig, poultry, and other sources can reduce environmental pollution while also increasing farm income. lowering input costs by reusing waste from linked activities. Through the production of goods like eggs, meat, milk, vegetables, silkworms, and cocoons, integrated farming can bring in a consistent income. Animals will have access to nutrient-rich fodder as a result of techniques like border cropping and intercropping that are used in the cultivation of fodder crops. Energy-saving - By supplying substitute fuel sources as by-products of various industries, the IFS system efficiently decreases the further dependency on fossil fuels as a source of energy. In order to address the fodder shortage, perennial fodder trees can be established on the farm's property. The nitrogen that these bean trees fix for the soil is also used to produce high-quality animal feed.

IFS is used to produce fuel and industrial wood, therefore resolving the fuel and timber crisis. Additionally, it lessens deforestation and aids in maintaining the natural ecosystem. Employment Creation: By combining livestock and agricultural businesses, more jobs will be available and the need for labour will rise. Agro-businesses - The growth of the country's agribusiness and agro-industries is also greatly aided by the production of agricultural goods in IFS. Increased input efficacy - As reliance on external inputs like fertilizers, food, agrochemicals, and energy has decreased, this farming system's input efficiency has increased dramatically. The farmer makes money all year long because to the range of enterprises in IFS. It has a favourable impact on aspects of farmers' lifestyles like food, housing, health, and education.

One of the most significant advantages of integrated farming is the enhanced production system. A rise in productivity is defined as an increase in economic harvest in each unit area each unit over time due to the cropping intensity and associated farming operations. The profit margin rises along with productivity. This is due to the fact that we are dumping waste or by-products from one farming operation into another. Utilizing cutting-edge technology is one of an integrated agricultural system's main advantages. This is due to the high cost of implementing modern technology. The resources of large farms make it simple for them to adapt. But small farmers frequently experience financial difficulties.

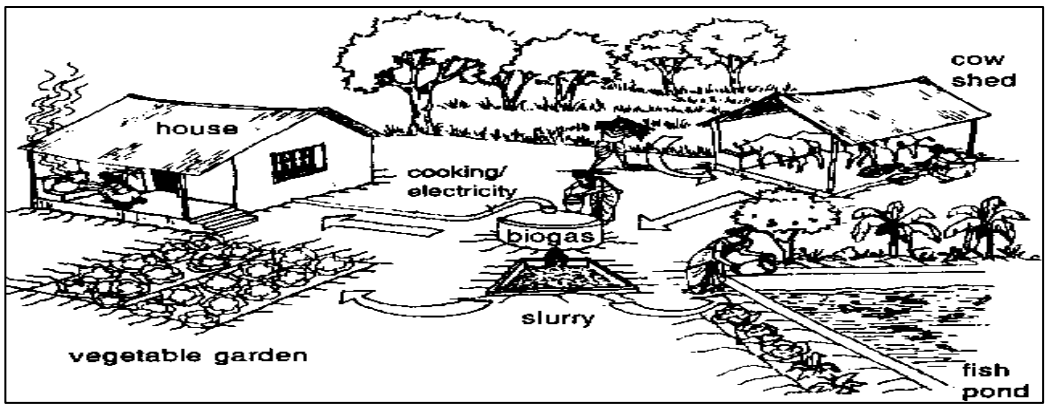

Figure 7.2: Example of Rural IFS Model

Farm productivity is rising, which results in more economic output per unit of time and space. Profitability increases due to lower production costs caused by waste recycling. Farm production is integrating and/or incorporating more economically significant components, which enhances sustainability.

7.8 Components of Integrated Farming System:

A. A: Crops for planting, flowers, forage and fodder crops, agricultural forests, sugarcane, fiber crops, cereals, legumes, oilseeds, fruits, vegetables, and spices.
B. B: Animals and poultry, including cows, buffaloes, pigs, goats, sheep, chickens, and ducks
C. C: Paddy cum Fish Culture, Composite Fish Culture, and Fingerling Production.
D. D: Secondary Agriculture - Examples of secondary agriculture include apiculture, mushroom, food processing, vermicomposting, biogas generation, Azolla, and silk growing. It is possible to develop an integrated farming system by integrating the aforementioned four components (A + B, B + C, A + C, A + D, B + D, C + D, A + B + C, B + C + D, A + B + D). Agrarian policy to rise the total output and sustainability of IFS.

- Adapting a more productive agricultural system based on the amount of rainfall and soil moisture that is available.
- Selecting the appropriate cereal crop varieties, tree species that produce pods or leaves continuously throughout the year.
- Additional fodder leaves, crop leftovers, etc. should be preserved as silage or grass throughout the lean season (summer) and wet season.

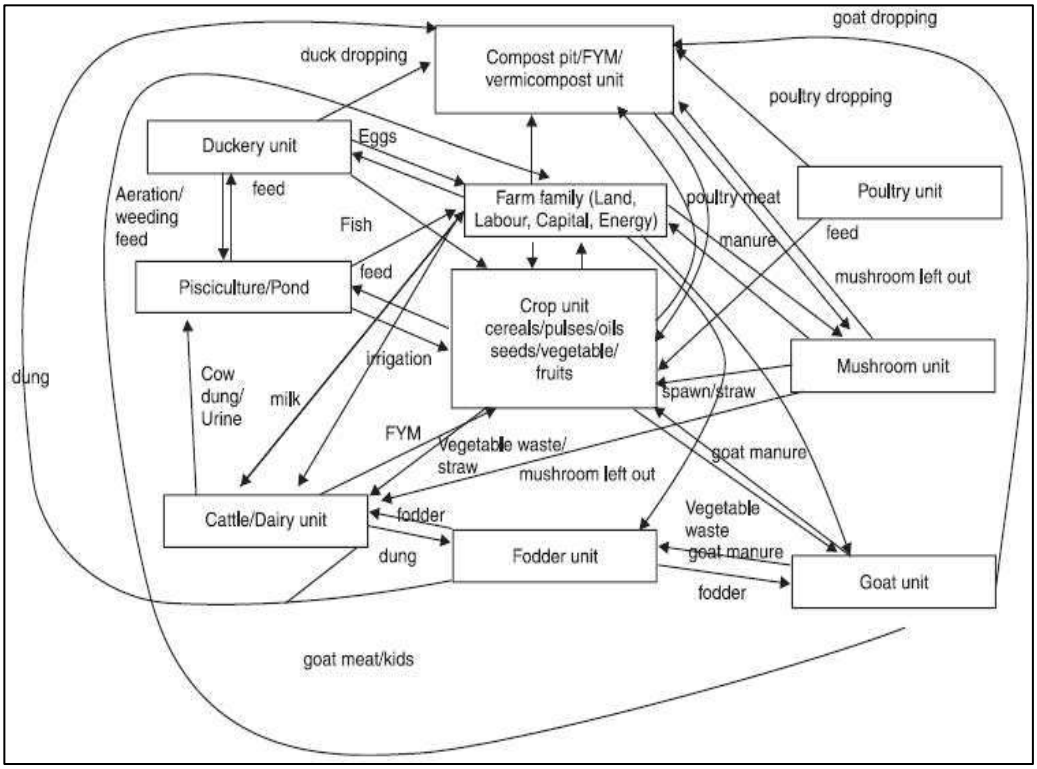

Figure 7.3: The input-output flow of a well-designed integrated farming system
Source: Kumar et al (2018)

7.9 Integrated farming system models:

Depending on the local environmental factors, integrated farming can take on many different forms. Rao (1996) suggested different types of integrated farming systems and a few of them have been mentioned below

7.9.1 Fish and livestock integrated system:

The raising of livestock and fish using similar farming techniques is an illustration of integrated farming. Farm leftovers like leaves, stalks, or other waste materials can be given to fish.

Additionally, livestock manure that accumulates around fish farms can be used to grow plankton, which is a significant source of food for fish. Silk warms (also known as sericulture) can be increased close to fish farms.

The pupae and other waste fish can then be fed the silkworm. Fish pond silt is greatly sought after by farmers as it makes excellent manure and fertilizer for land crops. As a result, integrated farming has a multicultural perspective that respects the environment and offers financial resources for sustainable growth.

7.9.2 Fish-duck integrated farming:

Ducks are quite compatible with farmed fish, therefore raising them in fish ponds works well with the fish culture method. Farmers can gain from this arrangement in a variety of ways. The ducks fertilize the pond with their waste when given free range at the pond's surface. Due to their effective manner of producing pond manure, ducks have been referred to as manuring machines. 60% of the overall expense is made up of culture (Saikia, *et. al.*, 2020).

Ducks help in exhausting soil nutrients, managing aquatic vegetation, loosening the pond's bottom with their shells, and improving the productivity of the pond. Ducks are biological aerators because they acerate the water as they swim.

On the pond's edge, duck houses have been constructed. Therefore, duck activities don't need any additional land. Ponds provide the majority of the food that ducks need in the form of larvae, aquatic grasses, insects, earthworms, and other such things. Farmers typically offer kitchen garbage, molasses, and rice bran for this purpose as they require relatively little food.

7.9.3 Cattle-fish integrated farming:

It is very nutritious and is used for cleaning both urine and livestock barns. You can feed fish with the leftover cattle feed. Building cattle sheds on the fish pond's broad embankment will allow trash and laundry to run right into the fish pond. For a 1.0-acre pond, 5 to 6 cattle will be adequate.

7.9.4 Integrated fish farming with agriculture:

Fish farming and gardening together Growing - To meet the daily fruit needs of a household of 4-5 persons, 200 m2 of land is normally needed. A larger area than 200 m2 is frequently enclosed by fish pond embankments. Ponds make up roughly 25 to 33% of the land used for farming (Chakrabarti, 2014).

7.9.5 Fish farming with vegetable farming:

Normally, 200 square meters of land are needed. Fish pond embankments offer greater space for kitchen gardens and are necessary. In a single year, two vegetable crops can be grown. Vegetables including okra, bitter gourd, beans, eggplant, french beans, cucumber, pumpkin, cauliflower, tomato spinach, peas, and others are thought to be perfect for growing on the backs of ponds.

7.9.6 Integrated fish farming with rabbit farming:

The rabbit home is constructed with embankments in the rabbit-fish integration so that trash and laundry may be dumped right into the pond. The pond's 1.0 hectares can be fertilized with the excretions of 300–400 rabbits. It is feasible to generate 3500–4000 kg of fish by stocking 15000 fingers per acre each year.

7.9.7 Integrated Fish with pig farming:

It has evolved a scientifically accurate and financially successful pig farming and fish culture production method for Indian environments. Pig compost is either thrown into the pond directly or taken out of the animal house and thrown into the pond. On or very close to the back of the pond, there are pig stalls built. Because it increases the biological activity of the water, which in turn encourages fish growth, pig dung is the ideal fertilizer for ponds. Furthermore, fish directly consume pig waste, which is a 70% digestible source of food for fish. Pond muck and fish food are no longer required with this configuration.

7.9.8 Integrated fish-horticulture/agriculture farming:

In this type of farming, the growing of horticulture/agricultural crops on the dyke of the pond was done to utilize the maximum use of the limited space with maximum return. As dyke of ponds accounts for about 25-33 % of the farm area, by growing fruits, vegetables, pulses, and oilseeds on the dykes, the required fruits and vegetables of the family can be met along with earning extra income by selling them. In this system of farming, the recommended fish species are such as *Channa marulius*, Common carp, C. *strialus* and tilapia, and the recommended fruit crops maybe a banana, papaya, coconut, lemon, guava, etc. and vegetable were bitter guards, French beans, pumpkin, tomato, cucumber, bottle gourd, brinjal, lobia, lady's finger, tomato, cauliflower, cabbage, peas, and spinach (Haobijam & Souvik, 2020).

7.9.9 Integrated fish-chicken farming:

In this type of farming, meat from a chicken or egg reduced the cost of feed and fertilizer in fish culture resulting in maximum return from minimum input. The chicken shelter was mostly built over or adjacent to the fish ponds, and the excreta from the chicken was recycled as fertilizer and fed to the fishponds. An effective method of building a chicken shelter above the pond resulted in maximizing the use of space and reducing the labour work for transporting manure into the ponds. As recommended, stocking about 500 to 600 poultry chickens/ha was sufficient to fertilize an area of one hectare of waterbody under integrated farming with fish. As the production manure from the chicken was around 50kg/daily (0.10-0.08 kg excreta/bird/year daily, 36.5-29.2 kg/bird/year). The production from this type of farming was about fish around 4500 to 5000 kg/ha/year, about 70000 eggs, and chicken meat of about 1000 kg/year.

7.10 Integrated farming system: Higher income, economic stability and sustainability:

7.10.1 Enhanced income:

IFS offers the chance to use a component's output as the least expensive input for another component. Eliminating middlemen's influence in the majority of the inputs utilised increases profitability per rupee invested by lowering production costs. In Asian mixed farming systems, small ruminants like goats and sheep fill a crucial ecological and economic niche.

Asia is home to 20% of sheep and 60% of goats, respectively. In India, goat sales account for 30% of all farm income. The results of the IFS study in Tamil Nadu are fascinating. A little farm of 2 acres generated an additional Rs 12,000/- in revenue from its 6 goats. In the Delta and Northwestern districts, In the rainfed black soil regions of Southern Tamil Nadu, tree legumes like Acacia senegal (Gum Arabic tree), Leucaena leucocephala (Subabul), Prosophis cineraria (Khejri), and perennial fodder grass produced an additional revenue of Rs 12,500 per year from a farm area of 1.6 ha. According to studies, crops and animals makeup around a third of the typical net income for agricultural households. Small landowners were better suited to maintaining livestock to generate additional money for the farming family (Hashmi, 2003). According to reports, the use of poultry and dairy-based integrated agricultural systems over cropping alone resulted in a 148% increase in return.

7.10.2 Employment generation:

One of the primary factors to be taken into account when evolving any farming system is gainful employment. On a tiny plot of land measuring 1.25 ha, the Over the course of two years, IFS study in Bhubaneshwar added 573-man days of employment in the fields and horticulture, fisheries, duckery, poultry, , mushroom, apiary, dairy, and agro-forestry (Tarai, *et. al.,* 2016). One hectare of coconut farming in Kasargode needed 150-man days., and when dairy-based integrated farming was introduced, that number rose to 1000-man days. Cropping produced 400-man days on its own, compared to 904-man days in integrated farming systems having six buffalo.

Raising cows and buffalo required a lot of family labour and provided small and marginal farmers with significant employment opportunities. Under integrated farming practises, a herd of 200 goats provided two people with year-round full-time employment. The adding of 270 poultry birds to a crop cum poultry firm was found to boost labour utilisation in integrated agricultural systems by 182%.

Cropping alone produced 245-man days, but integrated farming systems with sericulture produced 598-man days annually from one hectare (Surve, 2014).

7.10.3 Nutrient recycling:

Applying pigeon and poultry manure that has been recycled or composted along with inorganic fertilizer, A notable increase in the post-harvest accessible NPK nutrients can significantly enhance soil fertility status, even with higher nutrient removal through crop absorption (Al-Suhaibani, 2021). It improved soil fertility and gave better opportunities for manure to be recycled into crops when nitrogen was applied as 50% fertilizer and 50% goat dung. Continuous dairy farming strategies increase the availability of nutrients and organic carbon in the soil.

7.10.4 Alternate land use options:

IFS provides alternatives to traditional crop production methods that are more appropriate for places where subsistence farming is practised in delicate ecosystems because they have more promise and flexibility in land usage.

7.10.5 Agri-silvicultural system – lesser risk:

In order to meet the ecological and socioeconomic needs of the population, agro-forestry is a system of integrated, self-sustaining land management that includes woody perennials alongside agricultural crops, such as pasture/livestock, either simultaneously or in order on the same unit of land. Tree farming may replace hazardous farming, especially in dryland regions, because of the low initial cost, the intercropping's guaranteed seasonal revenue, and the accessibility of a range of raw materials to support cottage industries.

7.10.6 Agri-horticultural system – additional income:

Fruit-based systems of cropping are recognized for their capacity to generate income, create jobs, and defend against crop failure during drought years. Trees like the *Annona squamosa*, *Eugenia jamolana*, and *Psisdium gujava* can coexist with maize, sorghum, and cowpea. Agrihorticulture methods provide the maximum benefit-cost ratio when compared to yearly harvesting under Alfisol's rainfed settings.

7.10.7 Silvi/hortipastural system-improved) sustainability:

One of the agroforestry techniques that integrates fruit trees with grazing is horticulture. The trees suitable for the system are *Acacia Senegal and Prosopis cineraria*, while the grasses include *Cenchrus glaucus* and *Cenchrus ciliaris*. Guava, custard apple, and mango are compatible forage crops with Stylo and Cenchrus. In Tamil Nadu's southern region, it was discovered that the gross revenue and B: C ratio achieved from black gram + neem, black gram + tamarind, sorghum + neem, and sorghum + tamarind, were sustainable.

7.10.8 Land Reclamation and Integrated Farming System:

Seven million hectares of land in this nation are thought to be affected to varied degrees by soil salinity and sodicity. The afflicted areas' agricultural production is being hampered by such poor soils. The farmers continue to plant crops without using soil reclamation techniques and have extremely low crop yields since they are typically uninformed of the severity of the issue. 0.85 million hectares of land are damaged by salt , primarily scattered in the Midnapore and 24 Parganas districts, In terms of the distribution of saline-sodic soils, West Bengal comes in third, behind UP and Gujarat. Only the Sundarbans areas of the 24 Parganas district make up 94% of the State's salt-affected land.

7.11 Limitations in Integrated Farming System:

Lack of improved varieties, cultivars or breeds of livestock, lack of knowledge, particularly on the components of feed, and the potential for supplemental use of their own produce are some restrictions. Other restrictions include high initial investment, particularly in the acquisition of businesses, participation in cross-disciplinary activities like Lack of better cultivars, varieties, or breeds of livestock, as well as problems with fishing, horticulture, forestry, and other related industries.

7.12 Conclusion:

It is already evident that the most vulnerable populations, children aged 1-5 and women expecting babies, can immediately benefit from the poorest households' ability to lift themselves out of extreme poverty, especially when the effort is routed via females. The main objective is to build systems to feed depending on the use of regional assets must be taken into account of socio-economic aspects. In accordance with the "ladder concept," attention should be given to mini livestock which includes, cattle, ducks, pigs, chickens, goats, and sheep while still recognizing regional and cultural variation. Animal and plant wastes added as organic residues may also help the soil become healthier, which will raise productivity and not have any detrimental effects on the environment. On-farm research is a process that is ongoing. Farmer experimentation has always resulted in locally relevant technologies. Excellent "researchers" and "extensionists" are frequently farmers. The greatest strategy to combine research and extension is in this manner. Faster and a "natural selection" of technologies and priorities occur when research is conducted on farms. In some circumstances, it is beneficial if an "on-station" study is conducted in addition to on-farm research. It enhances space utilization and also increases the production per unit area. It offers a variety of goods. The use of cover crops, organic compost, and proper crop rotation increases the fertility and physical structure of the soil. Due to appropriate crop rotation, weeds, insect pests, and illnesses are reduced. Utilizing livestock waste and crop residues reduces the need for external inputs such as fertilizers, chemicals, fodder, and energy. Higher net returns to the family's land as well as imputed labour resources, but there must be a clear grasp of how this relates to the realities of the farmer's situation.

Innovative prospects for preserving and enhancing biodiversity exist thanks to integrated farming systems. Such systems place more focus on resource utilization optimization than they do on system component maximization. By combining the knowledge and continuous inputs of farmers, students, scientists and researchers, and from other nations with similar eco-sociological conditions, i.e. through an integrated farming system, the welfare of poor farmers can be improved.

Our main obligation is to address the youth of today. It will be crucial to give young people a platform to cater to the needs of farming systems that are professional and business-oriented. Additionally, the management of knowledge-intensive farming systems will benefit greatly from the involvement of highly educated and skilled youth. By enhancing their skills through advanced training, the youth population will be better equipped to establish supply chains for primary and secondary agriculture. The only way to keep young people in agriculture is to create microbusiness models since they provide opportunities for a regular, sustainable income. Youths from metropolitan regions with connections to the rural system may be lured to work in rural areas by farming systems that are highly productive, commercially successful, environmentally friendly, and sustainable. This may stop transmigration in its tracks and encourage agroecological tourism.

7.13 Future scope for integrated farming system:

A database on farming systems must be created in relation to the various types of farming systems, infrastructure, economics, and sustainability. Farming systems with a range of holding sizes, as well as those that are more or less economically viable or widely accepted,

require the creation of new research modules. Refinement at a research station on a cultivator's field of the techniques developed there. Weather inclinations and climate threats must be anticipated and a contingency plan formulated to address them. A policy structure must be created for planners to take into account in order to promote it widely while using only a small amount of cash, such as short-, medium-, or long-term financing as well as other promotional incentives.

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8. One District One Product (ODOP) Initiative

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Abstract:

The ODOP (One District One Product) is an initiative which is led by the government in India for giving a required thrust to the rural economy by promoting traditional and local products of each district. This program primarily focuses on the identification of unique products in each and every district and also ensuring better platforms regarding production, promotion and marketing of that very unique product, which can be done by building a market for it through skill development, technological up gradation, and market linkage. The prime goal of this program is to improve the socioeconomic condition of local artisans and farmers which will improve the national economy by improving the rural economies at its base. This program is successfully implemented in various states of India and also got global recognition for promoting sustainable and inclusive development. The ODOP also gave a boost to traditional products such as handicrafts, textiles, and food items whose identity was lost in modern days.

Keywords:

One District One Product, ODOP, Mono-zukuri, Petha, Betel Leaf from Nagaon, Red Chilli from Guntur, Litchi, Banaras Silk, Jardalu mango, Varanasi,Muzaffarpur, Bhagalpur, Agra, Andhra Pradesh, Uttar Pradesh, Bihar,Cluster Development Program.

8.1 Introduction:

As our Indian society gets its strength from its vast cultural diversity across the nation, we know that after some minor distance, our country has a different culture. This cultural difference can also be visible on a material basis. This materialistic diversity is a treasure which is to be harnessed. For harnessing this treasure, the Government of India with the association of state governments started a program called ODOP (One District One Product) to encourage entrepreneurship and economic development in various regions of the country. The goal of this initiative is to identify unique products and crafts native to a particular district and promote them to support local artisans and manufacturers. By promoting these products, the government aims to create employment opportunities for local communities and enhance the country's overall economic growth.

The program generally focuses on perishable food products, cereals, and other food products widely produced in a district and its allied sectors. These products include mango, potato, litchi, tomato, tapioca, kinnu, bhujia, petha, papad, pickle, millet-based products, fisheries, poultry, meat, animal feed, and other traditional and innovative products.

The program also supports products, such as honey, minor forest products in tribal areas, and traditional Indian herbal edible items like turmeric, amla, and haldi.

8.2 History:

The ODOP (One District One Product) concept was first found in Japan as its Mono-zukuri movement, whose primary aim was to promote specialisation and excellence in specific products in different regions across all of Japan to enhance competitiveness and promote regional development. Similar types of approaches were observed in medieval Europe and ancient China, where guilds and the Baodiao system respectively helped in fostering the specialization and excellence in specific products, contributing to regional economic development.

In India, the Cluster Development Program (CDP) was introduced in the 1980s to promote small and medium enterprises in different regions.

The ODOP program, launched in Uttar Pradesh in 2018, has been successful in generating income and employment opportunities for local communities and preserving traditional arts and crafts. It has become an inspiration for other states and countries, leading to the adoption of similar initiatives to promote regional specialities and local manufacturing.

8.3 Objectives of One District One Product (ODOP):

The main objectives of One District One Product (ODOP) are:

A. Product Identification and Development: The goal of ODOP is to find and market distinctive products and crafts that reflect the distinctiveness of a particular area or district. It is necessary to do research, identify regional resources, acknowledge traditional talents, foster creativity, and boost production of goods and services. The objective is to create a strong feeling of identity for the area and promote economic growth by utilizing the district's distinctive commodities and crafts.

B. Promotion of Local Industries: ODOP aims to promote local industries by identifying and developing unique products and crafts that are distinctive to a particular district or region. This helps in preserving traditional craftsmanship, promoting local culture and heritage, and creating economic opportunities for local communities.

C. Diversification of Rural Economy: Through the identification and promotion of various goods and crafts in various districts or areas, the ODOP approach encourages the diversification of the rural economy. By encouraging the expansion of non-agricultural sectors and reducing reliance on agriculture, this strategy promotes a healthy and sustainable economic growth.

D. Inclusive Development: By focusing on underprivileged and excluded groups, such as women, craftsmen, and small-scale producers, the ODOP strategy aims to advance inclusive development. This gives individuals the opportunity to engage in economic activity, improve their standard of living, and contribute to the general growth of their districts or regions.

E. Sustainable Development: Through the use of regional resources, traditional knowledge, and environmentally responsible manufacturing techniques, ODOP encourages sustainable development. This aids in protecting the environment, encouraging sustainable livelihoods, and creating climate change resistance. This will help to sustain the locally available product for future generation.

F. Employment Generation: ODOP creates a vacuum in the economic growth of rural areas. By fostering locally owned enterprises and crafts, the ODOP project has the ability to drastically boost job opportunities, especially in rural areas. This can help combat the issue of underemployment and unemployment, stop people from migrating to cities, as well as promote inclusive growth.

G. Capacity Building and Skill Development: ODOP stresses the importance of building the capacity and skills of local producers, artisans, and other stakeholders involved in producing local products. This encompasses offering training, upgrading skills, and providing technical support to enhance the quality and competitiveness of local products. The aim is to augment the capacity and proficiency of local stakeholders to effectively engage in local economic activities.

H. Marketing and Branding: ODOP places significant importance on marketing and branding as a means of promoting local products and crafts in both domestic and international markets. This effort involves establishing brand identities, developing marketing channels, organizing exhibitions and events, and promoting e-commerce platforms for local products. The goal is to generate market demand for local products, increase their visibility, and improve their competitiveness in the market.

I. Community Participation and Ownership: ODOP recognizes that community participation and ownership are essential in the development process. The program encourages the active engagement of local communities, producers, and artisans in the planning, implementation, and monitoring of ODOP initiatives. The goal is to ensure that the development process is inclusive, participatory, and locally driven, which fosters sustainability and ownership by the local communities.

J. Policy Advocacy and Coordination: ODOP involves engaging in policy advocacy and coordinating with diverse groups of stakeholders, including government agencies, local organizations, private sector entities, civil society groups, and communities.

8.4 Principles:

Several fundamental principles underlie the success of the One District One Product (ODOP) program.

A. **Local resource-based approach:** The ODOP program is founded on the idea of recognizing and promoting the distinctive products of every district, based on their local resources, strengths, and abilities. This methodology guarantees that the products are viable, competitive, and representative of the local culture and traditions.
B. **Entrepreneurship and innovation:** The ODOP initiative stimulates innovation and entrepreneurship through providing support and incentives to local businesses for their establishment and growth. This strategy results in the creation of fresh job opportunities, increased income, and enhanced economic development in rural areas.
C. **Value addition and marketing:** The ODOP program stresses the significance of value addition and marketing to enhance the competitiveness of local products. By processing, packaging, and branding the products, local businesses can add value to them, enhance their marketability, and earn higher profits.
D. **Public-private partnership:** For the ODOP program to succeed, it necessitates the collaboration of the government, private sector, and community organizations. This strategy enables the pooling of resources, exchange of knowledge and expertise, and establishment of a supportive environment for local enterprises.
E. **Skill development and capacity building**: The ODOP program gives high priority to capacity building and skill development of local entrepreneurs and workers to enhance their knowledge and abilities. To achieve this, the program provides training, mentorship, and technical assistance to local businesses. This support helps them improve their production processes, adopt new technologies, and meet the requirements of the market.
F. **Inclusivity and sustainability:** The ODOP program aims to ensure inclusivity and sustainability by providing equal access to resources and opportunities for all members of the community, including marginalized groups, women, and youth. This strategy helps to foster social and economic equality, as well as the conservation of the environment and natural resources.

By adhering to these principles, the ODOP program can facilitate the advancement of local economic growth, safeguard local customs and traditions, and enhance the quality of life of rural communities. The program holds promise for generating fresh prospects for entrepreneurship and invention, while also contributing to the economic expansion at the national and regional levels.

8.5 Challenges and Their Solution:

The One District One Product (ODOP) programme has the ability for significant benefits, but there are also several hurdles that must be overcome. Some of the main challenges and their solution associated with the ODOP initiative are as follows;

A. Lack of awareness and participation: The ODOP program struggles to function effectively since so many residents of rural areas are unaware of it and does not know about how to participate. This is a problem because participation is necessary for the program to succeed. Government agencies and cottage businesses should collaborate to educate the public about the program and how to participate in it in order to remedy this.
B. Limited infrastructure and resources: The absence of essential infrastructure and resources, such as production and processing facilities, as well as basic amenities like

roads, electricity, and water supply, hampers the effective execution of the ODOP program in rural areas. The lack of these fundamental elements makes it difficult for local enterprises to start up and thrive, which in turn hinders the development of the local economy as a whole. Constructing or developing amenities such as warehouses, access to water, energy, and roads is crucial to tackling this obstacle.

C. **Limited access to finance:** Many local firms struggle to get access to financing, especially small and medium-sized organizations (SMEs), which frequently lack the collateral and credit history needed to get loans from traditional banking institutions. They find it difficult to start and grow their operations as a result. Governments and organizations can help SMEs with their financial needs by offering financial support in the form of grants, loans, or subsidies in order to overcome this difficulty.

D. **Limited technical and managerial skills:** Local businesses, especially those dealing with traditional and indigenous products, often face a lack of technical and managerial skills necessary to compete in the market. The specialized knowledge and skills required for such products are often missing, which adversely affects the quality and competitiveness of these products. To overcome this obstacle, training programs can be organized to develop the skills of local artisans and craftsmen, providing them with the required technical and managerial skills to enhance the quality and competitiveness of their products. Local Panchayat and entrepreneurs encouraging for conduct training programme for improving skills.

E. **Lack of coordination and governance:** Efficient coordination and governance among diverse stakeholders, such as local government, businesses, and civil society organizations, are vital for the successful implementation of the ODOP program. The absence of proper coordination and governance often results in duplicated efforts, lack of accountability, and ineffective implementation. To overcome this challenge, it is important to establish a centralized coordination mechanism that facilitates effective collaboration among the stakeholders.

F. **Climate change and natural disasters**: Rural areas are frequently at risk of facing the adverse effects of climate change and natural disasters, which can severely impact local businesses and the economy. These events can cause crop failure, loss of livestock, and damage to infrastructure, leading to disrupted supply chains and restricted market access for local products. To mitigate the impact of climate change and natural disasters, it is essential to develop effective contingency plans that can minimize the impact of such events.

G. **Lack of marketing:** Inadequate marketing may limit the market reach of ODOP products, which can impact their sales and growth. To overcome this, it is crucial to develop marketing strategies that target a broader audience, such as online platforms and social media, providing a wider market reach for ODOP products.

H. **Lack of innovation:**ODOP products may face the risk of becoming obsolete or losing their competitiveness over time. To overcome this challenge, it is essential to encourage creativity and innovation through research and development programs, which can help in enhancing the quality and competitiveness of ODOP products. Several factors contribute to the success of the One District One Product (ODOP) program, which are as follows:

I. **Local Resource Mobilization:** The success of the ODOP program is dependent on identifying and promoting the unique products of each district, which are based on local resources, strengths, and skills. Effective mobilization of the district's natural resources, human resources, and cultural resources is crucial to the success of the program.

J. **Value Addition and Quality Improvement:** To make local products more competitive, it is vital to prioritize value addition and quality enhancement. The ODOP program stresses the significance of local businesses adding value to their products by upgrading their quality, packaging, and branding.
K. **Market Access and Linkages:** The effectiveness of the ODOP program also relies on ensuring that local products have efficient access to markets and linkages. This can be accomplished by building local markets, creating supply chains, and connecting local businesses with national and global markets.
L. **Innovation and Technology:**The ODOP program highlights the importance of local businesses embracing innovation and incorporating new technologies to enhance the quality and competitiveness of their products. Technology transfer, research and development, and innovation hubs are some of the ways to accomplish this.
M. **Capacity Building and Skill Development**: The ODOP program's success also hinges on the efficient building of capacity and development of skills for local entrepreneurs. This can be attained through methods such as training programs, coaching, and mentorship.
N. **Community Participation and Empowerment:** The ODOP program is unable to continued without the support of the community. This might be accomplished by incorporating members of society in the creation and execution of the program, supporting social and environmental sustainability, and giving women and young people the chance to participate. Local engagement is essential for the expansion of ODOP.
O. **Policy Support and Enabling Environment:** The right policy backing and supportive environment are also essential to the ODOP program's efficacy. Establishing a favourable legal and regulatory environment, offering financial incentives, and encouraging collaborations among the government and private sectors can all help achieve this.

Below are some examples of case studies that demonstrate the success of the One District One Product (ODOP) program in promoting local products and creating sustainable livelihoods:

Petha from Agra, Uttar Pradesh:

The Agra locality of Uttar Pradesh is famous for producing petha, a traditional dessert made from pumpkin and syrup with sugar. The objectives of the local ODOP set up were to boost the lives of local producers while promoting Petha as an unique indigenous product. The program's components such as training, promotion assistance, and monetary aid helped the producers, which raised their output and income. The campaign has established a paradigm that is environmentally sustainable for the region's Petha production, and the product has gained popularity on both the domestic and foreign markets.

Betel Leaf from Nagaon, Assam:

A traditional mouth freshener popular in India, betel leaf is produced in high-quality in the Nagaon area of Assam. The ODOP program in the area aims to raise the living standards of regional farmers and market betel leaf as a distinctive locally produced good. Farmers were given training, marketing assistance, and financial aid under the initiative, which increased

their output and income. As a result, Betel Leaf has grown in popularity on both the domestic and international markets, and the program has created a sustainable production strategy for Betel Leaf in the region.

Red Chilli from Guntur, Andhra Pradesh:

The Guntur region of Andhra Pradesh is famous for growing outstanding red chillies. The ODOP campaign in the vicinity centred on marketing red chilli as a distinctive locally produced good and enhancing the standard of living of regional farmers. The effort helped the farmers through training, marketing aid, and financial support, which led to an increase in output and income. The program has developed a sustainable framework for red chilli production in the area, and the red chilli is now well-known on both the domestic and international markets.

Litchi from Muzaffarpur, Bihar:

The Muzaffarpur region of Bihar is famous for its superior litchis. The ODOP campaign in the vicinity concentrated on developing litchis as a distinguishing indigenous good and strengthening local farmers' standard of living. The endeavor supported producers through instruction, commercial aid, and monetary help, which resulted in a boom in output and income. The venture has established a sustainable framework for litchi cultivation in the area, and the litchis are now well-known on both domestic and global markets.

Banaras Silk from Varanasi Uttar Pradesh:

The ODOP initiative was started by the Uttar Pradesh government to encourage the growth of Banaras Silk, which it recognized as a distinctive product of the region. The government developed a silk manufacturing and designing center in Varanasi to aid local weavers, and it additionally offered entrepreneurs financing to adopt novel methods, purchase essential supplies, and promote their products. Through these activities, the Banaras Silk industry has grown, weavers' wages have increased, and the cultural uniqueness of the area has been preserved.

Jardalu mango from Bhagalpur district in the state of Bihar:

The successful ODOP initiative in the Bihar district of Bhagalpur has allowed for the commercial cultivation and marketing of the Jardalu mango, a special type that only grows in this area of India. Jardalu mangoes from Bihar are designated as a Geographical Indication (GI). The purpose of the effort is to help nearby farmers solve their production, post-harvest, and distribution issues. Because of its light yellow skin and its peculiar aroma, this jardalu mango is very well-liked in both domestic and global markets. But the difficulties they faced were impeding the agriculture sector and way of life.

8.6 Conclusion:

The ODOP (One District One Program) is one of the promising programs of the current time which gained enormous popularity due to its unique and distinct vision as it promotes

sustainable economic growth. This program mainly aimed to develop and market unique local products that generate income for local communities. The program has been implemented in diverse sectors such as agriculture, handicrafts, textiles, and food processing. As of the latest data, there are 764 districts in India if this program got good implementation there are the same number of unique products that will come into the market. But the implementation of ODOP also poses several challenges such as inadequate infrastructure, lack of technical and financial support, and limited market linkages. These challenges can be overcome by adopting a holistic approach that involves the participation of all stakeholders, including local communities, government agencies, NGOs, and private sector actors. This approach can ensure that the program's success factors are met, including identifying unique local products, providing technical and financial support, creating market linkages, and promoting sustainable practices. These challenges can be overcome by adopting a series of holistic approach that involves the participation of all stakeholders, including local communities, government agencies, NGOs, and private sector actors. This approach can ensure that the program's success factors are met, including identifying unique local products, providing technical and financial support, creating market linkages, and promoting sustainable practices. A large portion of the success of ODOP depends on the identification of unique local products which have market potential. This requires a thorough analysis of the local resources and expertise available in each district. Once when the products are identified technical and financial support should be provided to the local communities to improve the quality and productivity of their unique products. This support can include training, access to credit, and modern technology. The factors which provided the success in ODOP can also be replicated in other regions and sectors to get better results in inclusive and sustainable economic development. The program is also very helpful in the achievement of the (UNSDG)UN Sustainable Development Goals by addressing the issues like poverty, promoting gender equality, and reducing inequality. ODOP will also help in the preservation of traditional skills and knowledge, which are essential for cultural heritage and identity.

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9. Model and Role of Communication in Extension

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Abstract:

Communication takes place when information is to be shared among the people. It focuses on changing knowledge or attitude of the people which are broader in sense. Effective communication takes place when two or more individual are homophillus. In extension, communication also be viewed as a two-way 'stimulus response' scenario in which the communicator, the extension worker, provides the appropriate stimulus in the form of a message which creates a certain response on the audience, the farmers and vice versa.

The communication has certain elements to pass the information to the individual namely source, message, channel, receiver and feedback. A visual depiction of the communication process, ideas, thoughts or concepts using diagrams, etc., is known as communication model. This can be viewed as methodical illustrations of the procedure that aid in our comprehension of how communication can be carried out. Communication has different models given by various authors that helps to share and gain the information among the individual.

Keywords:

Communication, Model, Elements, Process.

9.1 Introduction:

Communication Origin:

The term 'communication' comes from a Latin word 'Communis' meaning Common. According to **Rogers and Shoemaker** (1971), communication is the process by which messages are transferred from a source to receiver.

According to **Van den Ban and Hawkins (1988)**, communication is the process of sending and receiving messages through channels which establishes common meanings between a source and a receiver. According to **Leagans (1961),** communication as the process by which two or more people exchange their ideas, facts, feelings, or impressions in ways that each gains a common understanding of the meaning, intent and use of messages.

AUTHORS	PURPOSE OF COMMUNICATION
Aristotle	Persuasion
Berlo	Influence
Schramm	Immediate and delayed reward
Festinger	Consummatory and instrumental

9.2 Functions of Communication:

a. **Information function:** The process of getting or giving information either directly or indirectly relies the information function.
b. **Command or instructive function:** The command and instructions function of communication are more observable in formal organizations than in informal organizations.
c. **Influence or persuasive function:** It is a persuasive function of communication *i.e.,* to induce people in changing their behaviour which is extremely important for extension direction.
d. **Integrative function:** This function helps to maintain individual, societal or organizational stability and identity.

MODELS OF COMMUNICATION

Linear model	Transactional model	Interaction model
Source $\xrightarrow[\text{Message/Feedback}]{\text{Channel}}$ Receiver	Source $\xrightarrow[\text{Message/Feedback}]{\text{Channel}}$ Receiver	• Two-way communication model
• Simple one-way communication	• Senders and receivers both are Communicators	• Mostly used for new media like internet
• No feedback	• Non-verbal communication is considered as feedback	1. Schramm's model
1. Lasswell's model 2. Aristotle model 3. Shannon- weaver model 4. Berlo's SMCR model	1. Barnlund's Transactional model 2. Helical model 3. Becker's mosaic model	

A. Aristotle Model (300 BC):

Greek philosopher Aristotle was the first to take the initiative and develop the communication paradigm. His communication model was a spoken or spoken communication-based linear model.

3 Ingredients:

a. Speaker – The person who speaks.
b. Speech – The speech that the individual produces.
c. Audience – The person who listens.

5 Elements

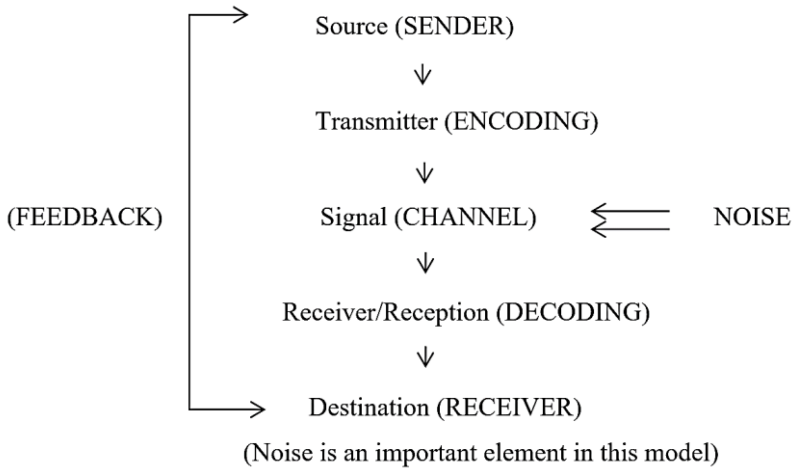
a. Speaker
b. Speech
c. Occasion
d. Audience effect

B. Laswell model (1948):

Six elements

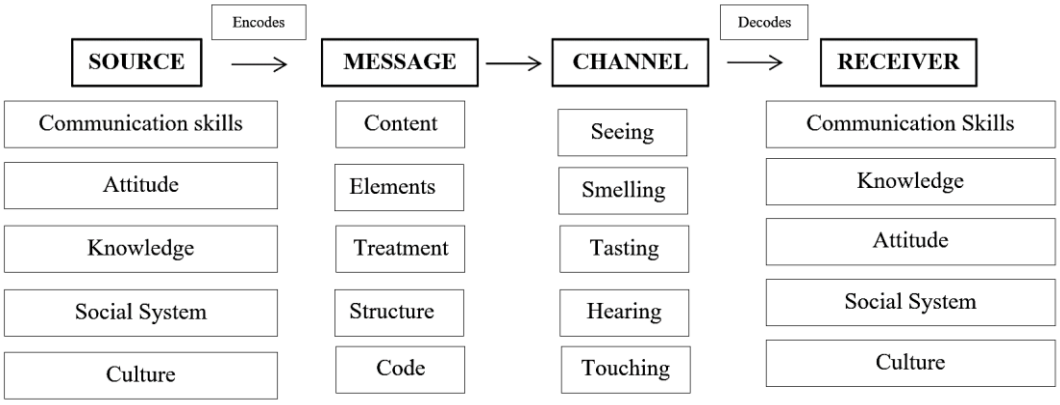
WHO (Sender)
↓
SAYS WHAT (Message)
↓
IN WHICH CHANNEL (Medium)
↓
TO WHOM (Receiver)
↓
WHAT CIRCUMFERENCE

C. Shannon – Weaver model (STSRD) (1949):



(Noise is an important element in this model)

D. Berlo's S-M-C-R model (1960):

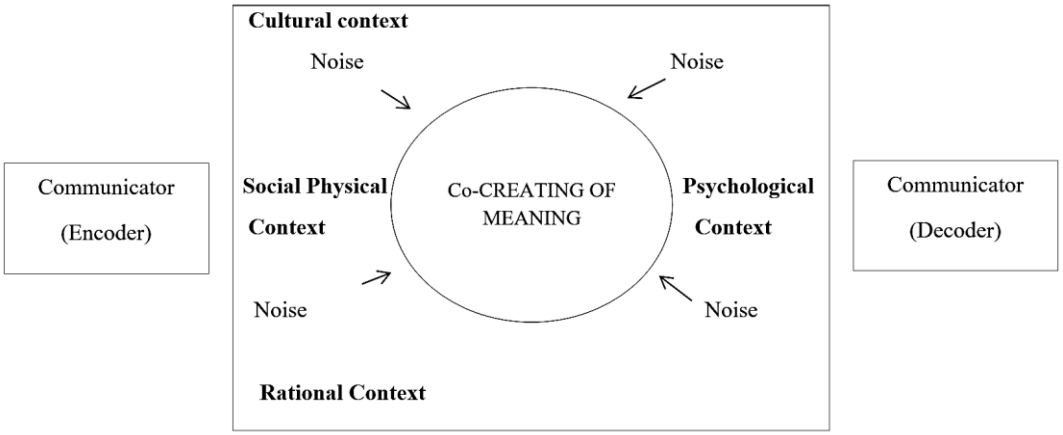


F. Rudimentary model of communication:

To study the political communication propaganda.

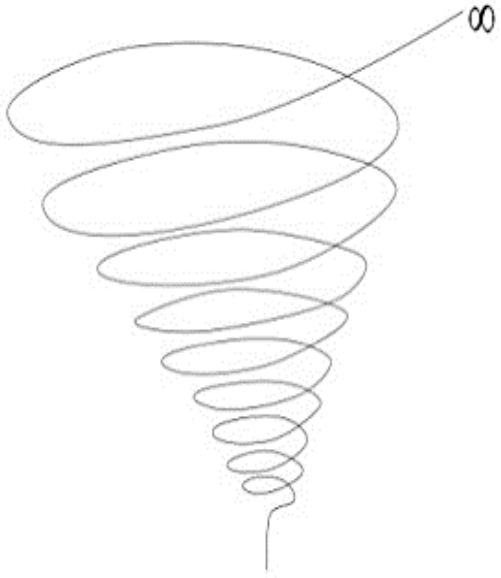
G. Barylund's transactional model (1970):

a. Multilayer feedback system.
b. Two-way communication channel.
c. Never ending cycle between sender and receiver where their roles switches.
d. Components used are public uses, private uses, behavioral uses where these can be verbal as well as non-verbal and speech act, filters and noise are used.



H. Helical model – By Frank Dance (1967):

- Simple helix which grows bigger and bigger as it moves.
- Communication is viewed as cylindrical, continuous and non-repetitive and accumulative.



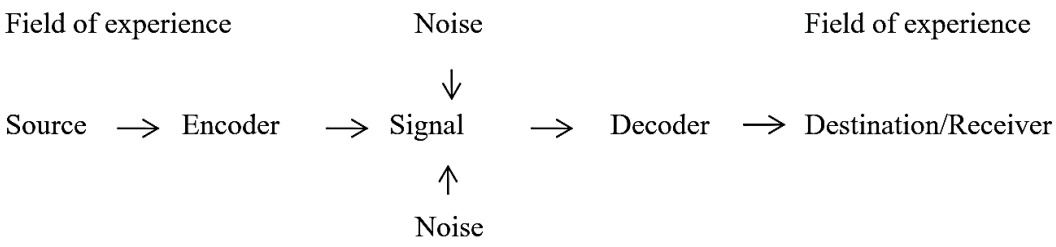
I. Becker's mosaic model (1968):

- Dynamic process.
- Explains the complexity of human communication.
- Receivers go through the cells in loops every time.
- Mosaic is made-up of network of bit.

Components:

- Empty cells – Unavailable messages or sources.
- Vertical cells – Set of similar messages.
- Cells – Messages and sources.

J. Schramm's model (1961) – SESDR:



K. Leagan's model (1963) (CMCTAR):

- Book ⟶ Communication process in Rural Development. – Leagans

- Most common for extension education

Communicator

↓

Message

↓

Channel

↓

Treatment

↓

Audience

↓

Response

L. Rogers and Shoemaker's model (1971) (SMCRE):

Source

↓

Message

↓

Channel

↓

Receiver

↓

Effect

M. Stimulus Response model (SR model):

By New comb.

N. Gerbner's model:

Human Communication system or open system.

O. Hovland percevation model:

Receiver – learner oriented.

P. Westley and Mclean Mass Media model:

9.3 Role of Communication:

- Upward communication
- Downward communication
- Horizontal communication

9.3.1 Key Elements of Communication:

4 Elements:

A. Communicator.
B. Message.
C. Channel.
D. Receiver.

A. Communicator:

- The initiator of communication, often known as the source, originator, or sender of messages is known as the communicator.
- A communicator could be a person, a team, or a whole social system.
- Forcommunication to be successful, both the communicator and the organization they represent must be credible.
- Messages Encoding and Decoding.

B. Message:

- An alteration or disturbance of the physical environment that can be noticed and distinguished from the rest of the physical environment is what is referred to as a message.
- The subject matter of the technology to becommunicated and the messages are not exactly the same. Itis a fact, feelings, impressions, attitude or information that a communicator wants his audience to hear, comprehend, accept and act upon. They are more of a generalized sense of what the subject matter signifies.

Dimensions of message:

a. Message Code:

- Any collection of symbols that can be organised in a way that has meaning for a particular person is considered to be a code.
- Anything that has a set of instructions for meaningfully mixing a group of items (a vocabulary) and a set of processes for doing so (a structure) is a code.
- We must choose the code to use, its components, and the ways in which these components will be organized.

b. Message Content:

- The information in the communication that the source chose to convey his message to audience. Like code, content has elements and a structure.

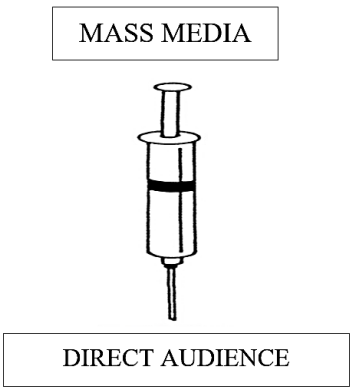
c. Message Treatment:

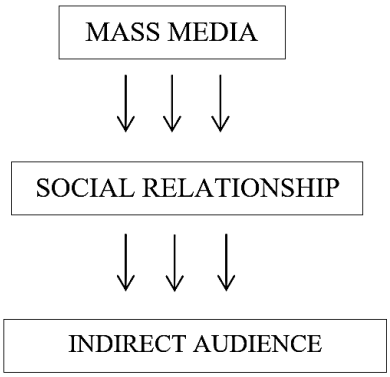
- We may define the treatment of a message as the decisions which the communication source makes in selecting and arranging both code and content in order to achieve comprehension on the part of receiver.
- It refers to the decisions the source makes as to how should deliver his message.

Message flow models:

a. Hypodermic needle model – Lasswell:

- Based on the Source- Receiver principle, this model hypothesis that the information flows direct the masses waiting to receive it, with nothing intervening.





b. Two- step flow model – Kartz and Lazarfeld:

- In the presidential election of 1940 in the USA, it was discovered that ideas flow from radio and print to some active members of a social system called key communicators and from then to lies active members of the audience.
- It is further concluded that in the first step, form source to key communicators, mostly information flows, while in the second step, from key communicators to other members, there is also a flow of influence.

MASS MEDIA

↓ ↓ ↓

KEY COMMUNICATORS

↓ ↓ ↓

AUDIENCE

c. One – Step flow model:

MASS MEDIA

↓

SCREENING ASPECTS

(Selective exposure perception retention)

↓

PERSONALITY VARIABLES

↓

DIFFERENTIAL EFFECTS

Multi- step flow model:

- Message received from various locations, The steps may vary depending on the following factors i) intention of the source, ii) accessibility of mass media, iii) nature of message and iv) relevance of the message to the audience.

Selective exposure:

- It is a tendency where people have a propensity to expose themselves more to messages that support their opinions, values, etc...

Selective Perception:

- Regardless of communicationexposure, an individual's underlying beliefs, attitudes, wants, needs, or other factors may affect how they see a particular event, problem, person, or location. As a result, two people who are exposed to the same communication may have very different opinions of it.

Selective Retention:

- People's social categories, personal traits, and interpersonal connections all have a significant impact on how they learn about and use knowledge.

Message distortion – Kirk (1953):

- The phenomenon with communication where the entire message does not reach the receiver or the intent of the message is changed.

a. Systematic distortion/ Stretch distortion: In systemic distortion no information or data is lost. Instead, it is altered or recorded in an orderly or systematic way.

b. Fog distortion: In fog distortion information is lost, masked or 'fogged' over, due to the communicator's inability to encrypt and/or the receiver's inability to accurately decode the message with complete fidelity.

c. Mirage distortion: In mirage distortion, rather than hiding information from us, we perceive something that isn't there. Mirage distortion provides us with extra unnecessary information.

C. Channel:

- According to Rogers and Shoemaker (1971) communication channels are the means by which messages travel from a source to a receiver.
- Channels may be interpersonal channels, mass media channels, localite and cosmopolite channels.

Interpersonal channel	**Mass media channel**
Face to face communication is there	No face-to-face communication
It effects in creating or changing attitude	For creating awareness or change in knowledge
Feedback received is high	Feedback received is low
Relatively reaches slowly to the audience	Rapidly fast in reaching the audience
Ability to overcome is high	Ability to overcome is low

Localite Channel	Cosmopolite Channel
Within the social system	Outside the social system
Personal	• Personal – Extension agent Impersonal – Mass media

NOTE: Medium is the message -- Mc Luhan

Media Forum:

- Combination of the both interpersonal channel and mass media channel. It originated in Canada.

Country	Media Forum
India	Charcca Mandals
Latin America	Radiophonics
Brazil	Cruzada ABC
Italy	Telecuosa

Noise:

- The obstructions that interfere in the channel.

Source of cause of noise:

- The audience for the channel wasn't reached.
- A failure to manage channels effectively as a part of communication.
- Not using channels appropriately for the audience's abilities.
- Failure to avoid physical distraction.
- Lack of attentively listening from the audience.
- Not using enough channels in parallels.
- Making excessive use of channels in a series.

D. Treatment and Presentation:

- Treatment refers to the manner in which a message is processed so that the information receives across to the audience, The necessity of treatment is to make communications clear, understandable and realistic to the audience.
- Presentation refers to the method used to convey the message before the audience.
- Treatment and presentation of the message are influenced greatly to the extent on choice of the channel and the nature of audience.

a. Audience:

- The audience or receiver of message is the target of communication function.
- Intended recipient on consumer of message.

b. Audience Response:

- Response of the audience is the ultimate objective of any communication function.
- Response of an audience to messages received may be in the form of some kind of action, mental or physical.
- Until the desired action results, extension communication does not achieve its most essential objective.

Feedback:

- Feedback is the act of bringing significant responses of the audience back to the communication, The extension agent should be aware of the audience's reactions after the message has been delivered.

Characteristics of Feedback:

- Feedback is source oriented.
- It varies in different communication situations.
- It affects the source or communicator.
- It affects communication fidelity.
- It exerts control over future messages.
- It maintains the stability and equilibrium of a communication system.

Advantages of Communication Models:

- The simplicity and clarity of their models are both blatant advantages of model
- The many forms of communication are organized by models, which make it easier for complex variables to be controlled by a single framework.
- Models give a straightforward, comprehensive view of a complex organization.
- Models make a variety of processes easier to describe and assist explain how information flows through a society and how innovations are accepted or rejected by the general populace.
- It helps to explain when experiments are impossible or possible.

Disadvantages of Communication Models:

- These are situations when a communication model lacks specific information.
- Communication models are constantly stiff therefore, communication cannot always be in a rigid model.
- A model could simplify things too much.

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10. SHGs in India: Current Status

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Abstract:

Self- Help Groups are small groups consists of 10 to 25 members, which are the main objective of forming an SHG is to promote an financial inclusion and a better living for the weaker sections of the society. It is important for alleviate poverty and to increase employment opportunity. The impact of SHGs in India are saving and financial decision making , Access to credit, Employment ,Participation in local government, Change in family violence .SHGs playing a important role in training of Swarozgaris, infrastructure development, marketing and technology support, communication level of members, it creates self confidence among sample members, change in family violence , frequency of interaction with outsiders , women were also participate in society programme, involvement in politics. It has a positive impact in political, economic, social and educational level. Self Help Group is an current strategy for the empowerment of woman in rural as well as urban areas to bring woman together from all scope.

10.1 Introduction:

Self-Help Groups (SHGs) are small groups of informal and self-governed people who get together to identify solutions to improve their living conditions. An SHG consists of 10 to 25 members between an age limit of 18-40yrs mostly and is primarily women belonging to the same socioeconomic background. The main objective of forming an SHG is to promote financial inclusion and a better living for the economically weaker section of the society. Most such groups are backed up by NGOs that help improve their financial and social problems. The Self-help group model was developed by an association named SEWA (Self-Employed Women's Association), formed by Ela Bhatt. She was responsible for shaping

an organised sector for women coming from backward in sowing, pottery, hand-made toys etc. NABARD established SHG bank Linkage Project in 1992, which became NABARD was backed by the Reserve Bank of India to help SHGs open savings account in banks. The government of open savings accounts in banks. The government of India, in 1999, came up with Swarn Jayanti Gram Swarozgar Yojana (SGSY) to encourage SHGs formation in rural India by upskilling them by conducting capacity building programs. Later in 2011, GOI came with National Rural Livelihoods Mission (NRLM) to alleviate poverty in rural India. NRLMs gave SHGs access to easy finance (insurance, savings, pension, etc.) and conducted various training & upskilling programs. Self-Help Groups (SHG) became an excellent opportunity for Rural Women to become financially independent and resolve various socioeconomic problems like education, health, collective bargaining power, building awareness, basic livelihood requirements . Its further gave them an alternative out of the traditional lending pattern followed in the rural region where the lender exploited the poor and women.

Why Self-Help Group Is So Important in India?

- To alleviate poverty
- To increase employment opportunity
- To accelerate economic growth
- To raise status in society is the prime reason for respondents joining the SHG.
- To promote income generating activities

Status of Self-Help Groups (SHGs) in Uttar Pradesh:

Self -help Groups **(SHGs)** came into existence in 1976 from Grameen Bank of Bangladesh founded by Mohammad Yunus. As an emerging economy, India adopted this model to alleviate poverty and empower the nation's women. NABARD started promoting SHG models in the early '90 to empower the rural sector of India. Uttar Pradesh constitutes 4,65,664 (or 6.69%) of the total SHGs in India (Ministry of Rural Development,n.d.). A study conducted in Uttar Pradesh revealed that SHGs and the microcredit system are promising tools to elevate women's status and standard of living and help women to solve common problems like health, education, and other house holds issues. A survey conducted in Uttar Pradesh stated that an SHG has better saving rate that helped them increase their value of assets. A study reported a 54.22% increase in the annual income level of an SHG member It further improved the social status of women in terms of education, enhanced borrowing patterns and economic status in Rural Uttar Pradesh (Maurya,2014).

What Is the Present Status of Self-Help Group in India?

Even after more than 62 years of planning, various poverty alleviation programmes, official estimates shows that around 26.1 percent of total population still lives below the poverty line in India the financial requirement is one of the basic needs of the poor rural people of the society for their socio-economic upliftment. Amongst the poor the most disadvantageous group are the women and they constitute almost half of the population in India. The proportion of the self-employed (vulnerable workers) has declined significantly in the development process.

The proportion of self-employment in the total employment is as low as 8% and 10% for women and men respectively in developed regions and as high as 64% and 57% for women and men in developing regions. In India the overwhelming proportion of workers is in the self employment category. About 64% of the rural and 46% of the urban workforce is engaged in self-employment. In India 20.51% of the workforce are living below the poverty level. The proportion is highest (31.9%) among casual labour and second highest (17.17%) among the self employed. However in terms of absolute number, the self employment category has the highest number of poor _45.28 million, followed by casual labour _ 41.45 million Microfinance to Self Help Groups (SHGs) may be considered as a vital tool for meeting the Women constitute around fifty percent of the total human resources in our economy. As per the Socio Economic and Caste Census out of more than 1794 lakh households in rural area, about 1337 lakh households are having a monthly income of the highest earning member of the households below Rs.5,000. Which is about 75% of the total households. All these households seem to be in the economically backward and underprivileged category. These households constitute the potential segment of the SHG Bank Linkage Programe.

10.2 Impact of Self-Help Group in India:

Saving and Financial Decision Making:

One of the primary benefits of participation in a SHG is the opportunity to save regularly, access formal savings institutions and participate in the management of these savings. They save regularly, have their own bank accounts and make deposits into these accounts. SHG is having a good impact on members, in their ability to save their hard earned money.

Access to credit:

A corollary of participation in SHGs is an improvement in a women's access to credit. Since the project is perhaps too early in its implementation to, directly improve women's access to credit. The financial mobility due to participation in the SHG has led to an improvement in the quality of life, according to some of the successful groups. Overall, many families were able to address their basic needs better than before than that of men, and that women were also more likely to spend the income earned, on their families, leading to improved health and nutrition of the poor population and for improving the quality of their lives.

Employment:

The implementation of SHG has generated Self-employment opportunities for the rural poor. The progress of the program since inception assisted in formation of 35.7 lakh SHGs: assisted 1.24 cr. Swarozgaris in establishing their own micro-enterprises. The Government of India released Rs.11,486 Crore under the program; bank credit mobilization is Rs.19,017; Total subsidy provided is Rs9,318 Cr. The program helped many participants in improving their economic conditions. Another good accomplishment of the program is that it has adopted the SHG strategy. The National Bank for Agriculture & Rural Development (NABARD) will create a Rs.15 billion fund to cater to women's Self-Help Groups in economically weaker districts in the country, After joining the self help group the women

are economically and socially empowered. This empowerment cannot be transformed or delivered it must be self generated such that it enables those who are empowered to take control over their lives.

Decision-making within the household:

The social impact of the SHG program increased involvement in Decision-making , awareness about various programs and organisations, increased access to such organisations, increased expenditure on Health and Marriage events, there is a change in the attitude of male members of the family, now they are convinced about the concept of SHG and encourage women to participate in the meetings and women reported that they have savings in their name and it gives them confidence and increased selfrespect. Within family the respect and status of women has increased. Members are now confident enough to raise social status.

Participation in local government:

Because of SHG, women know about their local political institutions such as the Gram Panchayats and have their knowledge of where to report certain types of grievances. As part of the political empowerment process, it is a pertinent fact that many women have not only been elected to the Grama Panchayats but have become the role holders too.

Communication Level of Members:

Microfinance movement is having a good impact on members, in their ability to express their feelings and has made people more confident to express themselves.

Change in Family Violence:

Involvement with SHG has reduced this violence in 25 percent cases especially due to reduction in economic difficulties. In most of cases the members revealed that their husbands should also be involved in SHGs.

Status of Access to Amenities:

Since SHG programme has economic as well social implications. It can be seen that there has been an increase of 40 percent in SHG members in terms of their status of access to amenities factors. Therefore, it can be concluded that after joining the SHG the members have improved in getting access to amenities like medical, sanitation, education, market, water supply, transport.

Increased Nutrition status:

They find positive impacts on empowerment and nutritional intake. Female social and economic empowerment in program areas increased irrespective of participation status. Evidence of higher consumption is not income or asset formation.

The program's main economic impact had been through consumption smoothing and diversification of income sources rather than exploitation of new income sources.

SHGs and Environmental Management:

Research and policy has tented to focus on the relationship between poverty and environmental degradation in terms of pointing out that the poor are both victims and agents of environmental degradation.

10.3 Shortcomings' of The Self-Help Group in India:

Though it was considered as a wonderful program by many stakeholders, the program failed on many counts is provided as follows:

Challenge of take-off:

The program supported promotion of 292 thousand SHGs in the first year. i.e 1999-2000. The number remains around this level in all subsequent years with wide fluctuations from year to year. Similarly ,214 thousand groups passed Grade -I, in the second year of the program, i.e., 2000-01. It remains around this level in all subsequent years.

Though there is significant growth in the number of groups that passed Grade-II, groups which have taken up economic activities are less. In total only 685 thousand groups have taken up economic activities. It is a little over one-fifth of groups promoted in the scheme.

Credit mobilization:

Mobilizing bank credit is a major challenge of the program, due to which the governments at centre and states could not increase the allocation over the years. In total, the target of credit mobilization is Rs.29,831 cr. But little over half of that amount was mobilized during the last 10 year. However, the proportion of actual mobilization to target is increasing over the years. It is a healthy sign because of lower than targeted mobilization of bank credit and allocation of a relatively higher proportion of funds for subsidy, the ratio of credit to subsidy was about two during the period and did not vary much from year to year. Thus, the credit-subsidy ratio remained much below the target ratio 3:1 (GOI,2009). It also resulted in less than planned investment Swarozgar.

Low survival rate of prompted micro-enterprises:

Many assisted Swarozgaris are either reluctant to create or acquire the planned assets or were disposing them immediately after acquiring .According to BIRD'S study "in northern states , the success rate in terms of whether units exists or not in case of units financed to group Swarozgaris turned out to be even worse than that in case of individual Swarozgaris as only 17.7% units were found to be existing in case of group Swarozgaris as against the 31.11% units intact in case of individual Swarozgaris . The results indicate just opposite pattern to what most of us believe / perceive that group approach of financing is better than

the individual financing. However, in case of southern states,76.6% units were found to be existing at the time of field visits which shows the better careby the government department as far as monitoring of units is concerned"

Low realized incremental income from Income generating act.

The program envisaged that Swarozgaris would realize about Rs2,000 per month from the investment of about Rs.25000. Except a few case studies, no major evaluation study reported additional income anywhere close to Rs2000 per month. In 2002-2003, only 43% of the assisted Swarozgaris reported on increase in their income.(as quoted in GOI,2009) .

10.4 Suggestions to Improve Self-Help Group in India:

Suggestions for designing the NRLM:

As three-fourths of households in the country are either poor or vulnerable, NRLM may cover all willing rural households, irrespective their BPL or APL status, in the SHG program for effective financial inclusion.

It may be divided into two sub-programs,viz. Financial Inclusion and Livelihood promotion. Two programs may be implemented sequentially. The first five years may be totally focusing on promotion and strengthening of SHG institutions and later focus may be on setting up of small and medium enterprises under SHG federations.

Suggestions to promote Financial Inclusion:

- SHG banking may be allowed to function as core banking activity without any outside interference like target fixing, interest cap, loan size, etc.
- The Government may promote quality SHGs through village /cluster level; sub-district /block level and district level federations.
- Wherever banks are not accessible or not responsive, federations may be prepared to take up financial intermediation.
- Promoting agencies should have a clear role transformation strategy and should implement the same in letter and spirit.
- NRLM may work on sensitization and orientation to bankers about the commercial value of SHG banking.
- NRLM may understand the banks concerns such as quality of groups, political interference in functioning of federations, wrong signals like loan waivers,etc and address them.

Suggestions for promotion of small and medium enterprises:

To obtain desirable employment transformation and to take full advantage of booming secondary and tertiary sectors, NRLM may focus on manufacturing and service sectors. The small and medium enterprises may be promoted to village/ cluster; sub-district /block and district level SHG federations.

- The potential units could be agro-processing units; milk processing units; common service providing units; cold storages; rural warehouses; market yards to organize weekly markets; etc
- Appropriate institutions like 'commodity cooperatives' and 'producer companies' may be promoted under SHG federations to take up small and medium enterprises as per the pattern of the borrowing from the SHGs.
- The federations could be assisted to have state of the art units by hiring professional consultancy firms, who can provide these units on turn key basis.
- NRLM may provide investment and working capital to the federations to set up these units.
- If banks are non-responsive, the apex financial institutions like state finance corporations / SIDBI/ NABARD could be accessed.
- Acquired units could be pledged as security to the banks and financial institutions.
- These units would result in development of entrepreneurship in federations, provide a large number of regular employment opportunities to the members and boost the rural economics.
- SHG concept should target the holistic development of women members. The ministry may bring out publications pertaining to different aspects of SHG and its development/ empowerment.
- It is felt that efficiency and effectiveness of SHG should be regularly monitored by a qualified and designated body to give corrective input wherever necessary as well as encourage the deserving ones.
- Timely release of adequate loans and the eligible subsidy is important. SHG member education and awareness on the high poverty regions should be viewed as long term investment in human capital development. All stakeholders should invest their time for capacity building, handholding and development support.

Suggestion for better Implementation of machinery:

Implementation mechanism may follow the design of the program. It may be kept in mind that a proper role transformation strategy and implementation of the same in letter and spirit is essential for the development of people's institutions. After joining SHG the income levels of the respondents have increased and with the help of increased income level they could overcome the poverty. Loan facility is available for all the members without any restrictions. Thus, SHGs are formed with the idea of mobilizing small savings from the members. SHGs are not treated as financial system but they are formed with a view to social and economic change of the rural people especially for the rural women. Women should be properly educated so that they will enhance the capability to manage communities and community projects. The NGOs and the State government must also monitor at a regular interval the overall performance of SHGs and the members included in it. There is a need for establishing computerized MIS for SHGs and SHG federations to monitor their performance on a regular basis.

10.5 Conclusion:

SHG programme clearly plays a central role in the lives of the poor. The programme in various blocks all seem to be very successful in reaching poor clients. Importantly; there is

evidence of increased household income. This is a very significant indicator of impact. Standard of living for the program participants have increased and also the food security is much more for the program clients. Programme loans are one of the main ways clients overcome food insecurity with sickness, disease, emergencies and crises , where programme participants seem to transfer the loan source from friends and moneylenders to SHG loans to meet these expenses.

At the individual level, there is evidence that the programme attracts already relatively empowered people and that empowerment occurs among some clients through programme participation. The process of empowerment manifests itself in increased self-esteem. Programme participation are far more aware about the various programs and organisations and have an access to these organisations.

Microfinance is playing a significant role in alleviate poverty and rural development. Since women are the sole family caretaker, proper emphasis should be given to the rural women and for empowering the rural women finance is required. Microfinance to the rural SHGs is a way to raise the income level and improve the living standards of the rural women. The Self Help Groups have proved the way for economic independence of rural women.

Thus , it can be concluded that the self help groups contribute substantially in pushing the conditions of the female population up and through that chip in poverty eradication as well. From the above analysis we can conclude that inspite of the concerted efforts taken by SGSY, it is clear that the failure of the programme is seen. But of course there are lot of advantages as well as disadvantages. Now MoRd has been taking a lot of initiatives to revamp the programme. Let us hope that better solutions coming up to implement the programme in effective and efficient ways and means in the near future.

Self-help Groups have been playing considerable role in training of Swarozgaris, infrastructure development, marketing and technology support, communication level of members, self confidence among sample members, change in family violence , frequency of interaction with outsiders , change in the saving pattern of SHG members, change in the cumulative saving pattern of SHG members per month, involvement in politics, achieving social harmony, achieving social justice, involvement in community action, sustainable quality and accountability, equity within SHGs , defaults and recoveries, and sustainability-financial value.

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11. The Integrated Farming System in The Context of Agricultural Economics

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Abstract:

The Integrated Farming System (IFS) is a holistic agricultural approach that combines various farming enterprises and practices to promote sustainability, resource optimization, and diversified income sources. This chapter explores the economic dimensions of IFS by analyzing its advantages over conventional farming systems. By reviewing some research studies indicate that IFS enhances resource use efficiency, generates higher returns on investment, and provides substantial employment opportunities. It optimizes resource utilization through synergistic interactions among crops, livestock, and other components.

The diversification of income sources in IFS results in increased profitability and risk mitigation, while its focus on sustainability, resource recycling, and environmental conservation fosters a balanced and efficient agricultural system. Overall, IFS offers a comprehensive solution to enhance agricultural productivity, rural livelihoods, and environmental sustainability.

Keywords:

IFS, resource optimization, cost, return, employment generation.

11.1 Introduction:

Green revolution in India made the country self sufficient in food grain production. The present agricultural situation of country has witnessed substantial improvements in food production through intensive cultivation of a few crops. However, the dependence on a small number of crops has made farming unprofitable for farmers and un-sustainable for the ecosystem. Economic liberalization in the information technology and industrial sectors has generated new job opportunities, resulting in a shortage of labour in the agriculture sector.

As a result, farmers' attention has shifted to less labor-intensive agriculture enterprices. Unfortunately, the per capita income of individuals involved in agriculture sector is merely one-third of their counterparts in the industrial sector. The uneven distribution, fragmentation, and scattering of land holdings over region.

Approximately 45% of the total cultivable area is comprised of sub-divided and scattered farm holdings. This has severely impacted the food security specifically, of small and marginal farmers and has made farming a main reason for poverty.

From ancient times, Indian farmers have engaged in a diverse range of occupations, including farming, dairy, poultry, apiculture, sericulture *etc*. This combination guaranteed food security, soil health, and a sustainable way of life and act as complemements to each other.

In the present era of civilization the number of nuclear families increases and running a diverse enterprises on farm has become less practical and less viable. Therefore, maximizing crop yield becomes major challenges which achieved only by using advanced technology, further increasing productivity of sigle crop caused soil and environment degradation.

Apart from food crop humen being also depends on non-food crop for their survival. To address all this mentioned challenges faced in agriculture, the terminology known as "Integrated Farming System (IFS)" helps farm households in promptly raising their income.

Integrating more number of farm enterprices by farmers leads them towards achieving goal of higher yield and net income simultaneously with sustainable use of soil, environment and other resources**..** For small and marginal farmers, the challenge of boosting farm production is compounded by the need for substantial capital investment in intensive farming practices.

However, Integrated Farming Systems (IFS) offer a crucial solution by enabling increased productivity without the burden of high investments. Through strategic resource utilization, effective waste recycling, and the involvement of family labor, IFS emerges as a pivotal strategy. By treating waste as a valuable resource, IFS not only eliminates ecological waste but also significantly elevates farm productivity while concurrently curbing production costs.

11.2 Integrated Farming Systems: A Holistic Approach in Agricultural Economics:

"Integrated Farming Systems (IFS)"- A Holistic approach that integrates different farming enterprises and practices that promote diversification, sustainability, and the holistic well-being of farmers and the environment. IFS offer a solution by bringing together various components such as cultivation of crops, rearing of livestock, agroforestry, other allied activities (*i.e.,* fisheries), and utilization of other agricultural resources within a single farming system. In an Integrated Farming System, different components are interdependent and interact synergistically, creating a balanced ecosystem. This integrated approach not only ensures food and nutritional security but also promotes sustainable and resilient farming systems. It emphasizes the efficient utilization of resources, cost reduction, and income diversification.This holistic approach encompasses several key aspects:

A. **Resource Optimization**: IFS optimizes resource utilization and improves overall farm productivity. By integrating different components such as crops, livestock, or

aquaculture, farmers can make efficient use of land, water, nutrients, and energy. This leads to higher yields, cost savings, and improved efficiency in agricultural production. By integrating different components, farmers can maximize resource efficiency and minimize wastage. For example, livestock can utilize crop residues or agricultural by-products as feed, while their manure can be used as organic fertilizer for crops. This resource optimization enhances productivity and reduces input costs.

B. **Income Diversification and Risk Management**: IFS provides farmers with multiple sources of income by combining different agricultural activities. By integrating crops, livestock, aquaculture, or agroforestry, farmers can generate revenue from various products and markets. Income diversification reduces dependence on a single commodity, mitigate risks associated with market fluctuations, climate variability, or pest outbreaks and enhances the economic stability of farming households.
C. **Synergistic Interactions**: The integration of different components in IFS creates synergistic interactions. For example, livestock can contribute to nutrient cycling by grazing on cover crops or agricultural residues, which helps improve soil fertility. Agroforestry systems can provide shade and windbreaks for crops, while trees contribute to carbon sequestration and biodiversity conservation. These synergies enhance overall farm productivity, sustainability, and ecological balance.
D. **Environmental Conservation and Biodiversity:** IFS contributes to environmental conservation and biodiversity preservation. By integrating trees, hedgerows, or agroforestry practices, IFS enhances habitat diversity, provides shelter for beneficial insects and birds, and promotes natural pest control. Additionally, IFS reduces soil erosion, enhances water quality, and contribute to climate change mitigation and adaptation by sequestering carbon and enhancing resilience to extreme weather events.
E. **Market Opportunities and Value Addition:** IFS offers opportunities for value addition and market diversification. Integration of livestock, fish, or horticultural crops with conventional farming allows farmers to tap into different market segments, catering to diverse consumer demands. Value-added products such as organic produce, agroforestry-based timber or medicinal plants, and niche market products can f *etc*h higher prices, increasing farm profitability.
F. **Social and Economic Benefits**: IFS has social and economic benefits for farmers and rural communities. It creates opportunities for employment, especially in activities like livestock rearing, aquaculture, or value-added processing. IFS practices often involve knowledge sharing, cooperative farming, and community-based initiatives, fostering social cohesion and participatory development. Moreover, the economic benefits from IFS, such as income diversification and improved profitability, contribute to rural livelihoods and overall agricultural development.
G. **Policy Support and Institutional Integration**: Governments and institutions play a crucial role in promoting IFS through supportive policies, financial incentives, technical assistance, and research collaboration. Effective policies and institutional integration facilitate the adoption and scaling up of IFS practices. They provide farmers with the necessary resources, knowledge, and market linkages to implement IFS successfully.

By considering the interrelationships between different components and practices, IFS provides a comprehensive and sustainable approach to agricultural economics. It recognizes the complexity of agricultural systems and seeks to optimize resource utilization, diversify income streams, conserve the environment, and improve the socio-economic well-being of farmers and rural communities.

11.3 Objectives of Integrated Farming System:

- Maintaining a steady and consistent income year-round is a primary goal.
- Assuring agro-ecological equilibrium through the restoration or improvement of system productivity
- Adoption of natural cropping system management and reduce intensity of insect-pests, diseases severity and weed
- Reduction in the use of chemical-based inputs in order to provide society with healthy food and a clean environment.
- Producing Organic foods which more are demanding in present time by adopting Integrated Farming System

Factors determining implementation of Integrated Farming System

- Soil and climate
- Availability of the resources, land labor and capital *etc.*
- Present level of resources being used
- Economic aspects of implementing integrated farming system
- Resource management skill of farmer

11.4 Components of Integrated Farming System:

The components of integrated farming system can be divided into four major categories:

Sr. No.	Category	Items
A	Agri-Horti Crops	Cereal crops, pulse crop, oilseed crops, fruits and vegetables, spices, medicinal and plantation crops, flowers, fibre crops, forage crops, other commercial crops *etc*
B	Animal Husbandary	Cattle, buffalo,goat, sheep, pig, chicken *etc*
C	Aquaculture/Fishery	Fish production
D	Other categories	Food processing, Apiculture, Sericulture, Vermicompost production, mushroom cultivation, , biogas production *etc*

*Certainly, an integrated farming system can be created by combining various components such as plants (A), animals (B), aquaculture (C), and other sustainable practices (D).

By exploring combinations like A+B, A+C, B+C, A+D and more complex combinations (like B+D, C+D, A+B+C, A+B+D, A+C+D, B+C+D A+B+C+D), a comprehensive and efficient farming approach can be established to enhance productivity and sustainability.

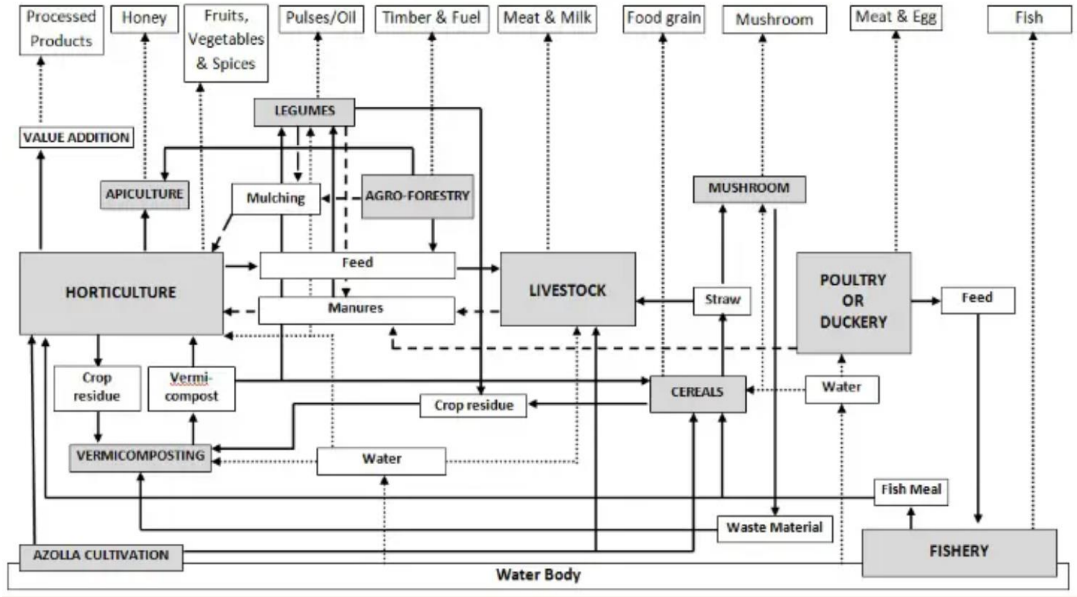

Figure 11.1: Conceptual framework of IFS by integrating various components

(Source: Roy *et al.*, 2014)

Integrated Farming Systems based on different enterprises.

The potential of various IFS in enhancing economic returns and sustainability through diversified enterprise integration.

Table 11.1: Types of Integrated Farming Systems based on different enterprises

Sr. No.	Type of IFS
1	Crop-livestockfarming system (CLFS)
2	Crop-livestock-fish farming system (CLFFS)
3	Crop-livestock-poultry-fish farming system (CLPFFS)
4	Crop-poultry-fish-mushroom farming system(CPFMFS)
5	Crop-fish – poultry farming system(CFPFS)
6	Crop-livestock-fish-vermicomposting farming system (CLFVFS)
7	Crop-livestock-forestry farming system(CLFFS)
8	Agri-silvi-horticulture system (ASHS)

(Source: Integrated farming system: Need, methods and components (agrotexglobal.com))

11.5 Advantages of Integrated Farming Systems (IFS):

- **Productivity:** IFS enhances crop and allied enterprises, leading to better space utilization and increased economic productivity over time. Soil fertility and structure improve through the use of cover crops and organic compost. Crop rotation reduces issues like weeds, pests, and diseases, revitalizing system productivity.
- **Profitability:** IFS reduces operational costs by utilizing waste materials from one enterprise as inputs for another, improving the benefit-to-cost ratio.
- **Sustainability:** By incorporating by-products from different components, IFS sustains soil fertility and production potential over extended periods. Ecosystem sustainability is promoted by avoiding deforestation.
- **Employment Generation:** Combining agriculture and livestock enterprises creates higher labor demand and more employment opportunities.
- **Agro-industries:** IFS's high agricultural output fosters the growth of agro-industries and agricultural businesses.
- **Input Efficiency:** Dependency on external inputs like fertilizers and agrochemicals decreases, enhancing input efficiency.
- **Year-round Income:** Multiple enterprises within IFS ensure a steady income throughout the year, positively impacting farmers' quality of life.
- **Diverse Food Production:**IFS enables diversified product output, ensuring the availability of various sources of nutrition and achieving food security.
- **Environmental Safety:** IFS minimizes pollution and maintains agroecological balance by effectively recycling waste materials through appropriate integration.
- **Resource Recycling:** Crop residues, livestock waste, and unused resources are efficiently recycled in IFS.
- **Adoption of Technology:** Increased profits from IFS enable farmers to afford and implement new technologies.
- **Energy Savings:** IFS reduces reliance on fossil fuels by providing alternative energy sources as byproducts, such as biogas.
- **Fodder, Fuel and Timber Production:**Perennial legume fodder trees grown on farm boundaries fix nitrogen and provide quality animal fodder. IFS produces fuel and industrial wood, curbing deforestation and aiding ecosystem preservation.
- **Water Management:**IFS can include techniques like agroforestry and contour farming that help in better water management and soil erosion control.
- **Biodiversity Enhancement**: The diverse components of IFS create a more varied habitat, promoting biodiversity and supporting beneficial insects and wildlife.
- **Risk Reduction**: With multiple enterprises, farmers are less vulnerable to market fluctuations or crop failures, reducing overall risk.
- **Climate Resilience**: The variety of enterprises in IFS can contribute to climate resilience, as different components may respond differently to changing climate conditions.
- **Soil Health Improvement**: The organic practices in IFS, such as composting and cover cropping, contribute to improved soil health and structure.
- **Reduced Chemical Dependency**: By minimizing the use of agrochemicals, IFS reduces chemical dependency, benefiting both the environment and human health.

- **Resource Optimization**: IFS optimizes the use of available resources, making the most out of land, water, and other inputs.

Overall, this holistic approach of Integrated farming contributes to a more balanced, efficient, and interconnected agricultural system.

Comparison between Integrated Farming System (IFS) and Conventional Farming System (CFS):

Conventional farming system (CFS) refers to the traditional approach of farming where individual components, such as crops or livestock, are managed separately without much integration. Comparative Analysis of IFS and CFS is given in Table 11.2 with special reference to agricultural economics.

Table 11.2: Comparative Analysis of Integrated Farming System (IFS) and Conventional Farming System (CFS) in Agricultural Economics:

Factors	Integrated Farming System (IFS)	Conventional Farming System (CFS)
Cost	Initial setup costs may be higher due to the integration of multiple components such as crops, livestock, fish, *etc.*	Initial setup costs are relatively lower as it focuses on single-component farming.
Return	Diversification of income sources can potentially lead to higher returns.	Returns may vary depending on the market conditions and the success of the single-component farming.
Resourceuse Efficiency	Efficient use of resources through synergistic interactions among different components. For example, animal waste can be used as organic fertilizer for crops.	Resource utilization may not be as efficient due to limited interactions and dependence on external inputs.
Employment Generation	Integrated systems can provide opportunities for additional employment, such as animal husbandry, aquaculture, and other value-added activities.	Limited employment opportunities as it primarily focuses on single-component farming.
Risk Management	Diversification of income sources helps in spreading risks associated with market fluctuations or climatic events.	Higher vulnerability to market fluctuations and climate-related risks due to reliance on a single component.
Overall Sustainability	IFS promotes sustainable agriculture by maximizing resource efficiency, enhancing biodiversity, and improving resilience.	CFS may have limitations in terms of long-term sustainability and environmental impacts.

11.6 Economics/ research findings on Integrated Farming System (IFS):

Cost and Returns of IFS:

- Gill *et al.* (2009) studied on the integrated farming system and agriculture sustainability in Punjab in a farmer participatory mode and revealed that incorporating dairy, fishery, and piggery components into the rice-wheat system significantly increased net returns. The rice-wheat + dairy system yielded net returns of Rs.75200 per ha, while rice-wheat + dairy + fishery further supplemented the returns to Rs. 80290 per ha. Strengthening the system with piggery raised the net advantage to Rs. 86530 per ha. Additionally, the dairy enterprise contributed Rs.10,761 per ha, and poultry enhanced the margin to Rs. 11546 per ha. These findings emphasize the economic benefits of integrating diverse components into the traditional farming system, highlighting their potential for enhancing sustainability and income generation.
- Tripathi *et al.* (2010) studied on the integration of seven different enterprises, including crop, fish, goat, vermicompost, fruit production, spice production, and agroforestry. The findings revealed that the integrated system yielded an annual net return of Rs. 230329 with a benefit-to-cost ratio of 1.07:1. The most significant contributor to the net return was fish production, accounting for 68.53 per cent, followed by vermicomposting (9.90%), spices (8.46%), and animal production (7.40%). Among the enterprises, spice production had the highest benefit-to-cost ratio of 1.83:1, second only to fishery (2.25:1), and followed by vermicomposting (1.45:1). These results indicate the economic viability and profitability of integrating multiple enterprises in the agricultural system.
- Dorge *et al.* (2015) in their study of comparative economics to assess the sustainability of different farming systems in Ahmednagar and Solapur districts in India. Three farming systems were analyzed: (I) Crops only, (II) Crops + Livestock, and (III) Crops + Livestock + Horticulture crops. The findings revealed that FS-II (Crops + Livestock) generated double the income compared to FS-I (Crops only). The majority of income in both FS-I and FS-II came from crop production. Farm expenditure accounted for over 70% of total expenditure in all farming systems. FS-II and FS-III (Crops + Livestock + Horticulture crops) demonstrated sustainable farm incomes in both regions, while FS-I fell short. However, the inclusion of income from other sources made FS-I sustainable. This suggests that additional income streams outside farming were crucial for sustainability in FS-I.
- Rashtrarakshak *et al.* (2016) revealed that the returns per rupee of investment was slightly higher (1.58) for IFS farmers as compared to Non-IFS farmers, indicating investment of one rupee will generate returns of Rs. 1.58 under IFS and Rs. 1.37 under Non-IFS situation in Hyderabad Karnataka region These findings indicate the potential economic benefits of adopting integrated farming systems in terms of higher returns on investment in the Hyderabad Karnataka region.
- Vinodakumar *et al.* (2017) that the Integrated Farming System (IFS) model consisting of crops, goats, cows, poultry, and fishery yielded significantly higher annual net returns of Rs. 189069 per hectare compared to the conventional cotton monoculture, which only yielded Rs. 74552 per hectare – a figure 2.5 times lower than the IFS system. This notable difference in returns could be attributed to the integration of livestock components within the IFS model, which introduced a consistent income stream for the

farmers.The inclusion of livestock components in the IFS model played a crucial role in generating regular income for farmers.

- Mitra *et al.* (2018) observed that IFS model comprising fish culture, duck farming, azolla, and pulses demonstrated a remarkable threefold increase in income (Rs 138,673 per year) compared to conventional farming (Rs 45,320 per year) in a sustainable manner. The B:C ratio for IFS model found to be higher (2.28) as compared to conventional farming model (1.14). These findings highlight the economic advantages of adopting integrated farming systems, showcasing their potential for higher profitability and financial sustainability compared to conventional single-crop systems.

Resource use Efficiency of Major Farming Systems:

- Rashtrarakshak *et al.* (2016) studied on the resource use efficiency of redgram cultivation in the North Eastern Region of Karnataka under Integrated Farming Systems (IFS) compared to conventional crop cultivation. The findings indicated that IFS farmers achieved slightly higher returns per rupee of investment (1.58) as compared to Non-IFS farmers (1.37). The direct estimates of production function were used to test the efficiency of different production inputs under IFS and Non-IFS farming system. They observed that the resources used efficiently in IFS compared to Non-IFS. Hence, these findings revealed that integrated farming systems demonstrated efficient utilization of resources, suggesting potential for increased productivity and profitability.
- According to Singh *et al.* (2018), their study on integrated farming systems in Banswara district of Rajasthan revealed variations in resource use efficiency. They found that inputs such as machine labour and human labour were overutilized across different farming systems. However, in rainfed areas, seeds, fertilizers, farmyard manure (FYM), and plant protection measures were underutilized. In contrast, in irrigated areas, labour, feed, and concentrates were found to be underutilized in livestock activities. These findings highlight the need for optimizing resource allocation and management practices to enhance the efficiency of integrated farming systems in Banswara district.

Employment Generation:

- Kumar *et al.* (2012) found that the integration of multiple components, such as crop + fish + duck + goat, resulted in the generation of 752 man-days followed by the integration of crop + fish + cattle, yielding 722 man-days, which was much more than conventional farming (rice - wheat). These findings highlight the significant potential of integrated farming systems in generating employment opportunities and enhancing productivity compared to conventional farming methods.
- Sharma *et al.* (2017) studied on two IFS models, One 3.5 acre model for rainfed and the other 1.5 acre model for irrigated systems. The models generated employment of 659 and 1033 mandays respectively. This substantial difference in generating employment between the two models can be attributed intensive cultivation, animal husbandry and diversification of enterprises in irrigated system as compared with rainfed model. As a result, the IFS encourages greater engagement of family labor in agricultural operations, increasing employment opportunities in rural regions. These findings highlight that IFS models, particularly in irrigated systems, can contribute

significantly to employment generation in rural areas, providing opportunities for increased engagement of family labor and contributing to rural livelihoods.

- Goverdhan *et al.*, (2018), conducted an IFS experiment in Telangana state which integrating crop + dairy + sheep + rabbit + hen + quails generated a substantial employment opportunity of 750 man-days. In comparison, conventional rice – maize cropping system, commonly practiced within the region, generated 225 man-days of employment for the same 1-hectare area. These findings highlight the significant potential of integrated farming systems in creating more employment opportunities and contributing to rural livelihoods.

11.7 Conclusion:

The concept of Integrated Farming Systems (IFS) offers a holistic and sustainable approach to agriculture, addressing the challenges faced by conventional farming systems (CFS). The integration of diverse enterprises, such as crops, livestock, fishery, poultry, and agroforestry, in IFS enhances farm productivity, resource efficiency, and income generation. Research findings have consistently highlighted the economic advantages of IFS, including higher net returns, benefit-cost ratios, and employment opportunities compared to conventional farming systems (CFS). Additionally, IFS promotes resource optimization, waste recycling, and risk management, contributing to long-term sustainability and resilience. These findings emphasize the potential of IFS in improving agricultural economics by diversifying income sources, reducing costs, and creating a balanced ecosystem. Implementing IFS can play a significant role in enhancing the livelihoods of farmers, ensuring food and nutritional security, and promoting sustainable and resilient farming systems.

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12. Strategies for Doubling Farmers' Income in the Face of Climate Challenges

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Abstract:

The strategy to double farmers' income in context of climate challenges necessitates a collaborative approach involving government and farmers. Government actions encompass sustainable policies, enhanced productivity, and improved market access. Concurrently, farmers must embrace modern practices, crop diversity, and supplementary income sources.

Climate-smart techniques like conservation agriculture and agroforestry enhance productivity and resilience. Crop diversification, notably with climate-resilient options like millets, mitigates risks and captures markets. Rural infrastructure, tech advancements, and financial support enhance productivity and decision-making. A unified effort involving government, research, private sector, and farmers is vital. With millets gaining prominence and initiatives like the International Year of Millets 2023, the path to doubling farmers' income and climate-resilient farming appears optimistic.

Keywords:

DFI, climate change, sustainable agriculture, climate smart practices, government schemes

12.1 Introduction:

Doubling Farmer's Income- What it is?

India is known as an "Agrarian Economy" as Agriculture plays a vital role in the country's economy by providing livelihoods to the millions of the people of the country. However, the agrarian-farming community of India has faced many challenges *viz.*, low productivity, insufficient access to resources, and poor market linkages *etc* while growing crops and marketing their farm produce which ultimately reduces their net income and affects their living standard.

The government of India has set a goal of doubling farmers' income by 2022 while considering the problems faced by the farmers. Towards achieving the objective of doubling the farmers' income the government had established an Inter-Ministerial committee in April, 2016. The committee has examined the problems faced by farmers and issues related to DFI goal and finally recommended various strategies to the government in its final report of 14 volumes in September, 2018. The report containing strategy for doubling farmers' income by implementing various policies, programs and reforms.

Why Double Farmers' Income?

- The initiative to double farmers' income is essential for various reasons. Firstly, the farming community in India is the largest employer, which gives employment to around 50% of the country's population. However, the majority of farmers are small and marginal (less than 1 to 2 hectares of land) and they have very limited access to farm resources, technology, and market linkage facilities, leading to low productivity and low income. Therefore, doubling farmers' income is crucial to uplift the living standard of these farmers and ensure their socio-economic development.
- Secondly, the agriculture sector is the backbone of the country which shares about 18 % of India's Gross Domestic Product (GDP). However, the growth rate of the primary-agricultural sector has been declining over the past few years had negative impacts on the overall economy. Therefore, increasing farmers' income is the key to accelerating the growth and boost the Indian economy.
- Thirdly, the initiative to double farmers' income is in line with the United Nations' SDGs -Sustainable Development Goals, *viz.*, SDG 1 and SDG 2, aim to eradicate poverty (No poverty), ensure food security (Zero Hunger) and sustainable agriculture. By increasing farmers' income, the initiative contributes to the achievement of these goals.

The Inter- Ministerial Committee identified seven sources of income growth to meet the objective of doubling farmer's income:

a. By increasing crop productivity
b. By increasing livestock productivity
c. Resource use efficiency – by reducing in cost of production
d. By increasing cropping intensity
e. Diversification towards high value agriculture
f. Remunerative prices on farm produces
g. By Transferring surplus manpower (agri-labour) from farm to non-farm occupations

(Source: Ministry of Agriculture & Farmers Welfare, GoI. Retrived from: Press Information Bureau (pib.gov.in) &

https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1886630)

A. Increase in crop productivity:

Improving crop productivity is an important strategy for increasing farmers' income. The government has emphasized on modern improved agriculture practices such as improved seed varieties, and efficient irrigation systems as a priority.

These include providing farmers with access to high-quality seeds, encouraging cultivation of hybrid and genetically modified crops, and precision farming technologies. Furthermore, the government has allocated funds for agricultural research and development with the goal of developing high-yield crop variations and disseminating best practices via agricultural extension services.

B. Increase in livestock productivity:

Livestock farming is an integral part of agriculture and can significantly contribute to farmers' income. The government has implemented various initiatives to enhance livestock productivity, such as providing veterinary services, improving breed quality, promoting scientific feeding practices, and developing better animal healthcare infrastructure. Additionally, efforts have been made to facilitate the availability of improved breeds and promote the adoption of modern practices like artificial insemination, breed management, and disease control measures.

C. Resource use efficiency – by reducing cost of production.

Improving resource use efficiency is crucial to reducing the cost of production and increasing farmers' income. The government has focused on promoting sustainable agriculture practices, such as efficient use of water, fertilizers, and pesticides. This includes promoting precision agriculture techniques, drip irrigation systems, integrated nutrient management, and integrated pest management. By adopting these practices, farmers can optimize input usage, reduce costs, and improve productivity, thereby increasing their income.

D. Increase in cropping intensity:

Increasing cropping intensity refers to cultivating multiple crops on the same land in a year. The government has encouraged farmers to adopt multiple cropping patterns, such as intercropping, mixed cropping, and relay cropping.

This helps maximize land utilization, increase agricultural output, and generate additional income for farmers. Furthermore, the government has supported the development of infrastructure like irrigation facilities and rural roads to enable farmers to practice multiple cropping effectively.

E. Diversification to high-value agriculture:

Diversifying into high-value agriculture involves shifting from traditional, low-value crops to high-value crops and horticulture. The government has promoted the cultivation of cash crops, fruits, vegetables, spices, and medicinal plants. These crops generally command higher prices in the market, leading to increased income for farmers. The government has provided financial assistance, technical support, and market linkages to encourage farmers to diversify into high-value crops.

F. Remunerative prices on farm produces:

Ensuring farmers receive remunerative prices for their produce is crucial for increasing their income. The government has implemented various measures to support farmers in this regard. These include minimum support price (MSP) programs, where the government sets a minimum price for certain crops to protect farmers from market price fluctuations.

The government has also established agricultural produce marketing infrastructure, such as mandis (marketplaces), to facilitate fair price discovery and reduce farmers' dependency on middlemen. Additionally, the promotion of farmer producer organizations (FPOs) and direct marketing initiatives has helped farmers access better prices for their produce.

G. Transferring of surplus manpower (agri-labour) from farm to non-farm occupations:

The government recognizes the need to create employment opportunities outside the agricultural sector to increase farmers' income. Policies have been formulated to promote rural entrepreneurship, skill development, and the development of rural industries.

Government scheme such as Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) provide rural employment opportunities, enabling surplus manpower from the agricultural sector to engage in non-agricultural occupations.

This shift helps diversify income sources, reduce dependence on agriculture, and increase overall income levels. By focusing on these seven sources of income growth, the government aims to address the various aspects of agricultural development and improve farmers' livelihoods.

These strategies collectively work towards the objective of doubling farmers' income, ensuring sustainable and inclusive growth in the agriculture sector.

Table 12.1: Some of Government schemes which helps in enhancing Farmers' Income

Sr. No.	Government Initiative	Objective
1.	**Increase in crop productivity:**	
a)	**Soil Health Card Scheme (SHC, 2015):**	The Soil Health Card scheme provides farmers with personalized soil nutrient status and recommendations for appropriate fertilizer use. This helps optimize nutrient management and improve crop productivity.
b)	**Pradhan Mantri Krishi Sinchayee Yojana (PMKSY, 2015):**	This scheme implemented to improve crop productivity and water management by expanding irrigation coverage, enhance water-use efficiency, and promote precision irrigation technologies.
c)	**National Mission on Sustainable Agriculture (NMSA, 2014-15):**	This scheme emphasizes on climate-resilient agriculture by promoting integrated farming system, the use of organic inputs and conservation agriculture.
2.	**Livestock productivity enhancement**	
a)	**Rashtriya Gokul Mission (2014)**	This initiative focuses on conserving and developing indigenous cattle breeds to enhance livestock productivity, genetic improvement, and breed development.

Sr. No.	Government Initiative	Objective
b)	**National Livestock Mission (NLM, 2014):**	NLM supports various interventions such as breed improvement, animal nutrition, and disease control to increase livestock productivity and enhance farmers' income.
3.	**Resource use efficiency – by reducing cost of production:**	
a)	**Pradhan Mantri Fasal Bima Yojana (PMFBY, 2016):**	This crop insurance scheme provides financial assistance to farmers in the situation of crop loss or damage, increasing their income security by reducing their financial risks
b)	**Paramparagat Krishi Vikas Yojana (PKVY, 2015):**	PKVY promotes organic farming practices, minimizing the use of chemical inputs and reducing production costs.
4	**Increase in cropping intensity:**	
a)	**Pradhan Mantri Krishi Sinchayee Yojana (PMKSY, 2015-16):**	PMKSY aims to promote the adoption of micro-irrigation systems, which enable farmers to practice multiple cropping and increase cropping intensity on the same land.
5.	**Diversification to high-value agriculture:**	
a)	**National Horticulture Mission (NHM, 2005-06):**	NHM promotes the cultivation of high-value horticultural crops, providing farmers with better market opportunities and higher returns on their produce. b. National Food Processing Policy: This policy encourages investment in food processing infrastructure, enabling value addition and reducing post-harvest losses, thereby increasing farmers' income.
6.	**Remunerative prices on farmers' produce:**	
a)	**Minimum Support Price (MSP):**	The government sets minimum prices for various crops to ensure farmers receive fair and remunerative prices for their produce.
b)	**Electronic National Agriculture Market (e-NAM, 2016):**	e-NAM is an online trading platform that facilitates transparent price discovery and efficient marketing of agricultural commodities, ensuring better price realization for farmers.
7.	**Shift of surplus manpower (agri-labour) from farm to non-farm occupations:**	
a)	**Pradhan Mantri Kaushal Vikas Yojana (PMKVY, 2015):**	PMKVY provides skill development training to rural youth, equipping them with industry-relevant skills for employment in non-farm sectors.
b)	**National Rural Livelihood Mission (NRLM, 2010):**	NRLM aims to create sustainable livelihood opportunities for rural households, including skill development and entrepreneurship promotion.

The basis of the doubling farmers' income approach depends on the given fundamental principles:

a. Increasing agricultural output through obtaining higher levels of productivity
b. reducing production costs
c. Obtaining remunerative prices for agricultural output
d. Effective risk-mitigation.
e. Adopting long-term/ sustainable technological solutions

According to these principles, the government implemented several schemes, policies, reforms and developmental programmes to increase income of the farmers either directly or indirectly.

Table 12.2: Governtment initiative towards the Doubling of Farmers' Income by 2022

Sr. No.	Key Area	Details
1	**Unprecedented enhancement in budget allocation**	Increased financial resources allocated to the Ministry of Agriculture and FW (including DARE, DAH, and F) budget allocation.
2	**Pradhan Mantri Kisan Samman Nidhi Yojana (PM-KISAN, 2019)**	This scheme provides income support to eligible farmers in 3 equal installments of Rs. 2000 per year (Total amount: 6000Rs./year)
3	**Pradhan Mantri Fasal Bima Yojana (PMFBY, 2016)**	Crop insurance scheme with increased coverage and reduced premium rates.
4	**Institutional credit for agriculture sector**	Credit availability increased through Kisan Credit Cards (KCC) and target for institutional credit. Concessional credit extended through KCC (at 4% interest rate) to Animal Husbandry and Fisheries farmers.
5	**Fixing of Minimum Support Price (MSP)**	Increased MSP for all mandated crops to ensure a return of at least 50% over cost of production.
6	**Promotion of organic farming**	This schemes introduced to promote organic farming and sustainable natural farming systems.
7	**Per Drop More Crop scheme (PDMC, 2015-16)**	This effort aims to improve water use and production by encouraging the use of micro irrigation technologies such as drip and sprinkler irrigation systems.
8	**Micro Irrigation Fund (MIF, 2018)**	Fund created with NABARD to support Micro Irrigation projects.

Sr. No.	Key Area	Details
9	**Promotion of Farmer Producer Organisations (FPOs)**	The Hon'ble Prime Minister inaugurated a New Central Sector Scheme on February 29, 2020, which aims to establish and develop 10,000 new Farmer Producer Organizations (FPOs) with budget allocation of Rs 6865 crore till the year of 2027-28.
10	**National Beekeeping and Honey Mission (NBHM, 2020)**	Mission aims to increase crop productivity through pollination and honey production as part of Atma Nirbhar Bharat Abhiyan.
11	**Agricultural Mechanization**	It concerned with promotion of farm mechanization through various schemes and subsidies. Subsidies provided for machinery like tractors, power tillers, etc.
12	**Soil Health Card Scheme (SHC, 2015)**	This scheme implemented to provide soil health cards to farmers for better nutrient management and improved productivity.
13	**Electronic National Agriculture Market (e-NAM, 2016)**	The e-NAM program seeks to create a single national market plateform for agricultural commodities by connecting the APMCs of our country (Agricultural Produce Market Committees).
14	**National Mission for Edible Oils – Oil Palm (NMEO, 2021-22)**	This mission seeks to establish workable prices for fresh fruit bunches (FFBs), ensuring farmers' connection to a guaranteed purchasing system by the industry through a more straightforward pricing mechanism. If the industry's payment falls below the sustainable rate, the Central Government will provide compensation to farmers to bridge the gap in viability payments until October 2037.
15	**Agri Infrastructure Fund (AIF, 2020)**	This initiative focuses on financing agricultural infrastructure projects. Since its inception, the AIF has sanctioned a total of Rs. 13681 crore for more than agricultural infrastructure 18133 projects.
16	**Improvement in farm produce logistics (2020)**	The Ministry of Railways has introduced this concept of the "Kisan Rail," a railway service designed specifically for transporting perishable farm products farm commodities.
17	**Mission for Integrated Development in Horticulture-Cluster Development Programme (MIDH, 2014)**	The Cluster Development Programme of the MIDH scheme initiated with the aim to leverage geographical specialization of horticulture clusters and to promote integrated and market-led development of pre-production, production, post-harvest, logistics, branding, and marketing activities.

Sr. No.	Key Area	Details
18	**Creation of a Start-up Eco system**	This emphasis on developing a startup ecosystems in agri and allied sectors.
19	**Export of Agri and Allied Agri- Commodities**	Emphatic growth in the export of agri and allied commodities.

(Source: Ministry of Agriculture & Farmers Welfare, GoI. Retrived from: Press Information Bureau (pib.gov.in) &

https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1886630)

(Situation Assessment Survey, 2014 and Situation Assessment Survey, 2021)

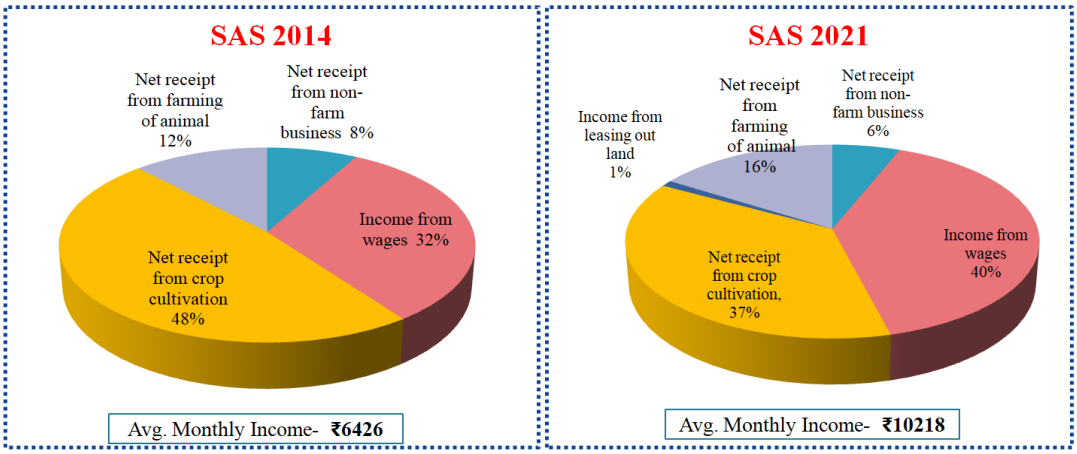

Figure 12.1: Composition of Average Monthly Income of Agricultural Households

(Source: Economic Survey 2021-22 (Based on data of SAS, 2014 and SAS, 2021))

In the above context, according to Economic Survey 2021-22, Based on data of Situation Assessment Survey- SAS, 2014 and SAS, 2021 conducted by National Statistical Office-NSO, estimated average monthly income per agricultural household were Rs.6426 and Rs.10,218 respectively. '

The average monthly nominal income has increased substantially over the seven-year period, indicating improved economic conditions. The notable changes in income sources include a decrease in the contribution of crop production and non-farm business activities.

Conversely, livestock production and wages have shown increased contributions to the average monthly income.

What is Climatic change?

Climate change is a long term abutment weather condition specifically related with temperature and rainfall or precipitation. This may be due to the result of natural calamities such as volcanic eruptions or anthropogenic activities like greenhouse gas emission, forest fires, and land-use changes *etc.* (Reddy, 2015). Climate change is one of the most critical global problems of our present era. Recent events have emphatically demonstrated our growing vulnerability to climate change. These implications range from damaging agriculture and increasing food security issues to sea level rise and the fast degradation of coastal districts. Furthermore, we are experiencing increased natural catastrophe intensity, losses of species, and the spread of vector-borne diseases.

Impact of climate change on Agriculture sector

- Soil: becomes drier and hence reduced productivity
- Irrigation: Increased demand with limited supply
- Pests: Increased pest ranges
- Production: Reduced production per unit area
- Livestock: Severity of diseases increased and issues of heat stress
- Fishery: Impact on abundance and reproduction of fishes
- Economic impact: Reduced agricultural output and therefore income of farmers
- According to IPCC (Intergovernmental Panel on Climate Change) report agricultural productivity in India was estimated to decreased by 2.5 to 10 per cent in 2020 to 5 to 30 per cent by 2050.

(Source: Report of the Committee on Doubling Farmers' Income Volume V "Sustainability Concerns in Agriculture" November 2017)

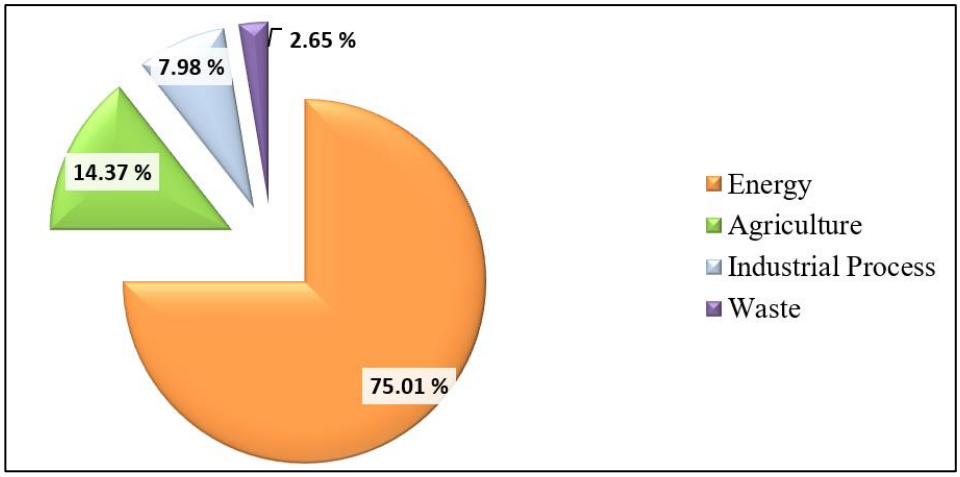

Figure 12.2: Sector-wise contribution (%) in GHG emission in India

(Source: Ministry of Environment, Forest and Climate Change, GoI 2021(MoEFCC); Retrived from: https://cckpindia.nic.in/)

12.2 Impact of Climate Change on Indian Agriculture:

The Indian government acknowledges climate change's impact on farming and farmers. Various network centers around the country conducted extensive investigations utilizing crop simulation models to investigate how future climates (2050 and 2080) would affect crops. Climate change has been demonstrated to reduce agricultural yields and the nutritional content of produce. Droughts, for example, have a detrimental influence on food and nutrient intake, severely affecting farmers. In the absence of adoption of adaptation measures for climate change projection in reduction in yield of some crop given below:

Table 12.3: The projected reduction in yield of crops by 2050 and 2080

Crop	Projected reduction in yield of crops (%)	
	2050	2080
Rainfed Rice	20.00	47.00
Irrigated Rice	3.50	5.00
Wheat	19.30	40.00
Kharif Maize	18.00	23 .00

(Source: Ministry of Agriculture and Farmers Welfare, Retrived from: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1909206)

12.3 Impact of Climate Change on Goal of Doubling Farmers' Income:

Climate change significantly affects the doubling farmers' income goal in India it is mentioned by various research and reports of the government. How climate change affects farmers' income.

A. **Erratic rainfall patterns**: The Indian agricultural sector heavily relies on monsoon rains for crop production. However, climate change has led to irregular and unpredictable rainfall patterns. According to the Indian Network on Climate Change Assessment (INCCA), studies suggest that the frequency and intensity of extreme rainfall events have increased in many parts of the country. This erratic rainfall adversely affects crop yields, leading to reduced income for farmers.
B. **Rising temperatures and heat stress**: Climate change causing rise in average temperatures across India. The Intergovernmental Panel on Climate Change (IPCC) reports that heatwaves are becoming more frequent and intense. Higher temperatures and heat stress negatively impact crop growth and productivity, leading to lower yields and reduced income for farmers.
C. **Water scarcity and changing hydrological patterns**: Climate change affects water availability and hydrological patterns. The Indian Agricultural Research Institute (IARI) highlights that changing precipitation patterns and increased evapotranspiration due to higher temperatures contribute to water scarcity. This scarcity hampers irrigation practices, affecting crop growth and yield, thereby impacting farmers' income.

D. **Increased risk of pests and diseases**: Climate change creates favorable conditions for the proliferation of pests and diseases in agricultural ecosystems. The Indian Council of Agricultural Research (ICAR) emphasizes that rising temperatures and altered rainfall patterns affect pest life cycles and the spread of diseases, leading to crop losses and reduced income for farmers.
E. **Crop damage from extreme weather events**: Climate change increases the frequency and intensity of extreme weather events, such as cyclones, storms, and droughts. The Ministry of Earth Sciences, Government of India, states that these events can cause significant damage to crops, resulting in yield losses and financial hardships for farmers.
F. **Impacts on livestock and dairy farming**: Climate change affects livestock productivity and dairy farming. The National Action Plan on Climate Change (NAPCC) highlights that heat stress reduces milk production in dairy animals, leading to income losses for dairy farmers. Additionally, changing rainfall patterns and availability of fodder impact livestock health and productivity.
G. **Vulnerability of smallholder farmers:** Small and marginal farmers, who constitute a major part of the farming community in India, are considered vulnerable with the impacts of climate change. According to NABARD (National Bank for Agriculture and Rural Development) reports, small farmers have limited resources to cope with climate change impacts. They often lack access to modern technologies, financial resources, and information on climate-resilient practices. This vulnerability puts their income at greater risk when faced with the challenges of climate change.
H. **Changes in cropping patterns**: Climate change affect favourable environmental condition required by different crops and hence, cropping patterns. The Indian Network on Climate Change Assessment (INCCA) highlights that shifting climate conditions may necessitate changes in the choice of crops and cropping seasons. Farmers may need to adopt new varieties, modify planting and harvesting schedules, and diversify their crops with changing climate situation, which can have implications for their income.
I. **Market fluctuations and price volatility**: Climate change can lead to market fluctuations and price volatility, affecting farmers' income. Extreme weather events and changing climatic conditions can disrupt agricultural production and supply chains, leading to fluctuations in commodity prices. This volatility can impact farmers' profitability and income stability, making it challenging for them to plan and invest in their farming operations.
J. **Increased costs of inputs and production**: Climate change impacts can also result in increased costs of agricultural inputs and production. For instance, water scarcity may necessitate the installation of irrigation systems, which can incur additional expenses for farmers. Similarly, the need for climate-resilient crop varieties, pest management practices, and infrastructure improvements can raise the overall production costs, potentially reducing farmers' income.

Overall, climate change affects farmers' income in India through multiple channels, including erratic rainfall patterns, rising temperatures, water scarcity, pest and disease risks, crop damage from extreme weather events, impacts on livestock and dairy farming, changes in cropping patterns, market fluctuations, and increased production costs. These factors pose significant challenges to farmers' livelihoods and highlight the urgent need for climate-resilient strategies, support systems, and policy interventions to mitigate the adverse effects and ensure sustainable income for farmers in the face of climate change.

12.4 Government Initiatives to Mitigate Climate Change:

A. National Action Plan on Climate Change (NAPCC):

- The National Action Plan on Climate Change (NAPCC) was launched by the Prime Minister on 30th June 2008.
- It is national strategy-plans to help the country to adapt to climate change and improve ecological sustainability, hence accelerating India towards the development phase.
- It focuses on maintaining a high growth rate which is needed for increasing living standards of India's vast population by reducing their vulnerability to the impacts of climate change.
- The core of the National Action Plan comprises eight National Missions. They focus on promoting of climate change understanding, adaptation and mitigation strategies, efficient use of energy and conservation of natural resources.

Table 12.4: Eight National Missions of NAPCC on climate change

Sr. No.	Government Initiatives to Mitigate Climate Change	Year of Launch	Aim/Objective
1	National Solar Mission	2010	To promote the development and use of solar energy in the country
2	National Mission for Enhanced Energy Efficiency	2010	To promote energy efficiency measures in various sectors
3	National Mission on Sustainable Habitat	2010	To promote sustainable practices in urban and rural habitats
4	National Mission for Sustaining the Himalayan Eco-system	2010	To conserve biodiversity, protect the Himalayan ecosystem, and promote sustainable development in the region
5	National Mission for Sustainable Agriculture	2010	To increase forest cover and enhance ecosystem services
6	National Water Mission	2011	To improve water use efficiency, water conservation, and management
7	National Mission for a Green India	2014	To increase forest cover and enhance ecosystem services
8	National Mission on Strategic Knowledge for Climate Change	2014	To support research, development, and innovation in climate change-related areas

It is important to note that while all the eight missions of the National Action Plan on Climate Change (NAPCC) have their significance, the NMSA stands out in terms of its direct focus on agriculture, farmers' income, and sustainable agricultural practices.

B. National Mission for Sustainable Agriculture (NMSA, 2010):

- The National Mission on Sustainable Agriculture (NMSA) initiated in 2010 by the Department of Agriculture and Farmers Welfare with the objective of making Indian agriculture more resilient to climate change and promote eco-friendly practices.
- Major focus of NMSA includes Integrated Farming System- Combining different farming activities for better results; Water use efficiency- using water efficiently in farming; Soil health- keeping soil fertile and healthy; Resource use efficiency-making the best use of available resources; Boost agricultural productivity, especially in rainfed regions by using integrated farming, managing water well, maintaining soil health, and utilizing resources effectively.

12.5 Objectives of NMSA:

- Integrated Farming Systems: Promoting location-specific farming systems to improve productivity, sustainability, income, and climate resilience.
- Resource Conservation: Taking steps to conserve natural resources, including soil and water, through smart practices.
- Soil Health Management: Using soil fertility maps and tests to apply nutrients effectively, reducing fertilizer waste.
- Efficient Water Use: Managing water resources efficiently in order to achieve objective of "more crops per drop" or with less water.
- Climate Change Capacity: Educating farmers and stakeholders about climate adaptation and mitigation.
- Adopting rainfed farming technologies through NICRA: Testing rainfed techniques to improve productivity, supported by resources from various schemes such as MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme) and IWMP (Integrated Watershed Management Programme).

National Mission on Sustainable Agriculture Initiatives:

A. Rainfed Area Development (RAD): Implemented since 2010

- Area-based approach for natural resource and farming system development.
- Integrates watershed and soil conservation efforts from various sources.
- Promotes diverse farming systems, including crops, horticulture, livestock, fishery, and forestry.
- Focus on soil health, resource conservation, and local agro-climatic suitability.

B. Sub-Mission on Agroforestry (SMAF): Launched in 2016-17:

- Encourages tree planting on farmland along with crops.
- Implemented in states with relaxed transit regulations for certain tree species.
- Aim- to increase farmer income, tree cover, and soil organic matter.

C. National Bambo Mission (NBM):

- Focuses on domestic cultivation of quality bamboo species.
- Addresses India's bamboo diversity and production challenges.
- Bamboo's versatile uses: construction, furniture, paper, textiles, energy, and more.
- Aims to revitalize rural economy, increase employment, and double farmers' income.

D. Soil Health Management (SHM): Implemented since 2010

- Promotes location-specific and crop-specific sustainable soil health practices.
- Includes residue management, organic farming, nutrient management, and erosion control.
- Addresses problem soils (acidic, alkaline, saline) through reclamation efforts.

E. Climate Change and Sustainable Agriculture (CCSAMMN): Implemented since 2010

- Pilots climate change adaptation/mitigation projects.
- Demonstrates climate-smart farming practices and integrated systems.
- Supports rainfed technology dissemination and convergence with flagship schemes.
- Aids climate change monitoring, knowledge sharing, and skill development.

These are the five components of the National Mission for Sustainable Agriculture (NMSA).

Each component aims to achieve specific objectives and implementation strategies for promoting sustainable agriculture, enhancing farmers' income, and ensuring climate resilience in the agricultural sector. (Source: National Mission for Sustainable Agriculture (NMSA) - Agriculture Notes (prepp.in))

The National Innovations on Climate Resilient Agriculture (NICRA) as a separate component integrates the objectives of the National Mission for Sustainable Agriculture (NMSA) ultimately helps to achieve goal of doubling farmers' income. While both NICRA and NMSA focus on sustainable agriculture and climate resilience, they have distinct goals and approaches.

National Innovations on Climate Resilient Agriculture (NICRA):

- The Indian Council of Agricultural Research (ICAR) introduced the National Innovations on Climate Resilient Agriculture (NICRA) in 2011.
- **Objective**: NICRA aims to enhance the resilience of Indian agriculture to climate change and climate variability in order to ensure food and livelihood security for farmers. The program focuses on developing and promoting climate-resilient technologies and management practices in the agricultural sector.
- Implementation of NICRA involves collaboration between various research institutes, state agricultural universities, Krishi Vigyan Kendras (KVKs), and other stakeholders.

The key implementing institutions under NICRA include:

- **ICAR -Indian Council of Agricultural Research :** ICAR as an apex institute leads and supports NICRA. It's in charge and guides the plan with its knowledge.
- **NARS Institutes -National Agricultural Research System:** These are research centers connected to ICAR and state universities. They create tough farming methods using climate knowledge.
- **SAUs (State Agricultural Universities) :** SAUs do vital work at the state level. They research, show how things work, train, and give advice about climate-friendly farming. They make strategies that fit each area's weather.
- **KVKs-Krishi Vigyan Kendras :** KVKs are farm centers made by ICAR. They spread knowledge and tech. They bring research to farmers. KVKs help farmers directly, especially in local areas.

The implementation of NICRA involves several components and activities aimed at developing and promoting climate-resilient agriculture. These include:

- **Research and Technology Development:** NICRA focuses on research and development of climate-resilient technologies, crop varieties, and management practices. This includes the identification and evaluation of climate-resilient crop varieties, conservation agriculture techniques, water management strategies, pest and disease management, and innovative farming systems.
- **On-Farm Demonstrations:** NICRA conducts on-farm demonstrations of climate-resilient agricultural practices to showcase the effectiveness and benefits of adopting these practices. Farmers are encouraged to participate in these demonstrations and learn from the experiences of successful adopters.
- **Capacity Building and Training**: NICRA conducts training sessions, workshops, and awareness campaigns to empower farmers, extension workers, and others with skills in climate-smart agriculture. These programs boost understanding and abilities for dealing with climate challenges and making positive changes in farming practices.
- **Knowledge Sharing and Dissemination:** NICRA promotes information and experience sharing among researchers, farmers, and policymakers. This includes the publication of research findings, technical bulletins, newsletters, and the development of web portals and mobile applications to disseminate information on climate-resilient agricultural practices.
- **Policy Support:** NICRA provides inputs and recommendations to policymakers for the development of climate-resilient agriculture policies and strategies. It aims to influence policy decisions that promote the adoption of climate-smart practices, incentivize climate-resilient agriculture, and support farmers in adapting to climate change.

Overall, NICRA works to close the gap between scientific research and on-the-ground implementation by creating and promoting climate-resilient agricultural technology and practices.

NICRA's joint activities with research institutes, universities, and extension organizations aim to improve Indian agriculture's adaptive ability to climate change and assure farmers' sustainable livelihoods.

There have been several other initiatives launched after 2011 to boost farmers' income by mitigating/reducing the impacts of climate change. Here are a few notable initiatives:

- **PMKSY-Pradhan Mantri Krishi Sinchayee Yojana (2015):** This scheme aims to improve the efficiency of water use in agriculture and enhance water security. It includes various components such as the Accelerated Irrigation Benefit Program (AIBP), Har Khet Ko Pani (Water to Every Field), Per Drop More Crop, and Watershed Development. By providing better access to irrigation and promoting efficient water management practices, PMKSY helps farmers increase their agricultural productivity and income.
- **PKVY-Paramparagat Krishi Vikas Yojana (**2015**):** This scheme encourages organic farming practices and certification. It encourages farmers to adopt organic farming methods, reduce chemical inputs, and enhance soil health. Organic produce often commands premium prices in the market, thus providing an opportunity for farmers to increase their income.
- **PMFBY-Pradhan Mantri Fasal Bima Yojana (**2016**):** This is a crop insurance scheme that aimed at providing financial protection to farmers in case of crop failure caused by natural calamities or pests or diseases severity. This scheme helps farmers to stabilize their income and protect them against climate-related uncertainties by lowering the risks associated with crop loss.
- **SHC-Soil Health Card Scheme (**2015**):** This scheme aims to offer precise information to farmers about their soil nutrient status. Based on soil test results, farmers receive recommendations on the appropriate use of fertilizers and soil amendments. This helps optimize fertilizer use, reduce input costs, and improve crop productivity, leading to increased income.

These initiatives, along with NMSA and NICRA, form a comprehensive framework to address climate change challenges and enhance farmers' income. They focus on improving water management, promoting sustainable and organic farming practices, providing crop insurance, and enhancing soil health, all of which contribute to climate resilience and increased agricultural productivity.

National Mission on Natural Farming (NMNF, 2023-24)

- The Indian government is actively promoting chemical-free agricultural and natural farming techniques. This initiative is now known as the National Mission on Natural Farming (NMNF) and initiated in the current financial year 2023-24. This mission is a separate initiative that grew out of the Bhartiya Prakritik Krishi Paddati (BPKP).
- **Objective:** Encourage farmers to switch from chemical-based inputs to indigenously produced inputs made from the cow urine, dung and other locally available materials. This transformation requires constant efforts to raise awareness, provide training, provide advice, and build farmer capacity, particularly in the initial years of farming.
- In the budget proposal for the fiscal year 2023-24, a provision of Rs 459.00 crores has been allocated for the NMNF, taking into careful consideration the financial requirements.

- **The National Standard of Organic Production (NSOP):** Organic farming was introduced as a method of achieving long-term production without the use of external chemical resources such as pesticides and fertilizers. This farming practice is well-known for its environmentally friendly characteristics, such as fostering a low reliance on external inputs, encouraging recycling and reuse, and eliminating the need for chemical-based goods. The Indian Council of Agricultural Research (ICAR) has created a complete set of rules for organic production within both cropping and farming systems through the All India Network Programme on Organic Farming.
- **Climate-Smart Agriculture (CSA):** Climate-smart agriculture (CSA) is a holistic landscape management approach that includes farms, livestock, forests, and aquatic resources. This plan efficiently addresses the interrelated challenges of guaranteeing food security while minimizing the effects of climate change. It encompasses a broader range of environmentally sensitive farming approaches, such as integrated farming systems, conservational agriculture, nature-based farming, chemical-free farming, precision-oriented farming, revitalizing agriculture, soil recuperation, and reducing food loss and waste. The key aims are to increase agricultural productivity and financial gains in a sustainable manner, to adapt to and fortify against climate change, and to reduce greenhouse gas emissions wherever possible.

How National Mission on Natural Farming enhances farmers' income while facing the challenges posed by climate change?.

a. **Reduced input costs:** Local resources and on-farm inputs are used, eliminating the need for expensive external inputs.
b. **Increased productivity**: Improved soil health and nutrient cycling lead to higher crop yields.
c. **Climate change resilience**: Natural farming helps farmers adapt to changing climatic conditions and mitigate risks.
d. **Cost-effective pest management**: Ecological approaches minimize the need for chemical pesticides.
e. **Carbon sequestration**: Natural farming practices contribute to increased carbon storage in the soil.
f. **Market demand for organic and natural products**: Farmers can access premium markets and command higher prices.
g. **Capacity building and support**: Training and guidance enable farmers to adopt natural farming effectively.

Overall, the NMNF offers a comprehensive approach that addresses the challenges posed by climate change while simultaneously improving farmers' income. By promoting sustainable and climate-resilient farming practices, the mission empowers farmers to adapt, prosper, and thrive in the face of climate uncertainties. (Source: Ministry of Agriculture and Farmers Welfare. (2023). Union Budget 2023-24: Agriculture and Farmers' Welfare)

The International Year of Millets 2023 (IYoM, 2023):

- Initiated by Prime Minister Shri Narendra Modi, India proposed to the United Nations that 2023 year be declared as the International Year of Millets (IYoM). This proposal

supported by 72 countries' of the world, resulting in its official announcement by the United Nations General Assembly (UNGA) in March 2021.

- The IYoM-2023 roadmap focuses on enhancing different millet-related activities such as production, consumption, exports, and branding.
- Shri Narendra Singh Tomar, Honorable Central Agriculture Minister, outlined a detailed strategy for marking the International Year of Millets 2023 (IYoM-2023). The primary goals of the strategy are to develop measures to increase millet production, consumption, export, and overall branding activities.
- **Production Linked Incentive (PLI) scheme:** The Indian government launched the Production Linked Incentive (PLI) strategy in order to expand the millet sector. This effort, is part of the Aatmanirbhar Bharat Abhiyan, has been given a budget of INR 10,900 crores over a seven-year period. The key objective of this strategy is to promote the expansion of the food processing industry. The PLI strategy aims to establish India's dominance in the global food industry by building of strong players in global food production and the globalization of Indian brands. The primary target areas are marketing of millet-based goods, which include ready-to-cook and ready-to-eat food items. These segments have been identified as having substantial potential for growth.

'**Seven Sutras**' (key themes) for the International Year of Millets (IYOM) of government which executed by the respective Ministries and Departments given below:

a. Enhancement of Production or Productivity by Department of Agriculture &Farmers Welfare/Department of Agricultural Research and Education
b. Nutrition and Health benefits by Ministry of Health/ Food Safety and Standards Authority of India
c. Value Addition, Processing and Recipe Development by Ministries of Food Processing Industries & Tourism
d. Entrepreneurship/Startup/Collective Development by Ministry of Commerce and Department of Agriculture &Farmers Welfare
e. Awareness creation including Branding Labelling and Promotion by All the Ministries
f. International Outreach by Commerce & Ministry of External Affairs and
g. Policy Interventions for Mainstreaming by Department of Food and Public Distribution and Department of Agriculture &Farmers Welfare
h. India plays a significant role in millet production, contributing to 80% of Asia's output and 20% of the world's total production. The country boasts an above-average millet yield compared to the global average. The Indian government has been proactive in endorsing millets, exemplified by the commemoration of the National Year of Millets in 2018 and the classification of millets as nutri-cereals. These efforts are further underscored by the incorporation of millets into the POSHAN Mission Abhiyan, a campaign focusing on nutrition. Leveraging the potential of millets, several entrepreneurial ventures are engaging in the millet value chain. The Indian Institute on Millet Research has been instrumental in nurturing numerous startups, extending crucial funding support to facilitate their advancement. The overarching objective of these endeavors is to stimulate both local and international demand for millets, furnish nourishing sustenance to the populace, and propel the expansion of the millet industry. (Ministry of Agriculture and Farmers Welfare)

How the International Year of Millets 2023-24 plays a significant role in enhancing farmers' income while facing climate challenges ?.....

a. **Market Expansion**: The designation of the International Year of Millets brings global attention to millets as a nutritious and sustainable food option. This increased awareness can lead to a surge in demand for millet-based products, both domestically and internationally. As a result, Indian farmers who cultivate millets can tap into expanded markets, command higher prices for their produce, and generate additional income.
b. **Diversification of Income**: Millets offer an alternative crop option for farmers, diversifying their income sources. By promoting millet cultivation, farmers can reduce their dependency on traditional crops, which may be vulnerable to climate change impacts, and tap into new market opportunities.
c. **Climate Resilience:** Millets are known for their resilience to adverse weather conditions, such as drought, heat, and pests. By cultivating millets, farmers can mitigate the risks associated with climate change and protect their income against unpredictable climatic events.
d. **Reduced Input Costs:** Millets are hardy crops that require minimal inputs, including water and chemical fertilizers. By adopting millet cultivation, farmers can reduce input costs associated with conventional crops, thereby increasing their net income.
e. **Enhanced Soil Health:** Millets have the ability to improve soil health and fertility. They are often grown using sustainable farming practices, such as intercropping, organic fertilization, and minimal tillage, which promote nutrient cycling and reduce soil degradation. Improved soil health translates into better crop productivity and increased income for farmers.
f. **Value Addition and Processing:** Millets can be processed into a variety of value-added products, including flour, snacks, and beverages. By adding value to millet produce, farmers can access higher-value markets and generate additional income streams.
g. **Knowledge and Skill Development:** The International Year of Millets promotes knowledge sharing, capacity building, and skill development among farmers. It provides opportunities for farmers to learn about modern millet cultivation techniques, innovative farming practices, and market-oriented approaches. Equipped with enhanced knowledge and skills, farmers can optimize millet production and effectively respond to climate challenges, leading to improved income.

Hence, the announcement of the International Year of Millets 2023 brings new opportunities for Indian farmers to double their income. With market expansion, diversification of income, climate resilience, reduced input costs, value addition, and knowledge development, the promotion of millets empowers farmers to enhance their livelihoods and achieve the goal of doubling their income. This initiative highlights the potential of millets in increasing farmers' income and promoting sustainable agricultural practices in the face of climate change challenges.

12.6 Conclusion:

The strategies of doubling farmers' income in the face of climate change require a multifaceted approach that involves both the government and the farmers themselves. The government needs to implement policies and schemes that promote sustainable agriculture,

increase productivity, and provide market access to farmers. Farmers, on the other hand, need to adopt modern agricultural practices, diversify their crops, and explore alternative sources of income. Firstly, adopting climate-smart agricultural practices such as conservation agriculture, precision farming, and agroforestry can enhance productivity, resource efficiency, and resilience to climate variability. Secondly, promoting diversification of crops and income sources, including the cultivation of high-value and climate-resilient crops like millets, enables farmers to mitigate risks and capture market opportunities. Additionally, investing in rural infrastructure, irrigation systems, and technology can improve productivity and reduce post-harvest losses. Furthermore, providing farmers with access to credit, insurance, and markets, along with capacity building and knowledge transfer, empowers them to make informed decisions and adapt to changing climate patterns. Collaborative efforts involving government, research institutions, private sector, and farmers' organizations are crucial in implementing these strategies and achieving sustainable agricultural development. By integrating climate change resilience with income enhancement strategies, we can ensure the well-being and prosperity of farmers, safeguard food security, and contribute to a sustainable and climate-resilient future for all. The climate-resilient crops like millets have the potential to play a significant role in enhancing farmers' income. With the announcement of the International Year of Millets 2023 and the government's focus on promoting millets through schemes like the Production Linked Incentive (PLI) scheme, there is a positive outlook for Doubling Indian Farmers' income in the future.

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