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RECENT TRENDS IN AGRICULTURAL ECONOMICS AND AGRICULTURAL EXTENSION

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PREFACE

We are delighted to publish our book entitled "Recent Trends in Agricultural Economics and Agricultural Extension". This book is the compilation of esteemed articles of acknowledged experts in the fields of basic and applied agricultural science.

The Indian as well as world population is ever increasing. Hence, it is imperative to boost up agriculture production. This problem can be turned into opportunity by developing skilled manpower to utilize the available resources for food security. Agricultural research can meet this challenge. New technologies have to be evolved and taken from lab to land for sustained yield. The present book on agriculture is to serve as a source of information covering maximum aspects, which can help understand the topics with eagerness to study further research. We developed this digital book with the goal of helping people achieve that feeling of accomplishment.

The articles in the book have been contributed by eminent scientists, academicians. Our special thanks and appreciation goes to experts and research workers whose contributions have enriched this book. We thank our publisher Bhumi Publishing, India for taking pains in bringing out the book.

Finally, we will always remain a debtor to all our well-wishers for their blessings, without which this book would not have come into existence.

Editors

CONTENT

AGRO – TOURISM A NEW PROSPECTUS FOR AGRICULTURE DEVELOPMENT

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Introduction:

India's main economic sector is agriculture. Agriculture engaged directly or indirectly around 55 percent of the population's income. The agriculture sector contributes about 18 percent to total GDP. Because of the global trends driving today's agriculture, the Indian industry faces tremendous competition. As a result of uncertain climatic conditions, the growth of agricultural crops is also weakened. As a result of these changes, farming operations have changed in form and practice. Farmers are increasingly turning to farm-based non-agricultural businesses and direction farm marketing to generate income beyond traditional farming. The contribution of agriculture to national GDP would be certainly increased if additional income-generating activities were added to existing agriculture. This can be accomplished through agritourism. The Indian tourism industry is embracing agri-tourism as a new concept. In this way, you are able to enjoy a direct encounter with the real world in a true and authentic way.

Tourism is considered a powerful tool for job creation, poverty reduction, and sustainable development. The World Tourism Organization (WTO) estimates that tourism grows by 4 percent per year and India's tourism industry, however, is growing at 10.1 percent, 2.5 times faster than the global average. Globalization and liberalization have created significant opportunities for the growth and development of travel and tourism throughout the world.

In Maharashtra, agri-tourism has recently emerged as one of these forms of tourism. There is potential for development in this field. Nowadays, Agri-tourism is developing all over the world in different forms. People can take part in agri-tourism by strolling through fields, riding horses, picking fruits, feeding animals, milking cows, riding horses, riding motorcycles, and learning about the rural environment. The concept of agritourism refers to the use of farms as tourist destinations for educational or recreational purposes.

Concept of agri-tourism:

Farm-based tourism is the latest trend in Indian tourism. Tourists are invited to experience real rural life, taste the food, and learn more about farming tasks during their visit. Tourists can relax and rejuvenate in a natural environment. There is an increasing complexity and frantic pace to urban life. In addition to providing good employment opportunities, the corporate world also increases stress levels and complexity. Agri-tourism provides people with relaxation opportunities. Rural life and agriculture are being lost to many children and adults due to urbanization. Their experience of rural life and agricultural activities can be enhanced by agri-tourism.

Tourists from the city and abroad can experience rural life through agri-tourism, which opens up farms to them. Apart from teaching tourists about the various crops, agri-tourism also exposes them to traditional foods, handicrafts, culture, music, and languages. Among other rural activities, tourists can ride in bullock carts, milk cows and goats, pick farm fresh fruit and vegetables, etc.

Agri tourism definitions:

World Tourism Organization (1998) defines as "Agri-tourism involves accommodation being offered in the farm house or in a separate guesthouse, providing meals and organizing guests' activities in the observation and participation in the farming operations."

History of agri-tourism

As far back as the 1800s, the University of Tennessee considered it agriculture. In India, Pandurang Taware initiated this concept in 2004. The Agriculture Development Corporation (ATDC) was established in Malegaon near Baramati in Maharashtra on the 16th of May, 2004. UNWTO (United Nations World Tourism Organization) recognizes 16th May as World Agri-tourism Day.

Status of agri-tourism in india:

There are a number of opportunities for agri-tourism in India as a result of the 'Tenth Five Year Plan'. According to the World Tourism Organization, there will be over one billion tourists travelling around the world between now and 2020, with the tourism industry expected to grow by 2.5% each year by then, bringing the worldwide number of tourists to more than one billion in the next decade. It has been observed that the Indian tourism industry has been experiencing more than 212 times the growth rates of the global tourism industry. This value addition contributes to further growth by sustaining present growth rate as well as contributing to future growth when Agri-tourism is introduced. From a tourism perspective, rural development has been boosted by state governments encouraging tourism infrastructure development.

On 16th May 2004, the Maharashtra Agritourism Development Corporation was established. The program focuses on promoting agritourism in rural areas to help young people earn a living in the village and on the farm itself. ATDC (Agri Tourism Development Corporation) in Malegaon, Baramati deserves credit for launching and operating the first Agri-tourism center in Maharashtra. Shri Pandurang Taware is the man behind the initiative. Maharashtra and India owe their Agri-tourism concept to him. The ATDC survey in 2014, 2015, 2016 shows that 0.40 million, 0.53 million, and 0.7 million tourists visited these centers respectively, totaling 35.79 million dollars generated. In our country, Maharashtra leads the way in agritourism.

Why agri-tourism?

In addition to the fact that India is an agriculture country, we should be well informed about it since It's like going to a school without walls where you can come and go as you, please. Keep an eye out, explore the hidden treasures, and learn something. Since urban children are surrounded by closed doors in schools, classes, cartoons on TV, video games, chocolate, soft drinks, spicy fast food, computers, internet, and so on, they have limited access to the outside world, and Mother Nature can only be seen through television. The same study found that 35% of people living in cities do not have relatives in villages and 43% have never been to or stayed

in a village. The cost of farming as a business is too high for many farmers. A decline in yields is also caused by the land's declining fertility. It is impossible for farmers to make ends meet below poverty line without starting businesses in addition to their land-based income.

Scope of agri – tourism

Due to the following reasons, agri-tourism has great potential in the current scenario:

1. An inexpensive gateway - Agri-tourism costs the least for food, accommodations, recreation, and travel. As a result of its cost effectiveness, agri-tourism broadens the scope of tourism.

2. Curiosity towards the farming industry and life style - As a result of their roots in villages, the urban population has always been curious about agriculture and rural lifestyles. This segment of the population can be satisfied by agritourism which revolves around farmers, villages, and agriculture.

3. Highly demand for whole family oriented recreative activities - In villages, recreation opportunities are available to children, young adults, senior citizens, males, females, at a lower cost to the whole family.

4. Health consciousness and finding comfort with nature friendly means - There has been a decline in life expectancy due to modern lifestyles that are stressful. Overall, urban populations looking for health solutions are turning to nature villages.

5. Desire for peace and tranquility - Peaceful locations can be found through tourism. Due to its proximity to nature and distance from urban areas, Agri-tourism offers peace and tranquility.

6. Interest in natural environment - Nature is becoming more and more important to a busy urban population. Since nature is always away from the hustle and bustle of everyday life. To urban citizens, birds, animals, crops, mountains, water bodies, and villages provide a totally different atmosphere where they can forget about their busy urban lives.

7. Rural recreation - Urbanites can enjoy festivals and handicrafts in villages as a form of recreation. Lifestyles, dress, languages, cultures, traditions, and culture of villagers (farmers) always contribute to entertainment. Farmers and the entire production process of agriculture may interest urban teachers. Agribusinesses with high crop yields, high livestock yields, processing units, and farms that are experimenting with new technologies add to the tourist attractions. It is possible for urban tourists to become interested in farmers' markets, organic foods, and processed foods. This Agri-ambiance in the villages offers opportunities for the development of agri-tourism products, including Agri shopping, culinary tourism, pick your tree, bed and breakfast, pick and pay, bullock carts, camels, boats, fishing, herb walks, and health (ayurvedic) tourism.

Basic principles of agri–tourism:

Three basic principles should guide agritourism are following:

1. Something for visitors to see - Among the many things Agri-tourism can offer tourists are animals, birds, farms, and nature. Additionally, tourists could be attracted to Agri-tourism through culture, dress, festivals, and rural games.

2. Something for visitors to do - Tourists can participate in agricultural operations, swim, ride bullock carts, ride camels, ride buffaloes, cook and participate in rural games.

3. Something for visitors to buy - As a souvenir, tourists can buy rural crafts, dress materials, farm gate fresh agriculture products, and processed foods.

Roles of agri-tourism in rural development:

1. In the off-season, it ensures cash flow.
2. Agritourism contributes to the preservation and communication of rural values.
3. Agricultural products can be sold from operations that grow and harvest them.
4. Rural populations are employed as a result of it.
5. Agricultural and rural values are conserved and communicated through it.

Benefits of agri-tourism for farmers:

1. Operational expansion of farms
2. In order to protest against income fluctuations, farmers need to increase their farm revenue streams. Creating new niche markets for consumers.
3. Making local agricultural products more accessible
4. Promoting local agricultural products
5. Providing better living and working conditions, as well as recreational opportunities on farms
6. Instilling a sense of entrepreneurial spirit and managerial skills.
7. Farm businesses can become more sustainable in the long run.

Benefits for communities:

Agritourism has the potential to be a vehicle for community development:

1. By attracting tourists, businesses and services can generate additional revenue
2. Tourists and residents should be protected from environmental degradation in rural areas
3. Contributing to the preservation and revitalization of local art, craft, and traditions
4. Creating jobs and income in rural areas to diversify and strengthen the rural economy
5. Attracting other small businesses and industries by providing a more dynamic business environment.

Problems of agri-tourism:

Agritourism centers can be developed more easily in India because of the better natural and climatic conditions that make it more conducive to the development of agritourism centers. In spite of this, there are some problems that are associated with the development of agri-tourism are the following:

1. Insufficient knowledge of agritourism.
2. Farmers lack commercial skills and communication skills.
3. Agri-tourism industry lacks basic infrastructure.
4. Agri-tourism industry has an unorganized sector.

Government's initiatives

1. Nationalized banks and cooperative banks provide loans for Agri-tourism at subsidized rates because NABARD has recognized it as an emerging business.
2. Local players involved in agricultural tourism will be encouraged to standardize their activities with additional incentives under the Maharashtra Tourism Policy of 2016.The Haryana Tourism Policy has pioneered introduction of the concept of farm or agricultural tourism.
3. According to the Punjab Farm Tourism Scheme 2013, farm house owners should serve as hosts and guides to tourists visiting their farms.

4. Tourism in Kerala has been greatly boosted by the government allowing 5% of farmland to be used for tourism.
5. Agricultural tourism projects taken up by farmers can be financed by Karnataka Vikas Grameen Bank (KVGB) with up to 75% of the project costs and at 12.5% interest rate.
6. In Uttarakhand, the state government plans to introduce 'Agri-tourism' in the near future to boost tourism like European vineyards and Japanese strawberries.
7. Agricultural and Rural Tourism Co-operative Federation (MART) has urged the Maharashtra state government to ensure that agricultural loans are also subsidized.

Major agri-tourism destinations in India

1. Tea plantation regions: Assam, Darjeeling, Munnar, Nilgiris.
2. Coffee plantation regions: Karnataka, Kerala, Tamil Nadu.
3. Coconut plantation regions: Kerala, Tamil Nadu.
4. Cardamom plantation regions: Kerala, Karnataka, Darjeeling, Sikkim.

Table 1: Agri-tourism sites and their specializations

States	Name of Village	Specialization
Andhra Pradesh	Village Etikoppaka, District Vishakhapatanam	Wood Craft
Arunachal Pradesh	Village Deke, District West Siang	Ethnic tribal culture
Bihar	Nepura Village, District Nalanda	Tusser Silk weaving
Gujarat	Dandi Village, District Navsari	Mahatma Gandhi Heritage
Himachal Pradesh	Nagar, District Kullu	Shawl and Toppi Weaving
Jammu & Kashmir	Village Agar Jitto, District Udhampur	Culture & Craft
Karnataka	Coorg, District. Kodagu	Coffee Plantation
Kerala	Villege Kalady, District. Ernakulam	Spices Village
Madhya Pradesh	Orchha, District Tikamgarh	Historical & Adventure (River rafting)
Rajasthan	Samode Village, District Jaipur	Lac Work, Pepper painting, Gems stone painting

Agri -Tourism Development Corporation (ATDC):

In the country, Maharashtra has been pioneering the development and promotion of Agri Tourism. An agri-tourism project of 28 acres in Palshiwadi, tal Baramati District, Pune, 70 kms from Pune city is owned by the Agri Tourism Development Corporation. It operates an Agri-tourism center, encourages farmers to engage in Agritourism, and conducts training and research programs. A tourist reservation platform that arranges for travel arrangements and then sends tourists to various destinations. Farmers save money on marketing costs. In addition to taking

bookings themselves, they may also provide customer service. The ATDC only provides assistance. Through its own pilot Agri-tourism project, ATDC, the umbrella organization for Agri-tourism, practices what it preaches.

Through the Maharashtra State Agritourism Vistara Yojana, ATDC launched training and skills development programs in 2007 with 52 farmers selected, and the story continues. This Agritourism model has been replicated in 328 Agri tourism centers across 30 districts in Maharashtra, thus conserving, enhancing the village environment, village traditions, and village culture, as well as the village arts and handicrafts. By displaying village culture, agricultural practices, and traditions, the agri-tourism model provides visitors with authentic experiences that have helped generate additional income and local employment. Visits to farmers' houses are essentially a type of farm stay, in which the tourist stays there like a farmer, performs farming activities, rides bullock carts, rides tractors, flys kites, and eats authentic food, wears traditional clothes, learns about the culture of the region, listens to folk songs and dances, buys fresh farm produce, and the farmer is responsible for maintaining the health and hygiene of his or her home and farm, greeting tourists, selling the farm products at a better price, and earning a living.

According to ATDC survey, 0.40 million, 0.53 million, and 0.7 million tourists visited these centers in 2014, 2015, and 2016, generating 35.79 million Indian rupees for farmer's families, and creating jobs for women and youth. This was a win-win scenario not only for farmers or tourists, but for the government as well. As Agriculture Tourism was given a major boost in Maharashtra Tourism Policy 2016, both farmers and tourists were happy to stay in the farm and purchase farm fresh produce.

ATDC (Agri Tourism India) project's objectives are

1. By developing and promoting agricultural tourism (Agri-tourism) through ATDC's projects, training, and support, rural economies can be diversified and stabilized.
2. Providing opportunities for on-farm employment, increasing farming community income, broadening the market, and preventing migration to urban areas.
3. Several traditional forms of art and music are practiced in rural areas as a result of agritourism income.
4. By promoting local agricultural products, strengthening small farm long-term sustainability by enhancing awareness of the importance of preserving agricultural lands.

Agritourism has been encouraged by the following partners:

1. To help small farmers, the Tourism Department - Government of Maharashtra has included Agri-tourism as a major focus area in its Tourism Policy 2016. For students in fifth to tenth standard, a mandatory educational tour to Agritourism centers has been adopted.
2. Agri-tourism marketing and promotion under Maharashtra Tourism Development Corporation's "MAHABHRAMAN SCHEME".
3. Agritourism centers are being developed by small farmers with the help of NABARD (National Bank for Agriculture and Rural Development), India's premier rural development bank.

A **SWOT** analysis of the Agri-tourism in India is enumerated in the matrix:

STRENGTHS	**OPPORTUNITIES**
• A Strong source of Income for farm family • Generate employment • Enhance the rural areas	• As a new branch has immense potential • Many farm families can be the benefit • Government support can increase of agro tourism • State land can be cultivated and converted for facilitate Agri-tourism.
THREATS	**WEAKNESS**
• Climatic conditions • A new area of tourism so, less competition • Rampant migration from farming to industry sectors.	• Growth of Agri-tourism is slow than industry sector. • Most of the farmers are less educated so need training. • Lack of government support in the form of subsidies. • Very less training center of Agri-tourism in India • Lack of publicity and popularity.

Case study: cost effectiveness of agro-tourism

1. Financial analysis: Can we make profit from this activity?

Under "Mahatma Phule Agri-tourism Expansion scheme 2007" Following financial feasibility analysis was put forth. (Please refer to Appendix for the attachment in detail)

Table 2: Estimated expenses for basic infrastructure to start agri-tourism

No.	Details	No	Cost/unit	Total	Remark
1.	Room construction measuring 576 sq. Ft. with attached toilet, bathroom, furnished with sit out. 2) Cash in hand - - Rs. 30,000/- - Rs. 10,66,800/-	03	@ Rs. 600/- per sq. Ft. Rs. 2,45,600/-	Rs. 10,36,800/-	If the said infrastructure is already available then their expenses should not be incurred
2.	Cash in hand	-	-	Rs. 30.000/-	-
				Rs. 10,66,800/-	

Table 3: Estimated revenue earned from agri-tourism activity

No.	Details	Monthly revenue in Rupees	Annual revenue in Rupees
1)	For 180 days in year @ 12 guests per day. Total guests 2160	Accommodation charges per head per night Rs. 175/-. Total 31,500/-	3,78,000
2)	Food served to the guests	@ Rs. 150/- per head per day. Rs. 27,000/-	3,24,000
3)	Entertainment	@ Rs. 25/- per head. Rs. 4,500/-	54,000
4)	Direct sale of agricultural Goods	@ Rs. 100/- per head. Rs. 9,000/-	1,08,000
5)	Allied income from handicraft and other goods	@ Rs. 100/- per head. Rs. 9,000/-	1,08,000
		Direct and indirect expenses, taxes etc.	7,29,000
		Total income	9,72,000
		Net Profit	2,43,000
		Payback period	4 years 3 months
		Net assets	10,66,800

Table 4: Estimated Turn Over Analysis of a Farm, "Gadgil Mala"

No.		Expenses	Revenue
1)	Initial cost of infrastructure development (Building dormitories, toilets etc.)	Rs. 12,00,000/-	-
2)	Peak season September to March (7 months X 30 days = 210 days)	-	Rs. 3,00,000/-
3)	Low season May to August (4-month X 30 days = 120 days)	-	Rs. 2,00,000/-
4)	Labour cost and other costs per months Rs. 13,000 X 12 months	Rs. 1,56,000/-	
Total		**Rs. 13,56,000/-**	**Rs. 5,00,000/-**

In this agriculture income of the Rs. 6, 00,000/- per year is not being taken into picture. Considering the above facts, it can be said that the Agri-tourism activity is financially viable.

Conclusion:

Traditional agricultural activities are enhanced by agri-tourism. In this way, farmers are able to diversify and innovate their use of the available resources. In this way, farmers and tourists benefit from a win-win scenario. Through agri-tourism, villages and farming life are unraveled. By utilizing available resources intelligently, farmers can earn more money, and tourists can

enjoy village life and nature at an affordable price. The development of agri-tourism does not only benefit those areas; it also benefits the villages. As demonstrated by Agri-tourism cases in Maharashtra, Agri-tourism not only contributes to the economic and social well-being of farmers, but also of their villages.

Village life is being unraveled through agri-tourism. In addition to experiencing rural life, tourists can taste traditional cuisine and live in a peaceful environment. At first, ATDC operated one agritourism center, but today it has 152. Agri-tourism services are currently provided by few Agripreneurs. Agriculture, tourism departments at the national and state levels, and farmers are required to support agri-tourism promotion. Commercially operated Agritourism Centers are few and far between. Agri-tourism needs to be promoted in order to attract farmers to participate. It is essential that farmers understand the maintenance of facilities, hospitality, and public relations aspects of this industry. Agri-tourism providers need to provide safe and clean accommodation, clean water, and hygienic food to urban customers. Television and radio can be used to increase awareness among urban customers. Farmers, government agencies, farmer's cooperatives, and non-governmental organizations should be consulted in order to promote the services.

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STATISTICAL SUPPORT FOR AGRI-INPUTS

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Introduction:

India is an agricultural economy, with over 54 per cent of the nation's land classed as arable and 50 per cent of the working force employed in agriculture. One of the most significant industries in the Indian economy is the agriculture sector. In fact, the agriculture of a place is the result of many economic, cultural and technological forces interacting together and with each other. In spite of making up only about 14 per cent of the nation's economy, agriculture in India is thought to be responsible for 42 per cent of all jobs. The amount of rainfall during the monsoon season is crucial for economic activity because around 55 per cent of India's agricultural land depends on precipitation. According to the latest data for 2020-21, the contribution of agriculture (role of agriculture in Indian economy 2023) to India's GDP was 19.9 per cent, which is higher than 17.8 per cent in the previous session 2019-20. Thus, keeping in view the current situation it is not possible to solve the problems of agriculture by isolated approaches. During the course of development, significant changes have taken place in the agrarian structure of India as indicated by the changes in the pattern of landholdings. In order to overcome these problems, a multidisciplinary approach is required and a large body of data to be incorporated as well. Agriculture is an economic sector which depends highly on climatic conditions. Crop models are frequently used to evaluate the ability of climate forecasts in guiding crop management practices. In the statistical model approach, one or several variables (representing weather or climate) are related to crop responses such as yield and yield contributing characters. The main advantages of statistical models are their limited reliance on field calibration data and their transparent assessment of model uncertainties (Lobell and Burke, 2010). This is where the start of agricultural statistics begins which has a very wide courage and its scope is widening. It is very important and required at the national to village and farm levels for agricultural policy decisions, placing agricultural development and estimates of agricultural inputs and national income. Agriculture inputs are those external sources that are integrated into the soil that helps to increase farmers' potential production by evaluating and interpreting these data regarding crop growth, yield and quality based on seed rate used, fertilizer consumption, number of holdings. Statistical support thus helps in making well-informed decisions about the use of these inputs and the efficacy and efficiency of agri-inputs on the environment. For example, Paddy, also known as rice, is one of the most widely cultivated and consumed crops in the world. In order to cultivate paddy effectively, farmers need accurate statistical data on a variety of factors, including weather patterns, soil quality, and pest infestations. This data helps them make informed decisions about planting, fertilizing, and harvesting their crops. they also need to know the nutrient levels of their soil in order to apply the right amount of fertilizer for

maximum yield. Additionally, they need to be aware of any potential pest infestations that could harm their crop, and take preventative measures if necessary. Accurate statistical data is crucial for farmers to make informed decisions that can improve their crop yields and overall economic outcomes. As such, governments and international organizations often collect and disseminate data on paddy cultivation to support agricultural development efforts.

Agri-inputs

Agri-inputs are key parts of contemporary agriculture since they help boost crop output and guarantee food security. All the equipment and supplies needed in agricultural production are referred to as agri-inputs, including seeds, fertilizer, pesticides, herbicides, irrigation equipment, and farm machinery.

1. Seeds: The most fundamental component of agriculture is seeds. For various crops, farmers employ a variety of seeds. While some seeds are open-pollinated kinds created using conventional breeding techniques, others are hybrids created to withstand pests, illnesses, and droughts.
2. Fertilizers: Fertilizers are used to increase crop yields and augment soil nutrients. Fertilizers come in two primary categories: inorganic fertilizers like nitrogen, phosphorous, and potassium compounds, and organic fertilizers like manure, compost, and crop residue.
3. Pesticides: Chemicals that are used to manage pests including insects, weeds, and illnesses including pesticides. Pesticides come in a variety of forms, such as fungicides, insecticides, and herbicides.
4. Land: A vital component of agriculture is land. The land is necessary for farmers to raise cattle and develop crops. The output and profitability of a farm can be impacted by the land's quality and location.
5. Water: Another necessary input for agriculture is water. In places where rainfall is insufficient or unpredictable, irrigation systems are utilized to supply water to crops.
6. Farm machinery and equipment: Farmers employ farm machinery and equipment to increase production and efficiency, including tractors, harvesters, and irrigation systems.
7. Credit: To finance their businesses, many farmers rely on loans. Inputs including seeds, fertilizer, and equipment, as well as labour and other operating costs, can all be paid for with agricultural loans.

Agriculture statistics at glance

The gathering, examination, and interpretation of quantitative data pertaining to agriculture and related activities are referred to as agricultural statistics. Farmers, politicians, academics, and other stakeholders can utilize these statistics to help them make informed decisions regarding the production, consumption, trade, and other facets of agriculture. Many subjects are covered by statistics on agriculture, such as crop and livestock output, land usage, irrigation, farm revenue, and agricultural trade. Governmental agencies, international organizations, and other institutions gather these statistics, which are then routinely published in publications, databases, and other readily accessible formats. The choice of agricultural inputs is critically influenced by statistical analysis, particularly in the present year. It aids in determining the best inputs for a certain crop, as well as the soil type, climate, and other elements that affect

crop development and production. The following are some justifications for why statistical analysis is crucial for choosing agricultural inputs:

1. Trends can be identified: Statistical analysis enables us to determine trends in the effectiveness of various agri-inputs in a specific region. We can determine the most efficient inputs that are expected to do well in the current year by examining historical data and recent patterns.
2. Risk management: Due to elements including weather, pests, diseases, and market swings, agriculture is inherently risky. The risk of crop failure is decreased by using statistical analysis to determine the inputs that are likely to produce the best yield in various scenarios and reduces crop failure risk.
3. Cost optimization: Because agri-inputs can be pricey, it's critical to minimize costs while maximizing yield. By identifying the inputs that produce the best output at the lowest cost, statistical analysis helps to increase profitability.
4. Higher crop quality: The agri-inputs' quality directly affects the crop's quality. The crop's quality can be identified by statistical analysis, which increases the crop's marketability and profitability.
5. Data analysis: Grouping and evaluating a lot of data, such as soil characteristics, weather patterns, crop characteristics, and input utilization, is necessary for optimizing agricultural inputs. This data can be analyzed statistically to find patterns and trends that can aid with application and input choice selections.
6. Precision agriculture: By utilizing data-driven strategies, precision agriculture techniques strive to maximize agricultural yield. To increase agricultural output and cut costs, statistical analysis is used to establish the proper input amounts and application rates.
7. Statistical analysis is essential for the design of studies that examine the effectiveness of various agri-inputs under various circumstances. Researchers can determine which inputs are most useful and how to use them by adjusting for variables and utilizing a statistical model.

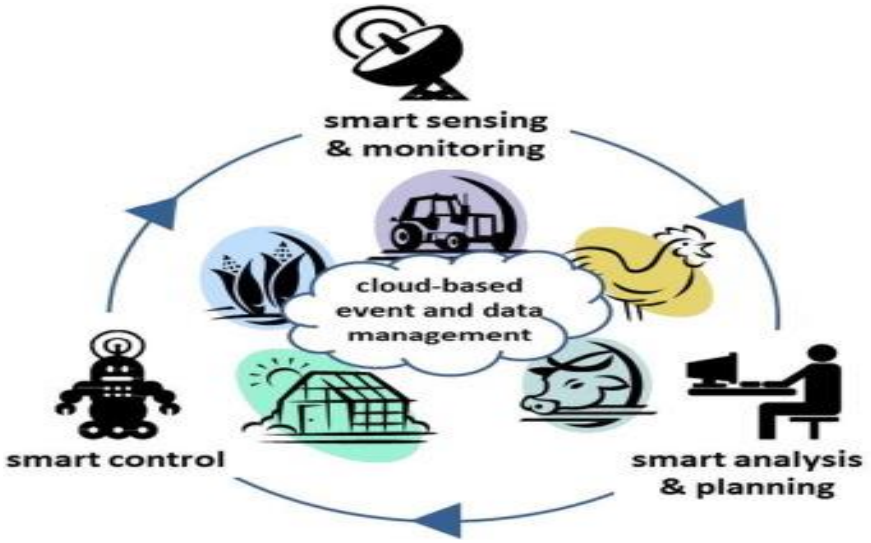

Figure 1: Statiscial data input role in farming and research (Wolfert *et al.*, 2017)

Statistical tools for agriculture data interpretation

There is a limited quantity of farmland available worldwide, and the UN predicts that by 2050, there will be 8.9 billion people on the planet (Kumar *et al*. 2018). Traditional agricultural practices, which make it difficult to apply scientifically developed agronomic methods like planting, irrigating, and harvesting at the right time, are the main obstacle to agricultural progress. Farmers must be able to utilize optimized plant density in a constrained cultivable area. The timing of seed planting, fertilizer application, and crop maintenance are all highly dependent on the weather. When to irrigate fields can also depend on the forecast, whether it rains or not. The loss of food grains due to unknown circumstances can be reduced by employing an appropriate grain harvesting period and the transportation of those grains. Using appropriate statistical analysis. Several statistical approaches are used in the selection of agricultural inputs to study and assess numerous elements that may affect the productivity and profitability of agricultural systems. Here is an overview of some of the statistical tools used for agri-input selection along with their authors:

1. **Linear Regression Analysis**: This popular modeling technique for agri-input selection is used to model the relationship between variables and estimate the value of a response by using a line-of-best fit. In addition to describing the relationship between variables (like correlation), it also provides an equation to predict the value of a response variable based on the value of the predictor variable. Typically, it is used in agriculture to simulate the link between two or more variables, such as crop output and inputs like irrigation, soil nutrients, and fertilizer application rates. This is often utilized in agricultural research by Bhattacharyya *et al*. (2021) and Chaturvedi *et al*. (2019) both recognise the value in its application. The formula for simple linear regression is **Y = mX + b**, where Y is the response (dependent) variable, X is the predictor (independent) variable, m is the estimated slope, and b is the estimated intercept.
2. **Analysis of Variance**- An analysis of variance (ANOVA) is a statistical technique used to compare the means and test the hypothesis of two or more sets of data to see if there are any notable differences. This instrument is frequently used in agricultural research to assess how various treatments or other factors affect crop yields. English statistician and geneticist Sir Ronald A. Fisher invented the ANOVA technique.
3. **Principle component Analysis**- Principal component analysis is a multivariate statistical method of data analysis which reduces the dimension of the data by using the multivariate statistical method of principal component analysis. By creating new variables that are linear combinations of the variables in the data set, the dimension is reduced. In order to capture as much of the original variance-covariance-correlation structure in the original variables as feasible, these linear combinations were chosen. Maximizing the variance of a linear combination of the variables is the primary goal of PCA.
4. **Cluster Analysis**- A data exploration (mining) technique called cluster analysis can be used to divide a multivariate dataset into "natural" clusters (groups). We investigate whether the dataset contains any previously undescribed clusters (groups) using the approaches. For instance, a marketing department might want to categorize its clients based on survey results (perhaps those likely to be most receptive to buying a product, those most likely to be against buying a product, and so forth).

5. **Time series analysis**- The statistical method of time series analysis is used to examine data points that are measured over time. A time series records the values of the variable being measured over a period of time by making measurements at regular intervals. Time series data examples include market prices, temperature readings, and patterns of website traffic. Finding patterns or trends in the data that can be utilized to forecast future values is the aim of time series analysis. This entails looking at the time series' statistical characteristics, including its mean, variance, autocorrelation, and stationarity. Time series analysis sometimes entails forecasting future values using mathematical models, such as autoregressive integrated moving average (ARIMA) models.

Statistical record of various agri-inputs for paddy crop

Table 1: Seed and fertilizer input requirement for paddy crop

Year	Seed s (Kg/ha)	Fertilizer (kg Nutrients)
2004-2005	47.38	122.18
2005-2006	49.25	122.14
2006-2007	47.22	123.79
2007-2008	47.93	123.79
2008-2009	45.28	134.26
2009-2010	45.49	134.61
2010-2011	45.2	140.27
2011-2012	44.59	145.82
2012-2013	44.03	138.26
2013-2014	42.12	140.04
2014-2015	49.25	150.57
2015-2016	49.84	149.22
2016-2017	48.62	133.56
2017-2018	48.55	152.34
2018-2019	47.03	155.03
2019-2020	48.77	166.98

Source: Indiastat.

Time-series data were gathered from 2004 to 2020 to fully address the study's objectives when examining the cost of cultivating paddy crops, and the results suggest that the year 2019–2020 saw the highest input of fertiliser. Nonetheless, the year 2005–2006 saw the largest seed production.

Fertilizer consumption in nutrients shows that the kilogrammes per hectare (kg/ha) of nutrients provided to the soil through fertilizer use are shown graphically in the fertilizer use the nutrients graph. The graph typically depicts the nutrient content of the three primary macronutrients—nitrogen (N), phosphorus (P), and potassium—found in fertilizers (K). A valuable tool for examining trends in fertilizer use and nutrient availability in agriculture is the graph of fertilizer use in nutrients. It enables farmers and decision-makers to comprehend how the availability of nutrients has changed over time and in various geographic locations. Using

this knowledge will increase soil health, decrease fertilizer waste, and optimize fertilizer application rates. Usually, the graph shows the number of nutrients in fertilizers used on crops for the given year.

According to data from the Food and Agriculture Organization of the United Nations (FAO), India's cereal production increased from around 50 million metric tons in 1950 to over 299 million metric tons in 2020. The major cereal crops grown in India include rice, wheat, maize, and millet. The government of India has implemented various measures to increase cereal production, including subsidies for farmers and investments in irrigation and other infrastructure. However, challenges such as climate change, soil degradation, and water scarcity continue to pose risks to India's cereal production in the future.

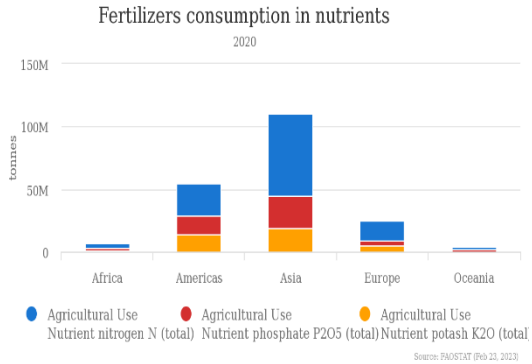

Fig 2: Statistical representation of fertilizer consumption

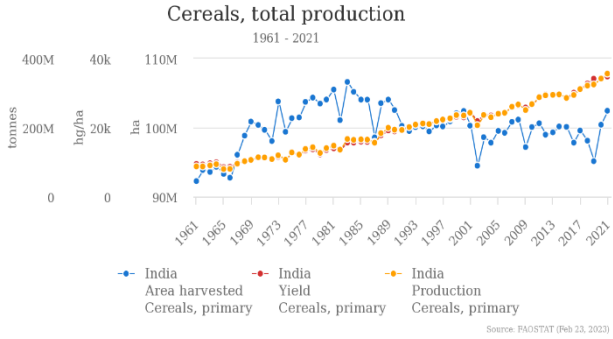

Fig 3: Indian scenario of cereals production

Table 2: Manure, Labour, Irrigation, Insecticide and No of holdings for paddy crop

YEAR	Manure (Qtl)	Man labour (In hrs)	Animal labour (Pair hrs)
2004-2005	18	831	80
2005-2006	19	812	72
2006-2007	15	795	72
2007-2008	15	795	72
2008-2009	13	770	58
2009-2010	14	772	55
2010-2011	13	748	55
2011-2012	13	730	56
2012-2013	14	706	53
2013-2014	12	679	45
2014-2015	15	758	42
2015-2016	15	735	37
2016-2017	8	599	90
2017-2018	13	697	32
2018-2019	10	589	16
2019-2020	10	583	20

Source: Indiastat.

Table 2 represents the amount of manure (in quintals), man labour (in hours), and animal labour (in pair hours) used in agricultural practices over a period of 16 years from 2004 to 2020. The amount of manure used varies each year, with a range of 7.66 quintals in 2016-2017 to 136.33 quintals in 2017-2018. Similarly, the amount of man labour and animal labour used also varies each year. It is essential to note that the amount of manure used in agriculture can affect the quality of soil and crop yield. Proper utilization of manure can improve soil health, reduce the use of chemical fertilizers, and ultimately result in better crop yield. The amount of man labour and animal labour used also has a significant impact on agricultural practices, as they determine the efficiency and productivity of the farming process. Overall, the data highlights the variability in agricultural practices and emphasizes the importance of proper management of resources to achieve optimal results.

Table 3: Showing various results of Irrigation, Insecticide and Number of holdings for paddy crop

Year	Irrigation	Insecticide (Rs)	No of Holdings
2004-2005	930	435	286
2005-2006	744	350	260
2006-2007	763	274	273
2007-2008	632	350	243
2008-2009	715	491	259
2009-2010	1017	612	251
2010-2011	829	603	254
2011-2012	1069	785	258
2012-2013	1325	890	252
2013-2014	1109	1029	252
2014-2015	1800	1030	294
2015-2016	1958	1265	290
2016-2017	1945	1407	223
2017-2018	1248	1344	284
2018-2019	1320	1300	220
2019-2020	930	435	286

Source: Indiastat

Table 3 represents the amount of irrigation, insecticide usage, and the number of holdings for agricultural activities in a particular region over a period of sixteen years, from 2004-2020. The data shows that the amount of irrigation and insecticide usage has fluctuated over the years, with some years showing an increase and others showing a decrease. However, the number of holdings has remained relatively consistent over the years, with only slight fluctuations. These statistics are important for understanding the trends and patterns in agricultural practices in the region. By analyzing these statistics, policymakers and agricultural experts can make informed decisions on how to allocate resources and improve agricultural practices. Additionally, farmers can use this information to make informed decisions about their own farming practices, such as when and how much to irrigate or use insecticides. In summary, the data provided gives insights

into the trends and practices of agriculture in the region and demonstrates the importance of statistics in making informed decisions.

Case study: Disease Pattern, Farmers' Awareness & Adoption of Fungicides in Paddy and Market analysis in the selected districts of Tamil Nadu

The study was undertaken in Thanjavur, Villupuram, Cuddalore, Kanchipuram and Thiruvallur districts with a sample size of 50 farmers in each district to a total of 250 to know the current disease pattern in paddy, agrochemical usage and awareness about the fungicides Avtar and Merger. Besides, prepared dealers and distributors in each district were interviewed to know the market size of selected fungicides.

Table 4: Current disease pattern and agrochemical usage in paddy and major seasons and varieties of paddy in the study area

Season	Thanjavur	Cuddalore	Villupuram	Kanchipuram	Thiruvallur
Sornavari (April-May)	-	-	-	ADT 37 ADT 43 ADT 45	ADT 37 ADT 43 ADT 45
Kuruvai (Jun-Jul)	ADT 43 ADT 46 ADT 39	Kattaponni ASD 16 ADT 43 TKM 9 ADT 37	ADT 43 TKM 9 ADT 37	-	-
Samba(Aug) and Late samba (Sep-Oct)	BPT 5204 Ponmani (CR 1009) White Ponni ADT 46 CO(R)50 CO 43	BPT 5204 White Ponni NLR CO 43	TRY 3 BPT 5204 Ponmani (CR1009) TRY 1 White Ponni ADT 39	White Ponni TRY 1 CO 43	White Ponni CO 43 ADT 46
Navarai (Dec-Jan)	ADT 43 ADT 46 BPT 5204 Kattaponni	ADT 43 TKM 9 ADT 37	ADT 37 TKM 9 ASD 16	-	-

Source: Indiastat

- In Thanjavur district, BLB (Kur-54%, Sam-70%, Nav-18%) was the major disease that was reported in all the three seasons, followed by leaf spot (Kur-32%, Sam-58%, Nav-18%), sheath blight (Sam-48%), Blast (Kur-24%, Sam-32%, Nav-24%) and grain discoloration (Sam-12%).
- In Cuddalore district, blast (Kur-34%, Sam-84%, Nav-18%) was the major disease followed by sheath blight (Kur-42%, Sam-70%, Nav-30%), bacterial leaf blight (Kur-13%, Sam-48%, Nav-14%), grain discoloration (Sam-60%) and leaf spot (Sam-14%).

- In Villupuram district, sheath blight (Kur-70%, Sam-84%, Nav-44%) was the major disease, followed by blast (Kur-26%, Sam-76%, Nav-42%), grain discoloration (Sam-70%, Nav-28%) and BLB (Kur-10%, Sam-34%, Nav-16%).
- In Kanchipuram district sheath blight (Sor-60%,, Sam-84%) was the major disease, followed by blast (Sor-20%, Sam-30%), grain discoloration (Sor-20%, Sam-24%), leaf spot (Sor-14%, Sam-24%) and false smut (Sam-12%).
- In Thiruvallur district, sheath blight (Sor-80%, Sam-37.5%) was the major disease, followed by blast (Sor-42.5%, Sam-70%), grain discoloration (Sor-30%, Sam-47.5%), leaf spot (Sor-12.5%, Sam-17.5%) and false smut (Sam-7.5%).
- BPH (22%) was seen only in Thanjavur district in samba season. The occurrence of BPH would be normally in suitable humid conditions of the rainy season. But in the last year, there was less rain, and it did not favor the BPH was quoted as the reason by the farmers.

In all, blast, sheath blight, BLB, grain discoloration and leaf spot are the major diseases irrespective of seasons and districts. The suitable period for the disease spread is during rain and cool climate is the reason for most of the diseases' occurrence in samba and late samba season, which is in August and September-October months. Delayed planting date and lack of knowledge about the disease are the other reasons for the spread of diseases.

Table 5: Occurrence of disease pattern in the study area

District / Disease	Thanjavur (n=50)			Cuddalore (n=50)			Villupuram (n=50)			Kanchipuram (n=50)		Thiruvallur (n=40)	
	Kur	Sam	Nav	Kur	Sam	Nav	Kur	Sam	Nav	Sor	Sam	Sor	Sam
i) Paddy	12	16	12	17	42	9	13	38	21	10	15	17	28
Blast	(24)	(32)	(24)	(34)	(84)	(18)	(26)	(76)	(42)	(20)	(30)	(42.5)	(70)
ii) Sheath	0	24	0	21	35	15	35	42	22	30	42	15	32
Blight	(0)	(48)	(0)	(42)	(70)	(30)	(70)	(84)	(44)	(60)	(84)	(37.5)	(80)
iii)Grain	0	6	0	0	30	0	0	35	14	10	12	12	19
Discoloration	(0)	(12)	(0)	(0)	(60)	(0)	(0)	(70)	(28)	(20)	(24)	(30)	(47.5)
iv)Leaf Spot	16	29	9	0	7	0	0	0	0	7	12	5	7
v) Stem rot	(32)	(58)	(18)	(0)	(14)	(0)	(0)	(0)	(0)	(14)	(24)	(12.5)	(17.5)
vi) BLB	0	8	0	0	0	0	0	0	0	0	0	0	0
	(0)	(19)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
vii) BPH	27	35	18	13	24	7	5	17	8	0	0	0	0
	(54)	(70)	(36)	(26)	(48)	(14)	(10)	(34)	(16)	(0)	(0)	(0)	(0)
viii) False	0	11	0	0	0	0	0	0	0	0	0	0	0
Smut	(0)	(22)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
	0	0	0	0	0	0	0	0	0	0	6	0	3
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(12)	(0)	(7.5)

Source: Field Survey

Note: Kur-Kuruvai, Sam-Samba, Nav-Navarai, Sor-Sornavari, BLB-Bacterial Leaf Blight, BHP-Brown Plant Hopper

Future directions for using statistics to assist agricultural inputs

1. Precision Agriculture: Precision agriculture is the process of gathering information about crop development, soil characteristics, and weather patterns using technology such as GPS,

sensors, and drones. This data can be analyzed using statistical techniques to produce insights that can be used to increase crop yields and decrease input usage.

2. **Machine Learning:** Models that forecast crop yields based on input consumption and environmental parameters can be created using machine learning techniques like neural networks and decision trees. These models can aid farmers in reducing waste and maximizing the use of inputs.

3. **Big Data Analytics:** Using big data analytics can offer information on crop growth and the use of inputs across a wide range of geographic areas. To find patterns and forecast crop production, statistical techniques like clustering and regression analysis can be utilized.

4. Robust Experiment Design: Using statistical techniques, experiments can be created that are resistant to a variety of causes of variation, such as soil heterogeneity or climatic changes. Farmers may benefit from getting more precise and trustworthy findings from their trials in this way.

5. Bayesian Analysis: As new data become available, the model can be updated using Bayesian analysis to account for the uncertainty related to the use of agri-inputs. With the most recent data, this can assist farmers in choosing the best input strategy.

Conclusion:

The advantages of agri-input optimization in agriculture, including higher yields, lower input costs, environmental advantages, and economic advantages, are often well supported by statistics. In conclusion, there is strong statistical support for the benefits of agri-inputs in agriculture. Research has consistently shown that optimized inputs such as seeds, fertilizers, and pesticides can lead to increased crop yields, reduced input costs, and environmental and economic benefits. These benefits are essential for achieving food security, promoting sustainable agriculture, and adapting to the effects of climate change. However, it is important to note that the use of agri-inputs must be balanced with sustainable agricultural practices to minimize any potential negative impacts on the environment and human health. Furthermore, the use of agri-inputs should be tailored to the specific needs and conditions of each farm, taking into account factors such as soil type, climate, and crop variety.. Continued research in agri-input optimization and the development of new technologies can help further enhance the benefits of these inputs and support sustainable and productive agriculture. By using agri-inputs in a responsible and efficient way, we can help ensure that agriculture can meet the needs of a growing global population while preserving natural resources for future generations.

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COMMERCIALISATION OF AGRICULTURE

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What do you mean by commercialisation of agriculture?

Commercialization of agriculture means the production of crops for sale in the market rather than for self-consumption. It began during British rule. This brought a change in home consumption to cultivation for the market.

"Commercialisation of agriculture" refers to cultivating crops for commercial selling instead of personal use. An "excess" of output above must be used to market farm goods. However, agriculture was only primitive during the period. It was not the result of peasants' deliberate responses to market pressures. As a result, the idea of the surplus was only partially meaningful. The marketable surplus was decided by the peasants' human community, not their entrepreneurial activity. Farmers' small-scale agricultural needs frequently influenced the choice to produce cash crops. As a result, corporate agriculture in India was not the result of "peasant economic efficiency."

Introduction:

Indian agriculture has been undergoing spectacular changes in recent period. These changes are manifestations of large scale commercialisation and diversification taking place in the agricultural sector. They broadly include cultivation of new crops and varieties, increase in the share of area under cash crops, large scale spread of livestock activities and fisheries, pursuance of hi-tech agriculture in the areas of aquaculture, bio-technology, horticulture, processing, etc. The latest changes are basically responses of our agriculture to new economic environment ushered in by the process of liberalization

Historical perspective

Before the advent of the British rule, crops such as cotton, tobacco and sugarcane were grown fairly extensively since land revenue had to be paid mostly in cash and the prices of these crops, relative to those of foodgrains, were much higher at that time. Even during the British rule, the situation did not change much. Though the primary concern of the rulers from then onwards was the expansion of trade, some of the policies in pursuit of this objective introduced market forces into agriculture. In the process, land was rendered marketable in principle as the British vested the property rights on land with the individual farmers for the first time. This, coupled with the growth in population and infrastructural investments in irrigation, communication and transport, resulted in rise in land value. Besides, expanding trade opportunities in agricultural produce also brought forth inflow of finance from rent-seeking urban traders and money lenders to agriculture. This set off the emergence of a different outlook for farm enterprise from an enterprise that provided a source of livelihood to one that had the potential of a commercial venture.

The All India Rural Credit Survey (AIRCS) 1951-52 was a pioneering attempt to capture the salient features of the agrarian structure. The survey report threw up a fair idea as to the extent of commercialisation with its regional perspective along with its correlates such as cropping pattern, value of gross produce per unit of land, distribution of holdings, land rent paid in cash and kind, wages paid in cash and kind, borrowings, etc. AIRCS classified the regions under three categories, viz., (i) subsistence region characterized by lower proportion of cash expenses in total expenses and lower proportion of cash proceeds from crop sales to gross value of output, (ii) monetised regions which had significantly higher proportion of cash transactions but with relatively low share of cash crops in the net sown area and (iii) commercialised and monetised regions having a high share of cash crops in the net sown area besides higher proportion of cash transactions. Further, it was observed that the average rent paid in cash and kind to landlords as proportion of gross value of produce was twice as high in the commercialised regions compared to subsistence regions. Similarly, the proportion of wages and salaries also was significantly higher in commercialised regions.

Agricultural sector has witnessed significant changes in the crop-mix over time in favour of superior cereals, non-traditional oilseeds such as sunflower, soyabean, etc. These changes have been largely the manifestations of conscious public policy support through price incentives, investment in generation of new technology, etc. Diversification of agriculture, outside the crop sector by way of subsidiary enterprises in animal husbandry, poultry, fisheries, sericulture, etc., has been an important development that accompanied commercialisation. There has been acceleration in the commercialisation, growth and diversification of agriculture since 1980s, especially during 1990s. The positive feature of this phase of commercialisation is the coverage of even small and marginal farmers and backward regions (for detailed exposition on the topic see Nadkarni and Vedini, 1996, Satyasai and Viswanathan, 1996a).

The concept of commercialisation

Commercialisation of agriculture has taken place at different times in response to different stimuli. Earlier, growing of cash crops like cotton, sugarcane, jute, tobacco, etc., that were grown exclusively for the market had been considered synonymous with commercialisation. Over time, even foodgrains were produced for the market due to cash needs of the farmers. This transition has been hastened by the Green revolution which increased the marketable surplus. Favourable price policy for foodgrains has also contributed to this transition.

Extent of commercialisation

A number of indicators have been used for this purpose since the commercialisation process cannot be captured solely by any single indicator.

National level

A. Product Commercialisation

Commercialisation on product side includes increase in marketable/marketed output relative to production, changes in product-mix, within crop sector in favour of commercial crops, both in terms of area and production, diversification towards different sub-sectors of agriculture, viz., livestock, poultry, fisheries, forestry, advent of high-tech agriculture, diversification towards secondary sector, i.e. agro-industry. These are discussed in the following paragraphs.

i) Shift in Cropping Pattern

Historically, Indian agriculture had been dominated by food grain crops although cultivation of commercial crops like cotton, sugarcane, tobacco, etc., was prevalent from olden days.

ii) Diversification

Diversification in agriculture can be broadly defined as producing increased number of agricultural commodities. Diversification becomes necessary for developing countries since growing of basic staples such as cereals alone cannot support the economic development notwithstanding the need to ensure food security to the people. In essence, diversification to commercial crops/commodities becomes an essential strategy that can increase income levels in agriculture, reduce risks of crop failures and earn foreign exchange. Further, diversification can be designed to help poverty alleviation, employment generation and environmental conservation.

Regional level

i) Area Shifts

The regional/state level conform more or less to the pattern of commercialisation that emerged from the changes in the crop-mix itself. While Punjab, Tamilnadu, Haryana, Gujarat, Andhra Pradesh and Uttar Pradesh stood in the first six positions in descending order in the 1970-71, states of the eastern region, Madhya Pradesh in north, IVlaharashtra in the west and Karnataka in the south depicted a poor standing compared to the average of all India. Although the top ranked states in terms of commercialisation retained their status during 1990-91 also, the index has come down in all the states indicating that the inter-state disparities in commercialisation has narrowed down. The states that performed better in improving their position with respect to commercialisation were West Bengal and Orissa in Eastern region and Maharashtra in west and the losers are Bihar and Rajasthan.

Farm level

Commercialisation is observed on large farms on a relatively significant scale. For, the small farmers are bound to cultivation of food crops for self-consumption and may wish to avoid risks of early adoption of any commercial venture. Large farmers have also access to better market information. Even experiences of other countries such as Guatemala (vegetable farming) and kenya (sugarcane farming) revealed that smallholders.

Consequences of commercialisation

Food security

The growing importance of non-foodgrain crops in terms of increase in their share over time would have seriously thwarted our food security system had it not been due to the introduction of the Green Revolution technology during 1967-68 which brought forth impressive growth in crop yields. As a result, the output had increased and so as the market arrivals. For instance, the market arrivals of paddy and wheat as proportion of their production jumped from a mere 3.6 per cent in 1960-61 to more than 20 per cent by 1967-68 and above 30 per cent by late 1980s. This is an indication that these crops have attained a commercial status and have been substituted for other uneconomical crops, the best example being the case of large scale cultivation of rice and wheat in North-Western states. This had a positive influence on our food

security. Despite the negative pulls of a burgeoning population, we maintained adequate buffer stock of foodgrains.

Increase in household income and change in consumption pattern in terms of nutritive values are natural consequences of commercialisation.

Other important changes in agricultural sector that had positive influence on our food security were increasing share of livestock and fisheries, on one hand, and increase in the share of fruits and vegetables in our food basket. These developments had the influence of improving the availability of animal protein as well as fruits and vegetables in the Indian diet (Satyasai and Viswanathan, 1996b).

Factors influencing commercialisation

Population and food security

Demographic change is a key determinant of commercialisation facilitating or impeding the process depending on the availability of resources. In a situation where expansion of the cultivated area is still possible, and if the marginal labour productivity exceeds the marginal subsistence requirements, population growth may enable in increasing the marketable surplus on one hand. On the other hand, due to perceived food sepurity risks, population growth might lead to reduced volume of marketed surplus in relative or even in absolute terms in regions with deficient market linkages. In the case of Indian agriculture, there is ample evidence to prove that the growth of population had been a driving force to bring about marginal expansion in cultivated area but nevertheless a substantial increase in productivity especially after the seventies.

Technological factors

Technological change is another factor which influences commercialisation. Although increased commercialisation can occur without technological change in agriculture, technological change without increased commercialisation is unlikely because the increased use of purchased inputs and specialisation are inherent elements of technological innovations in agricultural production. Technical considerations such as replenishing soil fertility, besides providing nutritious diet was an important factor behind inclusion of pulses in the cropping pattern. With the advent of new technology, the cash requirements of farm households increased on account of increased use of purchased inputs necessitating the cultivation of cash crops on a large scale.

Infrastructure

Infrastructural support is an important pre-requisite for commercialisation which is, at present, not commensurate with the production potentials available across states. For instance, concentration of production of fruits and vegetables and infrastructural facilities including processing capacity were observed to be mismatched across states (Viswanathan and Satyasai, 1997). Policies have to focus on aspects that foster commercialisation by facilitating an open domestic and international trade environment, improving hard and soft infrastructure for opening up new market opportunities and ensuring legal security. A study conducted by Ahmed (Ahmed, 1995) while attempting to quantify the impact of investments in rural infrastructure in the process of commercialisation concluded that improved infrastructure is a primary driving force under every condition for commercialisation. The benefit of commercialisation and

specialisation, to a greater extent, depend upon infrastructure and both have a 'push and pull' relationship.

Government policy

Commercialisation can also be enforced by direct government action through regulations related to the establishment and management of plantations. Commercialisation in a country also depends on the existing global economic environment and trade relations.

Public policies like agricultural price policy, market interventions to make available food to the poor and national priorities such as food security, creation of irrigation infrastructure, wasteland development, etc., have influenced the cropping pattern changes. For instance, area under oilseeds - especially non-traditional oilseeds -registered an impressive growth after mid-eighties following the launching of the Technology Mission on Oilseeds in 1986 in response to the national priority of curbing the increasing import bill on account of oil imports.

Information technology

Information technology can provide some of the most innovative tools/usages in the field of agricultural marketing in general and export trade in particular. If these tools are in conformity with the domestic trade policies and international technological sophistication, the technology can be effectively utilised for planning, analysis and policy making with the help of computer based information mangement systems, forecasting, modelling and other quantitative techniques. For the trade organisations or state-owned trade supporting organisations information technology can be utilised for order processing, export-import documentation and electronic data interchange *W\\h* the private or co-operative entities located at the grassroots level.

Role of institutions in commercialisation

While examining the factors that contributed to the growth of sericulture and its commercialisation, the institutions which played a complementary role in this growth process assume importance. Since commercialisation is closely linked to the marketing aspects, perhaps tfie role played by the institutions in marketing of the agricultural pro-(fcjce is the most important. Agencies/institutions that promoted agricultural exports can also be considered under this category as the difference lies only in the frontiers of marketing. Other groups of institutions that have also played a significant role in the process of commercialisation and diversification of agriculture are the financial institutions purveying credit for the purpose.

Agricultural marketing institutions

A. Regulated markets

As early as in 1928, the Royal Commission on Agriculture pointed out that "the prosperity of the agriculturists and the success of any policy of general agricultural improvement, depend to a very large degree on the facilities which the agricultural community has at Its disposal for marketing, to the best advantage, as much of its produce as is surplus to its own requirement". And, therefore, on the recommendation of the Commission, regulated markets for agricultural produce were established in the country. Before Independence, there were 250 regulated markets in the country which were mostly confined to cash crops like cotton. During the era of planned development in the country, more and more markets and crops were brought under regulation. As a result, there are 6738 regulated markets in the country handling a variety of agricultural produce.

B. Marketing Co-operatives

Although co-operative marketing societies came into being with the Co-operative Societies Act of 1912, it was the Report of All India Rural Credit Survey (1951) which recommended integrating co-operative credit and marketing societies in the rural areas for an effective solution to the credit and marketing problems of the farmers. The successive Five year plans also stressed the need for development of co-operative marketing. This resulted in the wide network of primary level co-operative marketing societies having strong linkages with all the important terminal markets in the country. In majority of the states wholesale agricultural produce markets are organised at the secondary level and the Apex Marketing Federations at the State level while in some of the states there are intermediate markets at the district level. The National Agricultural Co-operative Marketing Federation of India (NAFED) is the apex body of the co-operative marketing system at the National level.

C. Parastatal marketing agencies

The variations in farm output price and consumer price for agricultural produce and the need to create marketing facilities for future growth, required the State intervention by way of establishing public sector marketing agencies. Public sector marketing agencies were established to deal with procurement and marketing (including PDS) in major agricultural commodities like foodgrains, cotton and jute like Food Corporation of India (FCI), Cotton Corporation of India (CCI) and Jute Corporation of India (JCI), respectively.

i) Food Corporation of India

The FCI as the chief agency of the Government of India in handling the imports, procurement, storage and distribution of foodgrains and for implementing the national food policy, has played an important role in the process of commercialisation of agriculture. Besides, import, storage and distribution of fertilisers, the purchase, storage and distribution of levy sugar is also handled by the corporation. In the eighties there had been tremendous rise in the quantity of foodgrains handled by FCI, which reflects the rise in domestic production and market arrivals. During the six years from 1981-82 to 1986-87, total annual purchases of all commodities increased from about 17 million tonnes valued at Rs. 3434 crores to 22 million tonnes valued at Rs. 5737 crores of which foodgrains account for 90 per cent of the purchases. The fact that the foodgrain purchase of FCI are confined to only wheat and rice further strengthens the argument that these two major cereals aquired the status of cash crops on account of quantum jump in their production and, consequently, increasing the marketable surplus.

ii) Agricultural and Processed Food Products Export Development Authority (APEDA)

The increased production of various agricultural commodities and the potential for agricultural exports necessitated the establishment in 1986 of APEDA which acts as a nodal agency for agricultural exports, especially, of processed food in value-added form and ensuring effective quality control. The responsibilities of APEDA include survey and preparation of feasibility studies, participation in equity through joint venture, registration of exporters, quality control and standards, improving packaging, improving marketing abroad, collection of export statistics and training. Efforts taken by APEDA had significant impact on growth of exports of its scheduled products from Rs. 422 crore in 1988-89 to Rs. 2271 crore in 1994-95.

iii) Marine Products Export Development Authority (MPEDA)

Marine Product Export Development Authority (MPEDA) was set up in 1972 to undertake promotional works relating to export of marine products. The role of MPEDA includes developing off-shore and deep sea fishing, promoting shrimp farming using latest technology, adopting measures required for diversifying export products and export market, modernising seafood industry, inducting new technology for value addition, extending marketing services and ensuring quality control in fishery products. It is also vested with the responsibilities for development of marine products industry.

iv) Commodity Boards

Most of the plantation crops grown in the country are cultivated on commercial scale for selling in the market and many of these products have export potential. The specialised nature of these crops warranted creating specific agencies for to take care development, promotion and marketing aspects of the^s crops. Accordingly, Commodity Boards were established for tea, coffee, rubber, spices and for horticultural crops.

v) National Dairy Development Board (NDDB)

The NDDB was created in 1965 with the mandate of replicating the "Anand Model" initially in the dairy sector in other parts of the country. In the late sixties, with the implementation of Operation Flood, the milk production rose from 20 million tonnes in 1970 to 32 million tonnes in 1978 during the first phase. Operation Flood II (1981) was started with the objective of building a National Milk Grid linking 136 rural milk sheds in 22 states and Union territories with the urban demand centres in the country and creating infrastructure required to support a viable dairy industry. Operation Flood III (1987-96) is to consolidate the gains of earlier phases. The main focus of the programme is on achieving financial viability of the Milk Unions/ State Federations and on adopting the salient institutional characterestics of the "Anand Model" Co-operatives. The Board has successfully replicated the Anand Model in oilseeds, fruits and vegetables, salt and tree sectors as well.

Constraints to commercialisation

The commercialisation process faced several constraints in the past and many of these constraints are relevant even today while new constraints are being experienced.

A. Marketing constraints

Inefficient agricultural marketing system has been a major impediment in the growth of marketed surplus and realisation of remunerative prices by the farmers. Inspite of best efforts by the state, weaknesses still persist. Some of the maladies that affect the agricultural marketing are presence of unduly large number of middlemen, long marketing channels, malpractices by the intermediaries, information gap due to lack of free and effective flow of information

B. Input supply constraints

Supply of inputs in adequate quantity and time is essential for success of commercial projects. For example, for establishing plantations successfully, supply of quality seedlings is a prerequisite. In vast tracts of our country which are rainfed, water is a major constraint for undertaking land based commercial ventures.

C. Technology constraints

Lack of suitable technology and non-adoption of the available technology poses severe constraint. Technology is capable of easing some of the constraints. For example, tissue culture can solve the problem of non-avilabillty of quality seedlings in adequate number. Water saving technologies such as drip/sprinkler irrigation can ease the water shortage in rainfed areas to a large extent. Recent advances in information technology can bridge the information gaps in agricultural marketing system.

D. Infrastructure constraints

Constraints on account of adequate infrastructure galore in the agricultural marketing system in our country. Lack of roads, cold storage facilities, transport (including refrigerated) facilities, air cargo, pre-cooling, etc. Inadequate post harvest facilities relating to processing, grading, packing and erratic supply of electricity etc., is also a major impediment. Delays in electric connection is yet another important constraint.

E. Institutional constraints

The present level of exploitation of agro based hi-tech potential in the country has been observed to be very low. The supply of credit is inadequate to meet the demand not withstanding the significant role played by NABARD and credit rnstitutions.

Lack of awareness among entrepreneurs, bank personnel and other implementing authorities about the relevance of hi-tech and absence of effective coordination among different agencies involved are the major constraints.

The existing provisions of Land Ceiling Act in the country impedes large scale cultivation. Most hi-tech and commercial ventures require large extent of area under cultivation to achieve break-even point.

F. Socio-economic constraints

The socio-economic profile of our agriculturalists is not always conducive for adoption of new technology. Green revolution technology being scale neutral could enlist the participation of most of the farmers, sooner or later, irrespective of farm size. However, the new commercial agricultural ventures are capital intensive, require indepth knowledge and involve high degree of risk and hence, are not amenable for individual farmers many of them are illterate.

Impact of commercialization of agriculture?

1. Increase in Equality-Normally speaking, it should have acted as a catalyst in increasing agricultural productivity. But, in reality this did not happen due to poor agricultural organization, obsolete technology, and lack of resources among most peasants. It was only the rich farmers; who benefited and this in turn, accentuated inequalities of income in the rural society.
2. Major benefits to planters, traders and manufacturers- The commercialization of agriculture beneficial to the British planters, traders and manufacturers, who were provided with opportunity to make huge profits by getting the commercialized agricultural products at, throw away prices. The commercialization of Indian agriculture also partly benefited Indian traders and money lenders who made huge fortunes by working as middlemen for the British.

3. Increased dependency on moneylenders-The poor peasant was forced to sell his produce just after harvest at whatever prices he could get as he had to meet in time the demands of the government, the landlord, the money lender and his family members' requirements. This placed him at the money of the grain merchant, who was in a position to dictate terms and who purchased his produced at much less than the market price. Thus, a large share of the benefit of the growing trade in agricultural products was reaped by the merchant, who was very often also the village money lender. Commercialization of agriculture did not encourage growth of land market because major profit of commercialisation went to company traders and mediators. Indian money lenders advanced Cash advances to the farmers to cultivate the commercial crops and if the peasants failed to pay him back in time, the land of peasants came under ownership of moneylenders.
4. Decline in Food Production & Frequent Famine-Most of the Indian people suffered miserably due to the British policy of commercialization of Indian agriculture. It resulted in reduced area under cultivation of food crops due to the substitution of commercial non-food grains in place of food grains. Between 1893-94 to 1945-46, the production of commercial crops increased by 85 percent and that of food crops fell by 7 percent. This had a devastating effect on the rural economy and often took the shape of famines.
5. Impoverishment of Indian People- The misery was further enhanced became the population of India was increasing every year, fragmentation of land was taking place because of the increasing pressure on land and modern techniques of agricultural production were not introduced in India. Thus, the commercialization of agriculture in India by the British was also one of the important causes of the impoverishment of the Indian people.
6. Regional Specialization of crop- Regional specialization of crop production based on climatic conditions, soil etc., was an outcome of the commercial revolution in agriculture. Deccan districts of Bombay presidency grew cotton, Bengal grew jute and Indigo, Bihar grew opium, Assam grew tea, Punjab grew wheat, etc.
7. Linking Agriculture sector to World Market- Another important consequence of the commercial revolution in agriculture was linking of the agricultural sector to the world market. Price movements and business fluctuations in the world markets began to affect the fortunes of the Indian farmer to a degree that it had never done before. The farmer in his choice of crops attached greater importance to market demand and price than his home needs. The peasant class got adversely affected owing to imbalances in market condition.
8. Adverse effect on self-Sufficiency-Commercialization of agriculture adversely affected self-sufficiency of village economy and acted as major factor in bringing the declining state in rural economy.
9. Effect on traditional agriculture-industry relation-Commercialisation effected traditional relations between agriculture and industry. In India, traditional relations acted as factors for each other's development which were hampered
10. No Technological Development-Commercialization of agriculture indicated a commercial revolution. But this was devoid of any support from any technological revolution. Owing to true the healthy benefits which agriculture and associated fields would have enjoyed were lacking. The commercialization of agriculture had mixed effects. While it assisted the

industrial revolution in Britain, it broke the economic self-sufficiency of villages in India. The commercialization of agriculture was a new phenomenon in Indian agriculture scene introduced by the British. While the upper class and British industries benefited-from it, the Indian peasants' life was tied to remote international market.

11. Peasant Revolts-The worst effect of commercialization was the oppression of Indian peasants at hands of European. This found expression in the famous Indigo revolt in 1859. Moreover, commercialization of Indian agriculture got manifested in series of famines which took a heavy toll of life.

Positive Impacts of commercialization of agriculture:

In spite of having many negative effect commercializations in one sense was progressive event. Commercialisation encouraged social exchange and it made possible the transformation of Indian economy into capitalistic form. Commercialisation linked India with world economy. It led to the growth of high level social and economic system. The important contribution of commercialisation reflected in integration of economy. It also created a base for growth of national economy commercialisation of agriculture led to growth of national agriculture and agricultural problem acquired national form. It also brought about regional specialization of crops on an efficient basis.

Summary and Conclusions:

Commercialisation is a multifaceted phenomenon with its orientation depending on the technology, policies and the location-specific objective conditions. In a nutshell, it refers to production with a market-orientation. The transformation in agriculture during the last three decades, suggests that our agriculture has acquired commercial characteristics on a significant scale. The present paper seeks to examine the process of commercialisation and diversification of agriculture in the country.

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AGRICULTURAL PRICE POLICY

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India has implemented an agricultural price policy since it became an independent nation. However, India's agricultural price policy has changed significantly for various years and crops. The prices of food grains like wheat, rice, and coarse cereals like jowar, bajra, maize, etc. were heavily emphasised by this policy. Once more in 1950, the Foodgrains Procurement Committee was established, and it was this group that instituted the nation's rationing and control of the food grain supply (Singh, 2017).

Agriculture policy's main objective is to intervene in the markets for agricultural goods in order to affect price levels and their fluctuations, particularly from farm gate to retail level. Price policy is a major topic of discussion in both economics and politics because it aims to promote equity and growth in the nation. There are competing goals involved. Because the price policy affects the majority of the population, it is constantly being reviewed along with its tools. Increased agricultural production and affordable food grain supply were its twin objectives at the time of independence. Up until the middle of the 1960s, a variety of price controls, primarily the importation of foodgrains and their distribution at prices below market value, were practised. When the green revolution was introduced in the 1960s, price policy was given credit for helping to boost domestic agricultural production (Reddy *et al.*, 2018).

Only in 1964 a clear-cut strategy for offering incentive prices to farmers was introduced. Correctly stating that "the producer of food grains must get a reasonable return,". In other words, the farmer should have the assurance that the costs of the commodities he produces—including foodgrains—will never drop below a reasonable minimum. The Food Grain Price Committee was therefore established in 1964 (Singh, 2017).

This committee suggested a number of actions, including;

- Rationing in major cities,
- Lowering prices through lower-priced or fair-priced shops,
- The removal of restrictions on the movement of food grains between states,
- The imposition of regulation and licencing of the wholesale trade in food grains, and finally the strengthening of the state administrative machinery.
- Again, as per the recommendation of this committee, the agricultural price commission was set up in january 1965 with a broad framework of price policies. In the year 1985, it was renamed commission for agricultural cost and prices (cacp) (singh, 2017).
- In 1980, the policy framework was changed, and the emphasis shifted from maximising food grain production to making sure that the production pattern was diversified and met the needs of the indian economy as a whole. Three support strategies—technology, inputs, and marketing—were added to non-food grain crops in order to achieve the new strategic goal.

As a result, there was an increase in the production of non-cereal foods like edible oilseeds, fruits, vegetables, spices, and livestock products.

The main instruments of Agricultural price policy have been:

(1) guaranteed prices to producers through a system of minimum support prices put into place through mandatory procurement,

(2) Maintaining buffer stocks,

(3) ensuring intra- and inter-year price stability through open market operations,

(4) distributing food grains at reasonable prices through the public distribution system (Acharya, 1997).

Why need of agricultural price policy?

Price fluctuation is a typical feature. However, sudden and violent changes in the prices of agricultural products have a negative impact on the nation's economy. Because of the sharp drop in price of a particular crop, farmers who grow that crop suffer a great loss in income. This will make it impossible for farmers to grow the crop in the following year, which will result in a severe shortage of that food item. The government may then be forced to import that food crop from abroad.

In contrast, a sudden increase in the price of a certain crop may cause great suffering to the consumers, forcing them to discard it or significantly reduce their other spendings in order to cover the consumption expenditure on that crop. Both ways, the country's economy will suffer as a result of the widespread price fluctuations in agricultural products.

The government's price policy for agricultural products aims to ensure that growers receive fair compensation for their products in order to boost investment and production and to protect consumer interests by making food supplies affordable (Singh, 2017).

The need for agricultural price policy was clearly identified due to the following factors.

- Compared to the prices of industrial goods, agricultural prices fluctuate more wildly.
- Price changes are disastrous for both consumers and producers. Through speculation, middlemen take unfair advantage of the rest of the population.
- Price fluctuations retards the country's economic growth.
- Price changes have a negative impact on consumer welfare.

Therefore, protecting farmers' interests and providing the necessary incentives to increase agricultural production are major goals of the price policy. By offering the necessary goods through the public distribution system (PDS) at reasonable prices, consumers' interests are protected. As a result, the focus of the fundamental tools of price policy should be on terms of trade that benefit agriculture. Such favourable trade conditions would affect consumers' real income on the consumption side as well as the relationship between input-output price on the production side. The distribution of resources for the necessary inputs among the crops will be influenced by the relative prices of agricultural commodities. Price policy is also directed towards the stabilization of prices (Singh, 2017).

Objectives of agricultural price policy:

The agricultural price policy of the country like India should have the following objectives:

- To safeguard or insure the producer through a minimum support price guarantee, which acts as a stabilising mechanism by lowering price volatility and, consequently, price risk for farmers.
- To encourage an increase in total agricultural output through high input usage, the use of high yielding seed, fertiliser, and water responsive technology.
- To shield consumers from price increases that are too steep, especially low-income consumers during times when supplies don't keep up with demand and market prices are steadily rising (Tripathi, A. K. 2012).
- To keep the terms of trade stable between these two sectors of the economy by maintaining equilibrium between the prices of food grains and non-food grain crops, as well as between agricultural commodities and manufactured goods.
- Maintaining a suitable relationship between the prices of competing crops in order to meet production goals for various commodities in line with the increase in demand.
- To achieve economic equilibrium between the interests of producers and consumers by allowing price variations within a limited range.
- Minimising seasonal price fluctuations and achieving price integration across the nation's various regions in order to maintain a steady flow of marketable surplus for both domestic trade and export.
- Enabling the consumer to buy food grains at fair prices will protect his interests and stabilising the overall price level. (Chandra *et al.,* 2013).

Following objectives of price policies are formulated by APC:

- To achieve price stability without hampering the income of the farmers.
- To provide price support to the farmers in the initial stages and remunerative prices at later stages.
- By providing necessary goods at reasonable prices, to protect the interests of the consumer.
- By setting appropriate parity prices, it is possible to keep the terms of trade in the core sector's favour and preserve the reasonable correlation between the prices of manufactured goods and agricultural commodities.
- To maintain healthy relationships between the competing crops.
- To create an environment that encourages farmers to use the necessary new technology to increase agricultural production through remunerative prices for agricultural products.

A number of pre-independence government initiatives came to an end with the current price policy. Before independence, there were already provisions in place for the procurement of foodgrains, interregional movement restrictions on foodgrains, rationing, and the distribution of essential goods by the civil supplies corporation etc. were in operation even before independence. Even after independence, these control measures persisted to varying degrees. After the APC was founded, the first price policy was to give farmers price support as a means of encouraging them to increase agricultural output. Later, the Indian government set up many committees to discuss agricultural price policy.

Recommendations on agricultural price policy

Recommendations of the expert committee headed by Dr. C.H. Hanumantha Rao on methodology of cost of production of crops are:

- To evaluate the approach taken with regard to the generation of cost of production estimates under the comprehensive plan for examining the costs associated with the cultivation and production of different crops.
- To review "the terms of trade" between the agricultural and non-agricultural sectors and make recommendations for ways to protect farmers' interests.
- To suggest any other measure in order to increase the crop production's profitability.
- The committee looked into every matter and made the following suggestions:
- Whether they are market wages or the statutory minimum wage, the actual wages paid to the casually hired labour may still be used as the basis for evaluation.
- Family labour should be valued on the basis of actual wage rates for casual labour.
- A possible increase in production costs that is likely to happen during the cropping season should always be factored into procurement/minimum support prices announced prior to the sowing season. Before crops arrive on the market, the Commission should take another look at changes in input costs and adjust the minimum support prices or procurement prices if the observed increase in input costs turns out to be greater than expected.
- The Commission should publish the methodology including weighting diagram and index numbers of input prices used by them in their reports.
- The paid out cost will be 10% higher to account for management input for the farmers.

Recommendations of special expert committee (Sen's committee):

- A new cost classification system that includes six cost concepts—cost A1, cost A2, cost B1, cost B2, cost C1 and cost C2—is introduced.
- Use of cost index numbers with a three-year base as a price fixation guide instead of an absolute base.
- To study the relative movement of prices over time, farmers constructed an index of the prices they received and the prices they paid (only for goods used in production).
- Costing of inputs based on actual costs and imputed values based on the opportunity cost principle.

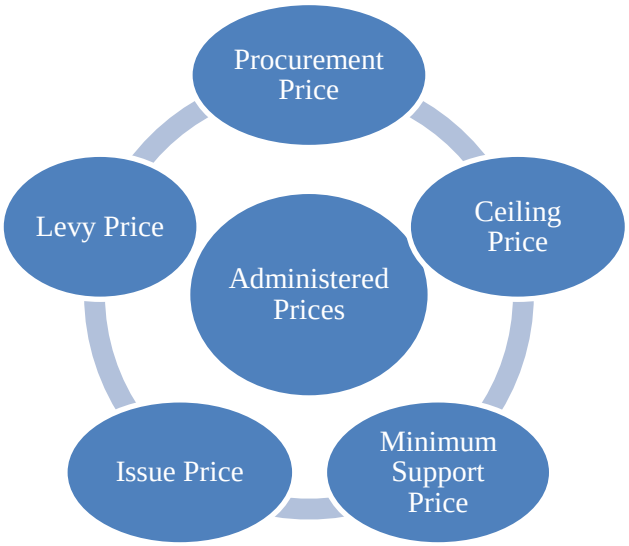
The following are the major functions of APC:

- To provide advice to the government on price policy, including the establishment of minimum support prices for agricultural commodities such as tobacco, rice, wheat, jowar, bajra, maize, ragi, barley, gram, tur, moong, and urad.
- To recommend appropriate measures to make price policy effective.
- To recommend appropriate measures to lower marketing costs and suggest reasonable price margins at different stages of agricultural marketing.
- To provide guidance to the Indian government on any issue involving agricultural production and price.

- Setting the minimum support price (MSP), which is based on the average cost of production, the procurement price, which is a premium over the minimum support price, the ceiling price, the issue price, the levy price, etc.

Administered prices

The administered price regime consists of the following: i) minimum support prices (MSP) for 24 commodities (seven cereals, four pulses, eight oilseeds, copra, raw cotton, sugarcane, raw jute, and VFC tobacco); (ii) a minimum legal price for sugarcane; (iii) levied prices for rice and sugar; and (iv) central issue prices for rice, wheat, and coarse cereals for sale through public distribution systems. Open market operations are carried out by government organisations like the Cotton Corporation of India, the National Agricultural Cooperative Marketing Federation (NAFED), the Jute Corporation of India, and state level federations.



i) Procurement price

It is the price at which the government purchases goods from producers or processors in order to maintain buffer stocks and supply the public distribution system. However, the government is forcing the farmers to sell a portion of their produce to the government at the announced procurement price through the use of the policy tool of procurement prices.

ii) Ceiling price

A ceiling price is the maximum price at which a good can be sold that the government has set in order to shield consumers from unjustified price increases. By fixing ceiling price Government checks that traders are not charging more than the maximum price. Farmers are exempted from it.

iii) Minimum Support Price (MSP)

It is fixed based on average cost of production. The primary goal of this is to safeguard farmers from price drops that may occur during periods of excess production or a glut in the market. Every year, the Government of India releases MSP in advance of the agricultural seasons. The price at which the Indian government commits to buying all of the quantities supplied by the farmers is known as the minimum support price. However, since farmers are not required to sell their goods to the government, MSP is always less than the market price for foodgrains.

iv) Issue price

It is the price at which consumers can purchase goods from stores that offer fair prices. Issue price always remains higher than procurement price.

v) Levy price

The levy price applies to both farmers and traders. It can be imposed on both the farmers and traders depending on the market situation for the food grains. The levy system is a procurement system, which makes it obligatory for farmers and traders to sell special quantity to the Government at the procurement price. They are permitted to sell the remaining part in the open market.

The procurement price is turning into a levy price as a result of the element of compulsion and the government, through the Food Corporation of India, is buying rice and wheat from the millers in accordance with the levy. The Millers are compelled to sell the FCI a portion of the rice they milled for them at the levy price. The levy price system will continue to be in place as long as there is a shortage of rice and Millers anticipate selling their goods for a profit in the open market. In comparison to rice and wheat, the number of coarse cereals purchased at the minimum support price continues to be much lower (Reddy *et al.* 2018).

APMC act 2003

The APMC act has the following characteristics as:

- Ensuring complete transparency in the market area of agricultural product transactions and pricing structure.
- To establish and encourage public-private partnerships for managing agricultural markets.
- It made possible to buy agricultural products directly from farmers in one or more market areas or through private yards.
- A new chapter on contract farming was added with the intention of establishing requirements for the mandatory registration of all sponsors, the documentation of contracts, and the resolution of disagreements.
- There is a provision for the direct sale of farm products from the farmer's field to the contract farming sponsor without the need for them to travel through notified markets.
- The sale of specified agricultural commodities in any market area is subject to a single point levy of a market fee.
- Encouraging the processing of agriculture.
- Licensing of market functionaries is dispensed with and a time bound procedure for registration is laid down.
- To facilitate the direct sale of agricultural products to consumers, provisions are made for the establishment of farmers' markets or consumer markets.
- Any agricultural products brought to the market area for sale are exempt from paying the market fee, according to state law.
- The funds may be used by market committees to establish facilities for grading, standardisation, quality certification, etc. (Chandra *et al.*, 2013).

Minimum Support Price/Procurement Price for Kharif (Rs. per quintal)

Crop	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Paddy common	1000	1080	1250	1310	1360	1410	1470	1550	1750	1815	1868	1940	2040
Paddy Grade 'A'	1030	1110	1280	1345	1400	1450	1510	1590	1770	1835	1888	1960	2060
Jowar Hybrid	880	980	1500	1500	1530	1570	1625	1700	2430	2550	2620	2738	2970
Jowar Maldandi	900	1000	1520	1520	1550	1590	1650	1725	2450	2570	2640	2758	2990
Bajra	880	980	1175	1250	1250	1275	1330	1425	1950	2000	2150	2250	2350
Maize	880	980	1175	1310	1310	1325	1365	1425	1700	1760	1850	1870	1962
Ragi	965	1050	1500	1500	1550	1650	1725	1900	2897	3150	3295	3377	3578
Tur (Arhar)	3000	3200	3850	4300	4350	4625^	5050^^	5450^	5675	5800	6000	6300	6600
Moong	3170	3500	4400	4500	4600	4850^	5225^^	5575^	6975	7050	7196	7275	7755
Urd	2900	3300	4300	4300	4350	4625^	5000^^	5400^	5600	5700	6000	6300	6600
Cotton Medium Staple	2500	2800	3600	3700	3750	3800	3860	4020	5150	5255	5515	5726	6080
Long Staple	3000	3300	3900	4000	4050	4100	4160	4320	5450	5550	5825	6025	6380
Groundnut	2300	2700	3700	4000	4000	4030	4220*	4450^	4890	5090	5275	5550	5850
Sunflower seed	2350	2800	3700	3700	3750	3800	3950*	4100*	5388	5650	5885	6015	6400
Soyabean Yellow $$	1440	1690	2240	2560	2560	2600	2775*	3050^	3399	3710	3880	3950	4300
Sesamum	2900	3400	4200	4500	4600	4700	5000^	5300*	6249	6485	6855	7307	7830
Niger seed	2450	2900	3500	3500	3600	3650	3825*	4050*	5877	5940	6695	6930	7287

Source: GOI Ministery of Consumer Affairs, Food & Public Distribution, Farmer's Portal.

** Including Bonus of Rs.75 per quintal.

^ Includin Bonus of Rs. 200 per quintal.

^^ Including Bonus of Rs. 425 per quintal.

* Including Bonus of Rs. 100 per quintal.

$$ Minimum of Support Price of Soyabean yellow is also applicable to black variety during 2015-16 and 2016-17.

! Including Bonus of Rs. 150 per quintal.

Minimum Support Price/Procurement Price for Rabi (Rs. per quintal)

Crop	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Wheat	1120	1285	1350	1400	1450	1525	1625	1735	1840	1925	1975	2015
Barley	780	980	980	1100	1150	1225	1325	1410	1440	1525	1600	1635
Gram	2100	2800	3000	3100	3175	3500**	4000^	4400!	4620	4875	5100	5230
Masur (lentil)	2250	2800	2900	2950	3075	3400**	3950!	4250*	4475	4800	5100	5500
Rapeseed & Mustard	1850	2500	3000	3050	3100	3350	3700*	4000*	4200	4425	4650	5050
Safflower	1800	2500	2800	3000	3050	3300	3700*	4100	4945	5215	5327	5441
Toria	1780	2425	2970	3020	3020	3290	3560	3900	4190	4425	4650	-
Other crops												
Copra (milling)	4450	4525	5100	5250	5250	5550	5950	6500	7511	9521	9960	10335
Copra ball	4700	4775	5350	5500	5500	5830	6240	6785	7750	9920	10300	10600
Jute	1575	1675	2200	2300	2400	2700	3200	3500	3700	3950	4225	4500

Source: GOI Ministery of Consumer Affairs, Food & Public Distribution, Farmer's Portal

MSP for Rabi Marketing Season 2022-23

Crop	**Cost* of production for RMS 2021-22**	**MSP for RMS 2021-22**	**Cost* of production for RMS 2022-23**	**MSP for RMS 2022-23**	**Increase in MSP for 2022-23 (Absolute)**	**Return over cost (in per cent)**
Wheat	960	1975	1008	2015	40	100
Barley	971	1600	1019	1635	35	60
Gram	2866	5100	3004	5230	130	74
Lentil (Masur)	2864	5100	3079	5500	400	79
Rapeseed/Mustard	2415	4650	2523	5050	400	100
Safflower	3551	5327	3627	5441	114	50

Statistic.pib.gov.in (2022-23)

Features of Agricultural Price Policy in India:

Following are some of the important features of agricultural price policy followed by the Government of India since independence:

- **Setting up Institutions:** The Indian government has established a few institutions to carry out the nation's agricultural price policy. The Agricultural Price Commission was established in 1965 as a result, and it announced the minimum support prices and procurement prices for agricultural products. This organization's name was changed to Agricultural Cost and Prices Commission in 1985. Additionally, the government appointed the foodgrains policy committee in 1966, which also suggested various price support measures. In 1965, the Food Corporation of India was founded. The corporation organizes the price of food grains at government determined prices and sale these food stocks through the network distribution system.
- **Minimum Support Price:** To protect the interests of farmers, the government regularly sets minimum support prices for agricultural commodities like wheat, rice, maize, cotton, sugarcane, pulses, etc. In order to maintain a fair price for food grains in the best interests of farmers, the FCI also purchases food grains at procurement prices.
- **Safeguarding Consumer Interests:** The agricultural price policy includes provisions for a buffer stock of foodgrains that will be distributed to consumers through a public distribution system.
- **Fixation of Maximum Prices:** The government typically decides the maximum price of agricultural products in order to protect the general public from exorbitant increases in the prices of essential commodities.

Effects of Agricultural Price Policy:

Important effects of Agricultural Price Policy are as follows:

(i) Incentive to Increase Production: Agricultural price policy has been giving farmers the necessary incentives to increase their agricultural output by modernising the industry. The government should establish the minimum support price in a way that effectively protects the interests of farmers.

(ii) Farmers' Levels of Income have Risen: In addition to supporting prices, the agricultural price policy has given farmers the necessary support, encouragement, and incentives to increase their output. All of these have led to an improvement in farmers' living conditions and income levels.

(iii) Change in Cropping Pattern: The cropping patterns of Indian agriculture have significantly changed as a result of the agricultural price policy. The adoption of contemporary methods and the required government assistance have significantly increased the production of wheat and rice. But in the absence of such price support, the production of pulses and oilseeds was unable to make any significant changes.

(iv) Benefit to Consumers: By consistently providing the necessary agricultural commodities at a fair price, the policy has also significantly benefited consumers.

(v) Advantage for Industries: The agricultural price policy has also been advantageous for the nation's agro-related industries, including sugar, cotton textiles, vegetable oil, and others. By keeping agricultural commodity prices stable, the policy has allowed for an adequate supply of raw materials for the agro industries of the country at reasonable prices.

(vi) Price Stability: The agricultural price policy has stabilised the prices of agricultural products to a large extent. It has become successful to contain the undue fluctuation of prices of

agricultural products. This has created a favourable impact on both the consumers and producers of the country (Singh, 2017).

Suggestions for Rationalisation of Agricultural Price Policy:

Following are some of important suggestions which can be advanced for the rationalisation of agricultural price policy of the country:

(i) **Establishment of Some More Agencies:** Additional organisations should be established in addition to the Food Corporation of India to guarantee fair prices for other agricultural products as well as to source other agricultural products. The government has already established the Cotton Corporation and Jute Corporation, which still requires strengthening. Furthermore, given the expanding potential market for both domestic and international consumption of perishable commodities like potatoes and other vegetables, fruit, etc., the government should establish a separate agency to provide the necessary minimum price support. Existing organisations like FCI should operate more effectively.

(ii) **Extension of the Price Policy:** Beyond the 24 commodities currently covered by the agricultural price policy, more commodities should be included. Commodities like potatoes, onions, and other significant fruits and vegetables may also be covered.

(iii) **Rationalization of Price Fixation:** To ensure that the full cost of production is covered, agricultural commodity prices should be set in the most rational way possible. The rising cost of agricultural inputs should be taken into account when setting prices.

(iv) **Protection of Consumers:** The determination of agricultural prices should be made in a way that can also safeguard the interests of general consumers.

(v) **Modernization:** The agricultural price policy should be designed in a way that will encourage farmers to upgrade their agricultural methods.

(vi) **Agricultural Marketing System Improvement:** Improving the agricultural marketing system is crucial to the success of the agricultural price policy. The hold of middlemen and all other intermediaries should be removed from the farmers.

(vii) **PDS Improvement:** To ensure the successful implementation of agricultural price policy, the public distribution system should be improved. The operation of fair price shops should be streamlined and be made more efficient and transparent (Singh, 2017).

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NATIONAL AGRICULTURAL MARKET

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Introduction:

Indian Agricultural and Allied industry is undoubtedly the largest source of income for the vast rural areas of India. The increase in population has led to increase in demand of agricultural produce which is propelling the growth of agricultural market in India. The gradual change in agro climatic conditions and rise in population has led the farmers to invest more in improved farm technologies, including irrigation, machineries, setting up better farm infrastructures like cold storage etc to meet the diverse needs of population. The present organized agricultural market trend as compared to past unorganized agricultural market has witnessed a significant contribution of agricultural sector to the Gross Domestic Product (GDP). The growth in agriculture and allied sector has increased the consumer purchasing power leading to positive effect on domestic demand of agricultural produce. Due to the surge in population and rising food demand the Indian agriculture market attained a value of USD 435.9 billion in 2022 driven by the growing population and the rising food demand which is predicted to reach USD 580.82 billion by 2028. Increase in the consumer's disposable incomes, rise in population, enhancing technological advancements, rising food demand, and more importantly growing government aid are expected to boost the market growth. In past few years after observing the shortcomings of agricultural market, Government is focusing on the importance of developing marketing channels with elements of transparency in entire chain of transaction, better price of commodities through promotion of private markets and direct marketing.

In addition, Government has integrated markets across the states through a common online market platform called as e-NAM to facilitate pan India trade of various agricultural commodities. This e-platform was launched by Ministry of Agriculture and Farmers' Welfare for farmers and buyers to access and participate in trading in multiple markets or mandis situated anywhere in the country at the local level. This allows the farmers to receive more profit for their goods and improves transparency and price discovery through competitive bidding. The registration of the farmers is free on e-NAM Portal and can sell their produce easily. The main benefit of this platform was to maintain transparency, reduce price anomaly and enhancing the financial literacy of farmers. It was a part of implementation of the roadmap for doubling income of the farmers by 2022. Farmers can unveil their farm produce online from their nearest market and traders can quote price from anywhere. It will ensure more competition as a result of participation of more traders resulting in better returns to farmers. Moreover, it will guarantee transparent price setting and higher farmer returns. As on 05th December, 2022, about 1260 mandis of 22 States and 3 UTs have been integrated with e-NAM platform. Under the e-NAM platform, marketing of agricultural products has so far been documented for a value of Rs. 1.82 lakh crore.

National Agriculture Market

The Indian government post-independence faced difficulty in finding a way to assure appropriate marketing of the country's agricultural products and also getting farmers the right price for their crops. As a result, the Indian government established the Agricultural Produce Market Committee (APMC) or Agricultural Product & Livestock Market Committee to handle this issue. The Indian government first enacted the Model APMC Act in 2003.

APMC:

To shield the farmers from abuse by big retailers, Indian state governments created the APMC, a regulatory and marketing committee. It regulates the prices of crops from farms to retail establishments. With the aid of APMC, the state governments of India make sure that crop prices don't rise significantly. The key responsibilities of APMC are to maintain transparency in pricing, monetary transactions, and—most importantly—ensure that farmers receive money on the same day they sell their products.

Model APMC Act:

The central government of India passed the Model APMC Act in 2003, with the primary objective to develop a better and more efficient marketing system for buying and selling of crops. The main goal of this act is to encourage the export of the nation's excess agricultural goods. Also, by establishing new policies and regulations with the aid of this act, the Indian government aims to improve the country's agricultural infrastructure.

Challenges of Agriculture market in India before introduction of APMC and NAM

- **Presence of too many middlemen:** The presence of an excessive number of middlemen contributed to an increase in the cost of marketing agricultural produce. The ultimate result is that the consumer is responsible for paying a hefty amount, while the producer is barely compensated enough for his work.
- **Lack of storage facilities:** There is a lack of suitable storage or warehousing facilities in the markets.
- **Insufficient Transportation infrastructure:** The transfer of agricultural produce is hampered by insufficient road transportation facilities and links in rural areas. Indian farmers are unable to travel to neighbouring mandis, where they may sell their produce at a more reasonable price.
- **A lack of market intelligence and information systems in India:** There is no market intelligence or information system in India. The Indian farmers are not aware of the rates that are now being charged for their goods in the larger markets.

Why NAM?

The centre's decision to work towards establishing a national agricultural trading platform is a step in the right direction, and the launch of NAM can be attributed to two elements that contributed to the centre's decision to do so. The first issue is the inadequacies that are present in the agricultural marketing regulations that have been adopted by the states, as well as the states' lack of interest in following the centre's advice on these issues.

Farmers face a great deal of regulation and obstructions in their efforts to directly sell their products on the market as a result of the current state of agricultural marketing. Farmers receive only a small portion of the market price as a result of fragmented markets and the huge

number of intermediaries that participate in regulated markets (APMCs). In this scenario, the most effective strategy would be to give the farmer the opportunity to sell his produce straight into the market. In order to accomplish this, the centre developed a model of the APMC Act, which it used to propose amendments to the current APMC law. Yet, several of the states chose to ignore the recommendations made by the centre. It is in this context that the new NAM become very important.

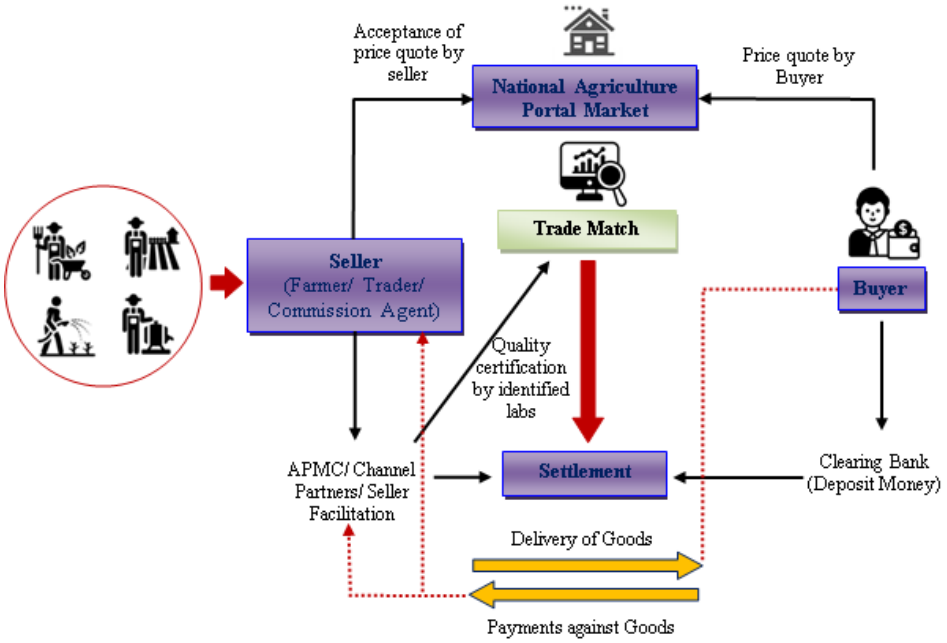

Figure 1: National Agriculture Market

Second, because it is a platform with technological infrastructure, NAM takes advantage of the benefits that technology present for agricultural marketing. Using an electronic auction system, farmers are able to sell their produce directly to customers. They might get a better price for their produce if they sold it through an online auction outside of the conventional boundaries of the regional market. Hence, the most appealing aspect of the NAM is its nationwide online auction platform. A short while ago, the official debut of the NAM's online portal, known as e-NAM, took place. In the context of the LPG phase, some additional problems were added to these traditional issues. These issues include a lack of quality consciousness on the part of farmers and traders, the cultivation of crop varieties that are not suitable for processing and importers' requirements, stringent Sanitary and Phytosanitary standards, the absence of cost-effective production, higher transaction costs, and shifting customer priorities or preferences towards Ready to Eat (RTE) and Ready to Cook (RTC) foods. In light of these shifting conditions, the government of India accepted the challenge of enhancing the vitality and responsiveness of India's agricultural marketing system in order to guarantee profitable pricing to the country's farmers in a manner that is both just and open. Because of this, e-NAM was finally introduced on April 14, 2016, with the intention of providing an online trading platform for agricultural commodities. Even some appealing features, such as the MIS dashboard, BHIM, and other mobile payments, as well as additional capabilities on the mobile app, such as gate admission and payment using mobile phones, and a farmer’s database promoted its acceptance even more.

NAM addresses these challenges by-

- Establishing across the nation a single market through the utilisation of an online trading platform (at state and national level).
- Standardizing processes throughout the united markets to provide consistency.
- Putting an end to inconsistencies in the flow of information between buyers and sellers and fostering the discovery of prices in real time based on actual demand and supply.
- Encourages openness and honesty throughout the bidding process.
- Supplying the farmer with a countrywide market that is easily accessible and offers comparable prices based on the quality of the farmer's food
- The availability of products of higher quality at costs that are more affordable, as well as the option for customers to make purchases online.
- The platform's development, operation, and maintenance are all the responsibility of M/s. Nagarjuna Fertilizers and Chemicals Ltd., which holds the position of Strategic Partner (SP) in this partnership.
- The broad role of the Strategic Partner is an all-inclusive one that includes writing the software, modifying it to meet the specific requirements of the mandis in the States that are willing to incorporate with NAM, and running the platform. This is all included in the broad role of the Strategic Partner.

What is the vision of the National Agriculture Market?

The National Agriculture Market (NAM) is envisioned as a pan-India electronic trading portal that will seek to network the existing APMC and other market yards in order to create a unified national market for agricultural commodities. This is accomplished through the use of blockchain technology. The NAM intends to establish a nationwide network of actual mandis that will be accessible via the internet. The National Agricultural Market, more commonly referred to as e-NAM, is a flagship programme that was developed by the Government of India with the intention of establishing a single national market for agricultural goods. It is a platform for conducting business online and receives all of its funding from the federal government. On April 14, 2016, the Honourable Prime Minister Narendra Singh Modi announced the inauguration of e-NAM. The Ministry of Agriculture and Farmers' Welfare is responsible for overseeing e-NAM as its administrator. The goal of the e-NAM project is to promote uniformity in agricultural marketing by simplifying processes across all integrated marketplaces, eliminating information imbalances between buyers and sellers, and facilitating real-time price discovery that is based on the product's actual demand and supply.

"One Nation One Market" is the slogan that e-NAM uses as its tag line.

How can APMCs join e-NAM?

States (State Agriculture Marketing Boards) that are interested to consolidate their APMCs /mandis with NAM are required to carry out the following reforms in their APMC Act.

a) Single trading license (Unified) to be valid across the state
b) Single point levy of market fee across the state
c) Provision for e-auction/ e-trading as a mode of price discovery.

In order to sell his produce through e-NAM, a farmer is required to establish a connection with the nearest APMC or Mandi. It is not possible for him to get direct access to the e-NAM

portal. It is necessary for a farmer to bring their produce to the APMC in order to be sampled and auctioned off. Following a careful study or bid and the electronic weighing of the sample, the payment will be made to him using BHIM, a cheque, internet banking, RTGS, or NEFT, or a cashier's check. The initial APMC framework, in and of itself, presents its own unique set of difficulties. This lack of uniformity or compatibility has led to the fragmentation of the agricultural market, with each state functioning as its own market due to the fact that it has its own APMC act, with provisions that can vary quite a bit. Each state also has its own APMC act, with provisions that can vary quite a bit.

Yet, the formation of such fragmented markets led to restrictive practises and collusion among dealers, which resulted in an undue dependency of farmers on intermediaries. The primary goal of APMCs was to avoid the exploitation of farmers by traders by bringing all commerce into regulated marketplaces. As a direct consequence of this architecture's design, interstate trade became far more difficult. To find a solution to this problem, e-NAM was developed with the intention of establishing a unified national market in which buyers and sellers are able to conduct business without physically being present in the same place. More potential purchasers are able to place bids on a particular lot while using the e-NAM platform. This dispersed group of online purchasers who bid anonymously helps to cut down on the potential for traders to conspire with one another. This is the primary benefit that comes with using e-NAM.

With the e-NAM system, a trader just needs to obtain one licence that may be used in any of the state's markets. For the initial purchase made in wholesale quantity from the farmers, there is a market fee that is assessed as a single point tax. E-NAM provides the ability for local dealers on the mandi to access a larger national market for secondary trading. This market is on a national level. It decreases the amount of time that a farmer needs to spend transporting his produce to the mandi by increasing access to marketplaces for the farmers through warehouse-based sales. Because of this, the farmers profit from being able to participate directly in trading at the local mandi level through the use of the e-NAM platform, which in turn helps them reduce the expenses associated with intermediation.

Together with direct payments made by traders into the farmers' bank accounts, SMS alerts containing the final price of the auction are also provided to the mobile phones of the farmers. Traders can also quote bids online and buy from many markets using the same licence. Traders can also buy from multiple markets.

Features of e- NAM

- Liberal licencing of traders/buyers and commission agents by state authorities without any pre-condition of physical presence or possession of shop in the market
- One licence for a trader that is valid across all markets in the state.
- A national e-market platform for transparent sale transactions and price discovery of products.
- The harmonisation of quality standards for agricultural products across all markets, as well as quality testing and common marketable characteristics.
- A market fee that is levied once, on the initial wholesale purchase made from the farmer, at the point of sale
- The establishment of soil testing laboratories within or in close proximity to the several mandis.

- The e-NAM mobile app is available for Android, and it allows farmers and dealers to bid and complete a transaction all within the app. The app is available in eight different languages.
- The MIS dashboard, BHIM, and various other mobile payment options were among the features that were added to the app in February of 2018.

Table 1: Detailed list of agricultural commodities under eNAM

Foodgrains/ Cereals (24)	1. Arhar 2. Arhar Dal Split 3. Bajra 4. Barley 5. Basmati rice 6. BuckWheat 7. Chakhao Or Black Rice 8. Chana Dal Split 9. Chana whole 10. Horse Gram 11. Jowar 12. Kabuli Chana Whole 13. Lobia 14. Maize 15. Masoor whole 16. Moong Dal Split 17. Moong whole 18. Moth 19. Oats Raw 20. Paddy 21. Ragi 22. Rajma 23. Urad Dal Split 24. Urad whole
Oilseeds (14)	1. Castor seed 2. Cotton Seed 3. Kusum seed 4. Linseed 5. Mustard seed 6. Neem Seeds 7. Nigar Seed 8. Peanut kernel 9. Pongam seeds 10. Rapeseed 11. Sal Seed 12. Sesame seed 13. Soyabean 14. Sunflower seed
Fruits (31)	1. Amla 2. Apple 3. Apricot 4. Banana 5. Ber6. Cherry Red / Black 7. Custard apple 8. Grapefruit 9. Grapes 10. Guava 11. Jackfruit 12. Jamun 13. Kinnow 14. Lemon 15. Litchi 16. Mango 17. Musk melon 18. Orange 19. Papaya 20. Papaya Raw 21. Passion Fruit 22. Peach 23. Pear 24. Pineapple 25. Plum 26. Pomegranate 27. Raw Mango 28. Sapota 29. Strawberries 30. Sweet orange 31. Watermelon
Vegetables (50)	1. Aloe Vera 2. Banana Raw 3. Beetroot 4. Bhindi/Okra 5. Bitter gourd 6. Bottle gourd 7. Brinjal 8. Broccoli/Calabrese 9. Button Mushroom 10. Cabbage 11. Capsicum 12. Carrots13. Cauliflower 14. Cluster beans 15. Colocasia vegetable 16. Coriander leaves 17. Cucumber 18. Curry Leaves 19. Drumstick20. Fenugreek Leaves 21. Garlic 22. Gherkin 23. Ginger 24. Green chillies 25. Ivy gourd 26. Jimikand (Suran) 27. Lobia Pods 28. Mint Leaves 29. Mustard leaf 30. Onion 31. Oyster Mushroom 32. Pea 33. Pointed gourd 34. Potato 35. Pumpkin 36. Reddish 37. Ribbed celery 38. Ridge Gourd 39. Safed Petha 40. Sem 41. Snake Guard42. Spinach 43. Sponge Gourd 44. Spring Onion45. Sugar Snap Peas 46. Sweet Corn 47. Sweet potato 48. Tapioca 49. Tinda 50. Tomato
Spices (16)	1. Ajwain 2. Black Pepper Whole 3. Cardamoms Whole 4. Cloves Whole 5. Coriander whole 6. Cumin 7. Dried Raw Mango Slices 8. Dry Ginger 9. Fennel seed 10. Fenugreek seed 11. Large cardamom 12. Mace Whole 13. Poppy Seed 14. Red chilli 15. Tejpata 16. Turmeric
Misc (38)	1. Anthurium 2. Areca nut (betel nut) 3. Bamboo 4. Betel leaves 5. Carnation 6. ChhappanKaddu 7. Chironji 8. Chrysanthemum 9. Coconut 10. Coconut with Husk 11. Cotton 12. Gerbera 13. Gladiolus 14. Groundnut with pods 15. Guar seed 16. Hilsa 17. Isabgol 18. Jaggery 19. Jute Seeds 20. Lily 21. Mahua flower 22. Mahua Seed 23. Marigold 24. Nutmeg Whole 25. Persimmon 26. Raisins 27. Raw Cashew nut 28. Raw Jute 29. Ritth 30. Rose Cut Flower 31. Safed Musli 32. Saffron 33. Spray Chrysanthemum 34. Tamarind 35. Tender coconut 36. Tuberose 37. Tulip 38. Walnuts Inshell

Recent development in e-NAM

PAY2CORP is the name of the new payment gateway solution that e-NAM has integrated, and it is now Live. The following steps are required to be carried out as part of the process: -

1) Once the trade between the buyer and seller has been completed, the buyer clicks on the payment option, which takes them to a page where they can choose from a variety of payment methods.
2) If the trader wants to make the payment through SBI Corporate Internet Banking, he must click on the PAY2CORP tab, which will then present him with the option to select SBI as the financial institution.
3) The trader will be taken to the internet banking page for his SBI account, where he will be required to enter his username and password for online banking in order to finalise the transaction.
4) An e-NAM-generated success receipt would be issued after the transaction has been successfully completed.

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ROLE OF ICT IN SUGARCANE MARKETING DEVELOPMENT

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Introduction:

Sugar cane is one of the world's oldest crops, and its production and marketing have been part of many countries' agricultural systems for centuries. In recent years, Information and Communication Technologies (ICT) have become a powerful tool to promote development in the sugar cane industry. They can help farmers produce better products, optimize efficiency and promote sustainability. In this blog post, we will discuss the role of ICT in sugarcane marketing development, including how it has helped to improve yields, reduce production costs, increase profits and create new opportunities for farmers. We will also look at how ICT can be used to track market trends and assess consumer demand. Finally, we will examine the opportunities that ICT presents for increased access to technology and improved communication between growers and buyers. The role of ICT in Sugarcane Marketing Development has been to provide the best technologies of Internet, Mobile and Telco, with suitable solutions to meet the needs of producers and consumers. It has been established that ICT is really a tool in every field of human activities, including foods and beverages.

However, ICT is now used in ways it was never intended to be used before; i.e. via social media and mobile applications. The main objective of this book chapter is to identify the potential role ICT plays in marketing development, which has not reached its potential at the time being. In addition, the affect of ICT on developing marketing strategies will also be asked . e-communication System which helps to keep the markets updated. These technologies have been developed to serve and help farmers. The ICT are used by farmers so as to monitor their farm and get knowledge about what is happening on the market. The use of technology has been directed at making a better situation for farm marketers and entrepreneurs as they facilitate an easier way for them requesting information. These tools have assistance to monitor the supply and demand of their commodities at the market. It has assisted farmers in improving the quality of marketing that they are doing. The efficiency of this system has been improved which has contributed a lot to improve the production, as well as advancing the economic growth of countries.

The role of ICT in Sugarcane Marketing Development can be seen in various ways. One way is with mobile phones, where it can be used for SMS text messages which are capable of receiving and sending messages via a mobile phone. This is important in spreading information such as weather forecast, news and other communications about business activities such as crop prices to farmers.

Another way is through mobile application, where the farmer can use the mobile phone to receive market updates. In addition they can use it to compare the prices of their commodities against other countries and compare them with their daily profit so as to decide what products are worth exporting. These applications are important for farmers because it helps them keep updated about the prices of their products.

Another way is with websites, where it can be used for newsletters and posting messages about farming activities such as marketing prices of commodities and other related activities such as weather forecast (if there is any). This is important in separating the target market from different parts of the world.

The role of ICT in sugarcane marketing development

The role of ICT in sugarcane marketing development is to provide information and communication technology (ICT) tools and services that can be used by sugarcane growers and marketers to improve the efficiency and competitiveness of the sugarcane industry. ICT can play a significant role in improving the efficiency of sugarcane marketing by providing growers and marketers with access to accurate and timely information on prices, production costs, market trends, weather conditions, etc. This information can help growers and marketers make informed decisions about when to sell their sugarcane crop, what price to accept, etc. In addition, ICT can also help reduce the costs associated with marketing sugarcane by providing growers and marketers with access to online marketplaces, auction sites, etc. where they can buy and sell sugarcane without incurring high transaction costs.

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A. The different types of ICT used in sugarcane marketing development

There are many different types of ICT that can be used in sugarcane marketing development. Some of the most common and useful include:

- **Social media platforms:** These can be used to reach out to potential customers and promote your products or services.
- **Websites:** A well-designed website can help you showcase your business and attract more customers.
- **Email marketing:** This is a great way to stay in touch with your existing customers and reach new ones.
- **SMS marketing:** This is another effective way to reach out to potential customers and promote your business.

B. The benefits of ICT in sugarcane marketing development

1. ICT can help to improve the efficiency of sugarcane marketing development by reducing the need for manual input and paper-based processes.
2. ICT can provide real-time information on market prices, trends and developments, which can help farmers to make more informed decisions about when and how to sell their sugarcane.

3. ICT can also help to connect farmers with potential buyers, including large sugar mills and processors, in a more efficient and effective way.
4. In addition, ICT can help to facilitate payments between buyers and sellers, and can also help to track shipments of sugarcane from farm to factory.
5. Overall, the use of ICT in sugarcane marketing development can lead to improved efficiency, transparency and communication throughout the supply chain, from farm to factory.

C. The opportunities from ICT

ICT is adopting an ever-increasing role in the nation's agricultural development. ICT has been altering all aspects of life over the past few decades. As ict offers a wide range of tools and technology available for the sugar business, its potential is undeniable. We talk about several ICT potential for managing the sugar sector well.

Large amounts of data (including text and graphics) can be efficiently stored and retrieved at a low cost using database and data warehouse technology. [Chaudary *et al.,* 2001 and Hampshires (1999)]. Historical information about crop productivity, protection, and statistics on use Such repositories can be used to maintain meteorological data, pest and disease information, and other important information for future analysis and decision-making. It is possible to extract novel insights and insightful patterns from huge historical databases using data mining and online analytical processing (OLAP) approaches [Ganti *et al.* (1999) and Hampshires (1999)]. On the basis of the analytical methods, practical recommendations might be made or suggested.

An expert system is a computer software that is clever and uses knowledge and inference techniques to solve problems that are complex enough to need a great deal of human skill.

Hardware, software, and data are all integrated into a geographical information system (GIS) for the collection, management, analysis, and presentation of all types of geographically linked data.

By taking into account a particular crop environment, modelling and simultaneous techniques can be utilised to simulate an ideal crop state and predict its growth through exploration and other strategies.

Applications for MIS can increase decision-efficacy making's and efficiency. It aids in the coordination, monitoring, and evaluation of all activities throughout the entire business process. This system can be used in many different functional management disciplines, such as finance, personnel, estates, etc.

The universe of information and communication has been transformed by internet technology [Agarwal (1999)]. Using this, it is possible to instantly parallelize the information broadcast to the farming community. Moreover, this technology offers a strong collaborative framework for information sharing via the web (WWW), email, chat, newsgroups, etc.

D. ICT tools developed by the agencies

ERP (Enterprise Resource Planning System) solutions for sugar industries: ERP is such an ICT based solution that caters to all the information needs of the organisation and allows automation of activities at full length.

ERO follows ABC rule:

Accelerate the reporting: Financial reporting and corporate processes are expedited by ERP systems. It makes it possible to share results, act on insights, lower risks, and boost performance.
Boost productivity: Automate your key business operations, and then deploy resources more effectively. Everyone in your firm benefits from increased productivity, which quickens the expansion of your enterprise.
Catch preventor: Effective ERP software increases your company's visibility and control, foresees and mitigates risk, and assures regulatory compliance.
Administration and control agencies: Organizational resource planning The main characteristics covered by this agencies are information about farmers, contractors, buy centres, growing regions, etc.
Cane planning agencies: The goal of this agency is to collect specific data that will be used to plan the procurement of cane. What does it usually provides

- whole structure of a sugarcane field
- information on crop type and acreage level from individual grower surveys
- a computerised copy of the growers' passbook that includes survey data
- Detailed planning report with data from the zone level to the level of each grower

Cane procurement agencies: It strives to make available the necessary materials of the appropriate quality, in the right quantity, at the right time, and in the right place to ensure operations run smoothly.
Cane yard management agents: Bar code technology combined with a fully automated cane yard operation ensures perfect system accuracy, continuity, and traceability. This not only gives management dependability and security, but also raises the mills' credibility in the eyes of the growers.
Cane accounting agents: The processing of the cane accounting includes numerous procedures for special and modified payments against loans in addition to processing security cane procurement receipts, payments, bank batch tagging for bank reconciliation, and bank scroll processing.
General ledger agents: The agent streamlines the mill's financial and operational procedures. Companies can produce net worth statements, trial balances, profit and loss statements, as well as a variety of other management data and transactional reports, using this model.
Inventory agents: The inventory module manages issues, dispatches, receipts, and quality control for the organization's whole stock-related operations.
Sales and marketing agents: Any organization's primary function is sales, which are all handled by this agent through the system.
Payroll agents: Employees are an organization's most valuable resource. This module streamlines all payroll-related tasks; a thorough employee database is kept with information on each employee's salary, attendance history, and leave record.
Major ERP programmes used by sugar mills in India include:
NexGen Sugar ERP, Sugar mill cane management ERP, Sugar Mill ERP etc.

E. **Farmer field schools and farmer field information system**

What are FFS (Farmer Field School)

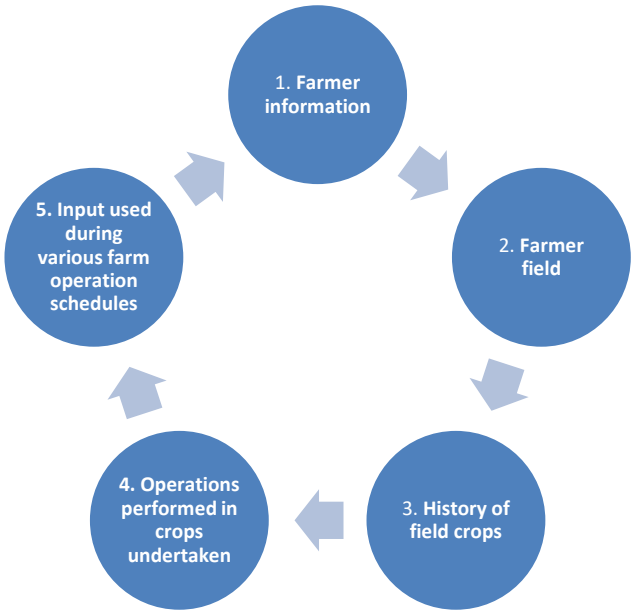
Farmer field schools are based on an adult non-formal education strategy in which the field serves as the classroom and learning is accomplished by experimentation, reflection, and learning by doing. The FFS are structured operationally around a season-long series of weekly or biweekly meetings that focus on biology as well as agronomic and management issues. During these meetings, farmers analyse their agroecosystems, identify issues, and then plan, execute, and interpret field experiments using comparisons between their current practises and better practises. This gives those without access to formal education more authority and lowers the hazards associated with self-experimentation.The FFS also place a strong emphasis on enhancing both individual and group capacities (such as strengthening social and human resources). Many extension tools are used and more focused on skill development rather than technology development.

Farmers field information system

Land preparation, variety selection, seed cutting treatment, planting, irrigation, nutrient application, intercultivation activities, crop protection measures, harvesting, etc. are all part of the complex process of producing sugarcane. These must be carried out at various crop stages in order to maximise cane production and sugar recovery.

At the farmer level, there should be a system for appropriate scheduling of farm activities based on agroclimatic conditions, planting and harvesting times, mechanisation levels, labour, costs, etc. For this, historical data on farm operations and inputs used is essential. In this context, institutions have taken the initiative to implement a database management strategy based on information and communication technology (ICT) in the administration of sugarcane. A software prototype called "Farmers field information system" has been created at institutes to help with this goal.

The software uses the 5 categories of data as states:



This data are stored in the software's database in several tables with relationships between them added using the entity-relationship modelling technique. A programme offers a variety of

user-friendly data management modules for adding and updating data. Using a search engine-based method that allows users to search on a range of factors, the data can be viewed.

F. **Sugarcane field management system**

In the traditional research system, information management has been viewed as being unique to each research endeavour. As a result, the system does not integrate data connected to research projects or the findings. The traditional method does not allow for further analysis of data from domain-specific trials in terms of historical and spatial characteristics. With the aim of an efficient management of data generated in sugarcane field experiments carried out in institutional farms, institutions have taken the initiative to manage the data generated in their institute's sugar cane field through the development of software called "sugarcane field management system." It is a web-based application with the functionality mentioned below.

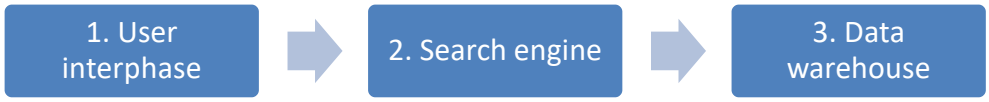
1) A significant issue in research planning is the integrated findings of experiments conducted within and across domains. The most significant aspect of the programme from this perspective is the data integration of experimental outcomes along with historical, research, and experimental domains. This software allows for integrated reporting of the field operations and input schedule carried out on experimental fields in various projects, which supports decision-making for resource usage planning.
2) Software is equipped with a potent reporting system for experimental findings and input data used in field research. A tabular report displays the database's current data, whereas analytical reports, which use various summarization methods and statistical tools, provide a logical explanation of the data.
3) It facilitates the planning of project activities generally and of field work and inputs specifically. The reports that are produced as a result help the research worker arrange field operations and further analyse data from field operations and input schedule.
4) Since the software modules in the sugarcane field management system are based on generic modules that may be reused in different crops, the system's many software modules can be used to add and update data.
5) Project leaders have full access to recover, change, and search experimental records for their projects. Software supports three different user types: administrators, project leaders, and regular users. Ordinary users are only permitted to view data for which they have been granted certain rights, whereas administrators have unlimited access to all data and modules in the system.
6) The software's well-designed architecture provided online accessibility over the internet, with the data and application module remaining on centralised services. The programme employs data from six categories—project details, user profile, experimental details, field operations, farm inventory, and experimental results—to adapt to the aforementioned features. Project details, experiment, field operations, farm record, results, general reports, analytical reports, and user profiles are the eight software components that make up this system.

G. Data warehouse on sugarcane production system

Using historical data gathered on sugarcane output, the sugar industry, and agro met data generated by government departments and agencies, data warehousing work has been performed to gain a better understanding of the dynamics of these industries. Place and time,

two dimensions, are taken into account. Time dimension is made up of temporal intervals like day, week, month, and year, and place dimension is the administrative structure of a state.

The production of sugarcane data is being explored and analysed using a data mining software application that is currently being developed. It consists of three parts: a user interface, a search engine, and a data warehouse. The tool's web-oriented design offers a web-browser-based user interface for searching the data warehouse.



The administration of enormous amounts of agricultural data for analytical exploration is best supported by data warehouse approaches [Hasan (2008)]. It offers mechanisms for data storage and retrieval that are adaptable, effective, and trustworthy for ad hoc and in-depth examination of massive amounts of data. Planners, decision-makers, development organisations, and producers will receive systematic and recurring information from a complete information system on sugarcane production.

H. Decision support tools in sugarcane cultivation

At several stages of the sugarcane production process, including variety selection, planting, irrigation, fertiliser, crop protection, and harvest, decision assistance is needed. Few have created these decision assistance tools for diverse subprocesses, given the intricacy of the issue [Hassan (2010)]. In order to identify the crop disorder that occurred and consequently caused the low yield, crop protection needs having a solid understanding of the various crop disorders (at various stages) as well as their symptoms. The first task that is started is the diagnosis and treatment of sugarcane crop disorders.

The first and most crucial step in creating knowledge-based systems is the creation of the knowledge base, which involves knowledge gathering, knowledge representation, and knowledge verification. Important insects, pests, and diseases of sugarcane are among the categories of knowledge acquired, along with textual and visual signs of diagnosis and other information on biology, economic significance, and control strategies.

In creating the decision support tools, two additional categories of software modules—knowledge updation modules and decision support modules—were discovered. Although decision support modules are end user software to receive decision support from the system, knowledge updation modules deal with loading the knowledge in the knowledge base and updating the same. Using computer programming languages like Active Server Pages (ASP) and Hyper Text Markup Language (HTML), knowledge updation modules have been created.

I. The challenges of ict in sugarcane marketing development

Due to falling sugar prices and rising competition from other sweeteners, the sugarcane industry has been under strain lately. The sugarcane sector must continue to develop and adapt new technologies, such as information and communications technology, in order to be competitive (ICT).

However, there are several challenges that must be addressed in order to effectively use ICT in sugarcane marketing development. First, the industry must have access to reliable and affordable internet connectivity in order to take full advantage of ICT tools and applications.

Second, training is required for stakeholders in order to use ICT effectively for marketing purposes. Third, data security is a concern when using ICT for marketing activities, as confidential company information could be at risk of being leaked or hacked.

Despite these challenges, ICT can play an important role in sugarcane marketing development if used correctly. For example, ICT can be used for market research, product promotion, customer relationship management, and supply chain management. When used properly, ICT can help the sugarcane industry become more efficient and effective in its marketing efforts.

Conclusion:

In conclusion, the use of ICT in sugarcane marketing has proved to be invaluable in ensuring that farmers, traders and consumers are able to access quality inputs and products at competitive prices. It has also improved efficiency and reduced transaction costs associated with traditional methods of trading, which helps increase profits for all parties involved. Furthermore, it is an important tool for data collection, analysis and decision making that can help inform future policy interventions aimed at improving sugarcane production performance.

The sugarcane industry is one of the most important industries in India. It employs millions of people and contributes significantly to the country's economy. The sector is also one of the largest consumers of information and communication technology (ICT).

Technology has a significant potential to raise the productivity and competitiveness of the sugarcane sector. It can aid in better activity planning and coordination, better decision-making, and increased accountability and openness. Moreover, ICT can aid in lowering waste, enhancing quality control, and boosting productivity.

ICT adoption in the sugarcane industry is still in its infancy. Yet, ICT can play a transformative role in the growth of the sector if the appropriate policies and investments are put in place.

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ENTREPRENEURSHIP OPPORTUNITY IN SUPPLY CHAIN MANAGEMENT OF AGRI-PRODUCE

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Introduction:

Entrepreneurship is one of the key drivers of economic development in a country. During a period of economic crisis, entrepreneurship development plays a very important role. The benefits of entrepreneurship include better growth, wealth, and quality of life. The development of entrepreneurial programs in developing countries such as India is essential for raising the living standards of the vast majority of the backward regions due to their overreliance on agriculture (Uplaonkar and Biradar, 2015). Thus, entrepreneurship development appears to be the most effective means to create employment, generate income, reduce poverty, improve nutrition, health, and overall food security in a country.

Agricultural activities contribute significantly to the overall wealth of the country. Modern trends in agribusiness are influenced by the internal desires of agricultural products producers for autonomy and independence, and all players in supply chains are trying to maximize the conjugation of logistics operations. In order to fulfill these requirements, In order to effectively market agricultural products, we must find ways to integrate the interactions between the various links of the supply chain.

Production, distribution, exchange, and consumption are the four major stages of the production process that have existed long before the concept of supply chain was conceived. The key to a successful supply chain is the ability of all the links in the chain to operate as a single process. Traditionally, it was possible to manage production cycles separately, but it was not possible to manage all of them simultaneously."Supply chain" refers to a managed process. In order to achieve this objective, we are introducing a concept referred to as supply chain management, which was first introduced by Oliver and Weber in their 1982 study entitled "Logistical aspects in the context of inventory management related to the supply of raw materials" (Christopher, 1992). Based on the SCM model, firms in any link in this chain are expected to maximize cooperation rather than maximize profits by optimizing their operations. In this chapter we will discuss entrepreneurship opportunity in supply chain management its scope, importance and challenges faced by agri-entrepreneurs in supply chain management.

Definition terms of entrepreneurship and supply chain management

1. Entrepreneurship

The definition of entrepreneurship is the ability to develop ideas and make them a success by implementing them. Innovation, adaptability, and risk tolerance are some of the factors that contribute to the success of a sustainable business. A successful entrepreneur is a self-employed individual who owns and operates his or her own business. In agriculture, entrepreneurship can

also mean creating a new economic organization with an aim to grow under risk and uncertainty (Dollinger, 2003).

Agri-entrepreneurship in common language can be defined as sustainable, community-oriented, directly-marketed agriculture. This association of agriculture and business promotes agrientrepreneurs who innovate, identify markets, and satisfy needs by developing different ways (Bairwa *et al.*, 2014a).

Need and Importance of Agri-Entrepreneurship: In the past, farmers have been unable to understand scientific agriculture and effective agri-management systems in a practical way. It is very hard to cope with the delayed monsoons, droughts, crop debts, fake seeds and shortage of fertilizer that they opt to take their own lives. Therefore, by applying the management, technical, and innovative skills of entrepreneurship to agriculture, as a result of this intervention, we will be able to develop a well-prepared agri-entrepreneur who will be a role model for all future depressed farmers. The importance of agri-entrepreneurship for the national economy can be summed up in the following way:

i. An important benefit of the program is that it enables small farmers to become more productive and to gain access to local, national and international markets.
ii. . it provides high quality diets in rural and urban areas to the poor, thereby reducing food costs.
iii. As a third benefit, it accelerates growth, diversifies income, and creates entrepreneurial opportunities in both rural and urban settings.

2. Supply chain management

Definition is “In the context of supply chain management, this process refers to the process in which an organization plans, executes, controls, and monitors its supply chain activities with the goal of creating net value, ensuring competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand, as well as evaluating performance on a global scale. (Kozlenkova *et al.*, 2015). As a result of managing the supply chain efficiently, companies can save money and be able to deliver their products to those who need them more quickly. In a supply chain, interconnected, interrelated or interlinked networks, channels, and nodes provide products and services to customers (Harland, 1996).

Elements of supply chain management

A supply chain manager is responsible for the coordination of all aspects of the supply chain, which are divided into five components as described below:

1) Planning: A critical aspect of successful SCM is planning to match the supply with customer needs and the manufacturing needs of the company in order to maximize the benefits of the practice. It is important for firms to anticipate what their future needs will be and to take action accordingly. The SCM process includes considering raw material requirements during each stage of manufacturing, equipment limitations, and staffing requirements. Often times, large companies rely heavily on Enterprise resource planning (ERP) system modules in order to aggregate information and compile plans to meet their needs.

2) Sourcing: Supplier relationships play a crucial role in the efficiency of supply chain management processes. In order to source raw materials, one must work with vendors to obtain the raw materials required throughout the manufacturing process.It may be possible for a

company to obtain goods in advance and to plan a process in advance in collaboration with a supplier. The purpose of SCM sourcing is generally to ensure:

i) A raw material meets the manufacturing specifications required for the production of a product.
ii) Market expectations are met regarding the price of the goods.
iii) In the event of unforeseen events, the vendor is able to deliver emergency materials.
iv) Vendors have demonstrated a record of delivering high quality products on time.

A supply chain management strategy is of particular importance to manufacturers when dealing with perishable products. Companies should pay attention to the lead time at the time of sourcing goods and the ability of a supplier to meet those needs.

3) Manufacturing: During the process of supply chain management, raw materials are transformed into something new by using machinery, labor, or other external factors that contribute to the transformation of the materials It is important to note that the end product is not the final stage of the supply chain management process, although it is the end goal of the manufacturing process. It is possible to further subdivide the manufacturing process into sub-tasks such as assembly, testing, inspection, and packaging. During the manufacturing process, a firm must keep in mind waste and other factors that can cause deviations from the original plan. Due to a lack of employee training, a company may use more raw materials than planned or sourced, forcing it to rectify the situation or revisit previous stages.

4) Delivering: When the company's products have been manufactured and its sales have been concluded, the products must be delivered to its customers. Since the customer has not yet interacted with the product at this point, the distribution process is often considered a contributor to the brand image. With a strong SCM process, an organization has robust logistics capabilities and delivery channels that guarantee products are delivered on time, safely, and at an affordable cost. In order to achieve this goal, it is important to have backup methods of transportation or additional distribution methods available in the event that one mode of transportation is temporarily unavailable.

5) Returning: The supply chain management process concludes with the support of the product or customer's return. When a customer returns a product, it's bad enough, but when the mistake is on the company's part, it's even worse. The return process is referred to as reverse logistics, and the company must be able to receive returned products and correctly assign refunds for products returned. Returns from customers are often viewed as an interaction between the customer and the company. In addition, the intercompany communication is one of the most important components of customer returns to identify defective products, expired products, and non-conforming products. A supply chain management process which fails to address the underlying causes of customer returns will likely lead to further returns in the future.

Importance of supply chain management

In order to achieve several business objectives, it is important to manage the supply chain. In order to build a strong consumer brand, you must control the manufacturing processes. By doing so, you can improve product quality, reduce recalls and lawsuits, and improve consumer satisfaction. It is also possible for a company to enhance its customer service by controlling shipping procedures in order to prevent shortages and periods of excess inventory. In

addition to increasing profit margins, supply chain management presents several opportunities for companies with large operations worldwide.

Opportunity of entrepreneurship in Agriculture: Agribusiness has provided a wide range of opportunities for value addition, packaging, retailing and exporting agricultural products using advanced technology. In India, a big part of the population relies on agriculture, which also provides raw materials to other industries. Since the WTO introduced policy reforms, the agribusiness has seen more scope and opportunities. There are lots of opportunities for entrepreneurship in agriculture. these are:

i. **Agro produce processing units :**In this type of mill, there is no manufacture of any new product, but only processing of the agricultural produce that has been acquired. For example, rice mills, dal mills, decorticating mills, etc**.**
ii. **Agro Produce manufacturing units** – This section presents entirely new products that are manufactured using agricultural produce as the primary raw material. Example- Sugar mills, bakeries, strawboard units, etc.
iii. **Agro-inputs manufacturing units** – Agro industrial production involves the production of commodities that are used to automate agriculture or expand manufacturing facilities, such as fertilizer plants, food processing plants, agricultural implements, etc.
iv. **Agro service centres –** A workshop and a service center are both part of the agricultural implement repair and service facilities, whose goal is to accommodate the needs of farmers.

Different Types of Enterprises in agri-entrepreneurship:

The following are some of the different types of agri-entrepreneurship enterprises:

i) Farm Level Producers: Families are treated as enterprises to enhance production by leveraging high technology, possessions, and market demand

ii) Service Providers: Various types of services are indispensable at the village level. This includes borrowing inputs and distributing them, as well as using equipment such as tractors, sprayers, seed drills, threshers, harvesters and dryers. Also, it includes scientific services, such as the establishment of irrigation facilities, the removal of weeds, plant security, yielding, threshing, transportation, and warehouses, among other things. There are a number of opportunities in the livestock husbandry region, such as the provision of cattle feed, mineral combinations, forage grains, and related services, including breeding, immunization, disease diagnostic, and treatment services.

iii) Input Producers: A village level can contribute significantly to a number of booming enterprises requiring significant contributions, such as the production of bio pesticides, soil amendments, bio fertilizers, vermicompost, a variety of vegetables and fruits, ornamentals, root media for pot planting plants, cattle feed concentrate, agricultural tools, irrigation accessories, mineral mixtures, and complete feeds, which can all be produced by home entrepreneurs.

iv) Processing and Marketing of Farm Produce: The management of post-production processes requires highly qualified and skilled personnel and a significant investment. It is possible to control such enterprises through People's Organizations such as cooperatives, service joint stock companies or societies. Cooperatives in the dairy, sugar, and fruit production sectors have been the most successful examples.

Entrepreneurship in agro supply chains: Issues and suggestions

Issues: Global supply chains are experiencing headwinds due to unforeseen demand and limited logistics capacity. The key issue faced in supply chain management include:

i) Managing customer expectations: As a supply chain manager, one of the biggest challenges you have to face is managing customer expectations. They deal with indirect procurement requests, project and manufacturing requests, which can come from both internal and external customers, as well as requests made by them for supplies. As a result, agricultural entrepreneurs have a responsibility to implement efficient workflows in order to ensure that they are able to fulfill requests on time. With this feature, you will have quick and accurate access to information and be able to see in real time how resourcing, planning, sourcing, and shipping are being executed. Overall, this will help you to gain visibility into your supply chain as well as help everyone to track orders all the way to invoice payment.

ii) Managing suppliers: In addition to managing customer expectations, suppliers also have to be managed. It is essential to maintain good relationships with your suppliers in order to effectively manage your supply chain. Ideally, you would engage with suppliers proactively through Supplier Relationship Management. However, there is always one supplier who experiences problems. It is imperative that you have access to reliable data at the appropriate time in order to resolve these challenges quickly. By doing so, you will be able to catch a number of scheduling, quality, and delivery issues before they happen, and you will also be able to proactively engage with suppliers and communicate about issues with them in order to align their expectations with yours.

iii) Lack of dedicated training & incubation centers: There is an almost universal lack of agricultural entrepreneurship centers, regardless of whether they are located in rural or urban areas, that can provide adequate quality knowledge and training. It has been found that in the urban setting some initiatives have been made in the form of Entrepreneurship Development Centres/Courses by renowned educational institutions, however the outreach and accessibility of these programs to the general public are limited. This situation is made all the more pitiful when taken into account the rural scenario.

iv) Infrastructural issues: Infrastructural issues include a lack of storage facilities, lack of transportation (including a lack of cold storage transportation), a lack of power and water facilities, a lack of appropriate fertilizers and pesticides, a shortage of quality testing centres, etc. New entrants also face the same issues as existing players do. Thus, they are definitely a turn-off to new players. FCI and other government agencies are not fulfilling their responsibilities properly.

v) Financial issues: It has been noted that the majority of the youth brigade is unaware of the opportunities for entrepreneurship in agriculture as well as the difficulties faced by existing players in obtaining timely credit facilities has also contributed to the loss of interest in the sector due to a lack of awareness amongst the youth brigade.

vi) Market related issues: There are a number of issues related to markets in spite of the efforts made by the government of India. Most agricultural areas do not have proper access to markets, despite the government's efforts. Therefore, even though agricultural products are highly productive, they ultimately go to waste.

Suggestions:

As a result of the current situation, there is a gap that needs to be filled if agricultural entrepreneurship is to establish strong roots and be able to grow enough fruits in the future. There have been a few suggestions made in this context to assist agricultural entrepreneurship attain a proper framework which would benefit the youth brigade of India and at the same time help the agriculture chains get maximum use out of the agricultural products. Some of the suggestions are given below:

i. **Agricultural Entrepreneurial Environment:** In order for an initiative to be successful, it is important to examine the environment of agricultural entrepreneurship as a whole. This means that all the players, including farmers, suppliers, processors, transporters, distributors, agents, wholesalers, retailers, as well as government, must play their part in a positive and systematic manner. In order for them to reach the ultimate consumer, each of them must play a significant role. In order to maintain an integrated system, each player must maintain an entrepreneurial spirit. It is more profitable and more effective to have a system that is integrated and better coordinated.

ii. **Promoting Innovation**: Innovative technologies are also causing enormous changes in other industries. It is imperative that traditional methods be abandoned in favor of new out-of-the-box approaches that consider sustainability issues. In order to raise the standard of the sector, the Government of India should promote innovative methods of production and distribution. In order to utilize ICT for agricultural development, significant institutional reforms, policy decisions, and capacity building initiatives are required at various levels in India.

iii. **Broadening Agro-Entrepreneurial Skills:** Earlier in the discussion, it was noted that it is rare to come across dedicated training centers, agriclinics, and agribusiness centers that can help the budding entrepreneurs to gain a valuable insight into the tenets of the industry and provide necessary services. However, even when such centers are present, the issue of monitoring their impact on the sector goes unaddressed, resulting in a growing disinterest. In order to achieve this, we need to set up a chain of dedicated and monitored training centers; academies; agriclinics; and agribusiness centers that would work on the district/state level with regional heads and a central control authority.Due to the lack of adequate infrastructure and teaching environment, both motivating and preparing the emerging generation to become entrepreneurs in the agro supply chain seems next to impossible.

Conclusion:

We must understand the importance and importance of supply chain management systems as we move forward into the 21st century. This is one of the most important e-business systems that an organization can implement in its business in developed countries as one of their most crucial e-business systems as well as widely accepted as vital e-business systems for the company. By integrating and cooperating in a manner that creates value as a result of integrating and cooperating, businesses can now benefit from the advancement of information and communication technologies. Due to this, rather than competing individually, they compete within the entire supply chain.

In order to remain competitive and to pass on the business to the next generation of entrepreneurs, business owners in our country need to embrace the concept of business partnership, develop an environment of trust, and open up their business processes to the rest of the world. By doing so, they will be able to take their relationship with suppliers and customers to the next level. Consequently, by coordinating a supply chain management system that will develop with the disappearance of borders within the supply chain, we will be able to create greater benefits for all members of the supply chain by achieving greater benefits for all chain members. Therefore, it is in the best interest of the enterprise to implement a method for optimizing the supply chain as a whole, rather than optimize the objectives of individual enterprises one by one.

Agri-food supply chain management can be improved by using appropriate information technology systems so as to ensure competitive edge throughout the entire supply chain (depending on the degree of sharing of information). In order to manage agricultural supply chains, information technology is useful, but it is a limited tool. In the near future, it is anticipated that the rapid development of information technology and the Internet will reduce these limitations.

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REGULATED AGRICULTURAL MARKET

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Introduction:

Agricultural marketing is one of the major aspects of agricultural development as it not only catalyses the dynamic channel from production to consumption but also accelerates the rate of economic development. The process of marketing begins with the decision making on the producer's-end to produce and bring a valuable product in the market system. Under the traditional agricultural marketing system, producers had to face various malpractices such as exploitation, short weights, high marketing cost and deduction of unconstitutional marketing charges. In order to create a better marketing condition for agricultural produce, the statuary body of the state realised the importance of reorientation of the marketing and trade paradigm by enabling fair competition and better bargaining power as the pre-requisite under legal framework. This led to the establishment of regulated markets.

The basic ideology behind establishment of regulated market is to eliminate unhealthy practices prevailing in the system and empower farmers in carrying out various market functions. Regulated markets are not only markets with legal enforcement but also an economic epicentre that creates adequate demand for the sale of specified agricultural produce at specified places with better returns. In order to facilitate fair trading, agricultural produce market committee have been set up under the aegis of comprehensive rules that have been framed and modified from time to time by the respective state Agricultural Produce Marketing Regulation Act. Although, Regulated markets since its establishment have helped in mitigating the market handicaps but its legal framework didn't portend well with competitive market structure. This pays way for making market committee more viable and managerially competent within a liberalised trade atmosphere.

Regulated agricultural market

Regulated market is defined as "A market that aims to eliminate unhealthy and unscrupulous practices by providing needful facilities to the producers and sellers in the market and safeguarding their interest in market functions" (S. S. Acharya). In order to establish, improve and enforce standard marketing practices in the marketing of agricultural produce, legislative measures have been designed in the establishment of regulated markets by the State Governments.

Regulated market came into existence to improve the farmers welfare by reducing the number of marketing intermediaries and therefore has been planned according to the expectations of the farmers. Regulated Markets provides needful facilities such as input shops, electronic weigh bridges and weighing balances to avoid short weights, godown facilities for storage, bank facility for credit, day-to-day price information and efficient credit payment facility.

Objectives behind establishment of regulated market

Due to technological intervention, agriculture has changed dramatically since its evolution and marketing plays a crucial role in this sphere. Proper and timely intervention in marketing has reduced the marketing charges considerably and also reduced middlemen involved in the chain. The specific objectives behind regulation of agricultural markets are as follows:

1. To ensure remunerative price of the agricultural produce to the producers and also commodities are available to the end users at reasonable prices.
2. To prevent exploitation of the farmers by controlling the non-functional margins of the traders and commission agents.
3. To narrow down the price differentials between the producer and the consumer.
4. Development and improvement of the infrastructural facilities by promoting year-round availability and orderly marketing of the agricultural produce.
5. To establish a rational marketing structure for agricultural produce both in the semi-urban and rural parts of the nation.

In order to achieve the above mentioned objectives, market committees are established in each regulated markets consisting of representatives from all sections such as farmers, traders, sellers, cooperative marketing societies, banks, local bodies (*panchayat samiti* and municipal board of the area and the state government officials.

Origin and history of regulated agricultural markets

Prior to the independence era, agricultural marketing that formed a major part of agricultural and rural economy pertained to be an unorganized structure in India. With increase in the population and production level, the marketing communities modified the existing agricultural marketing systems and institutions based on the social, cultural and economical needs that prevailed in different sections of the country. It was during the late 19th Century, when the British rulers realised the need for the regulation of agricultural marketing institutions in the country. The main reason behind establishment of regulated market was to enable continuous supply of export standard Cotton at a reasonable price from various cotton producing hubs in the nation to the textile mills located at Manchester, United Kingdom. Thus, this led to the very establishment of India's first regulated market at Karanija in 1886 under the then Hyderabad Residency order. Since then, this became the foundation stone for various legislative acts and measures under market regulation.

However the first Legislation in India was the Berar Cotton and Grain Market Act of 1897. This Act was regarded as a model and the very first attempt at regulation of markets that was adopted in the various provinces of then British India. In 1917, then Government of Bombay province was the first to enact the act. Since then, a number of Acts, Rules, Laws and By-laws have been appointed by several Committees and Commission facilitating and promoting the growth of regulated market all over the country. In the year 1928, the Royal Commission on Agriculture recommended the establishment and regulation of the regulated market in India. As a result of continuous deliberation, the Government of India established the Directorate of Marketing and Inspection under the Ministry of Food and Agriculture in the year 1935 to look into the problems of marketing of agricultural produce and safeguard the interests of the farmers.

In 1938, the Directorate of Marketing and Inspection prepared a bill and recommended the State government to enact legislation for the regulation of agricultural market in their respective state. With this vision, initially 13 states passed the legislation for the effective establishment of regulated market at the dawn of the Fourth FYP. With time, all other states also passed legislation. Since its establishment, the progress of regulated market was not uniform in all the states of the nation. States like Andhra Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal, Gujarat, Karnataka, Punjab, and Rajasthan have effectively enacted the legislation for the regulation of agricultural market. In 2006, the state of Bihar repealed the Bihar Agricultural Produce Marketing (Regulation) act from 1st September due to deregulation of some markets. It is observed that in our country, on an average scale regulated agricultural markets spread over an area of 459 sq.km. Based on the size of the market transactions, the regulated agricultural markets are classified into four types namely;

1. Super "A" class market
2. "A" class market
3. "B" class market
4. "C" class market
5. "D" class market

As far as commodities under regulations are concerned, almost all agricultural commodities such as cereals, pulse crop, oilseeds, fibre crops, commercial crops, horticultural crops, forest produce and recently livestock products are also included. But the number of commodities entitled to each regulated market varies from state to state. Apart from this, each state regulated market varies in terms of infrastructural facilities as well.

Table 1: State-wise list of No. of APMCs & Regulated Markets as on 31.03.2018

Sl. No.	Name of State/UT	No. of APMC's/ RMC	No. of Principal Market Yards	No. of Sub-Market Yards	No. of Regulated Markets
1	Andhra Pradesh	191	191	157	348
2	Andaman & Nicobar	0	0	0	0
3	Arunachal Pradesh	19	19	0	19
4	Assam	24	20	206	226
5	Bihar	0	0	0	0
6	Chandigarh	1	0	0	1
7	Chhattisgarh	69	69	118	187
8	Dadra Nagar Haveli	0	0	0	0
9	Daman & Diu	0	0	0	0
10	Goa	1	1	7	8
11	Gujarat	224	224	176	400
12	Haryana	108	108	173	281
13	Himachal Pradesh	10	10	46	56
14	Jammu & Kashmir	16	5	20	25
15	Jharkhand	28	17	173	190

16	Karnataka	162	162	352	514
17	Kerala	0	0	0	0
18	Lakshadweep	0	0	0	0
19	Madhya Pradesh	257	257	298	555
20	Maharashtra	307	307	597	904
21	Manipur	0	0	0	0
22	Meghalaya	2	2	0	2
23	Mizoram	0	0	0	0
24	Nagaland	19	19	0	19
25	New Delhi	7	7	8	15
26	Odisha	66	54	431	485
27	Puducherry	3	3	5	8
28	Punjab	153	151	281	432
29	Rajasthan	142	142	315	457
30	Sikkim	0	0	0	0
31	Tamil Nadu	23	281	6	287
32	Telangana	189	189	88	277
33	Tripura	21	21	0	21
34	Uttar Pradesh	251	251	372	623
35	Uttarakhand	27	27	44	71
36	West Bengal	22	20	515	535
Total		**2342**	**2558**	**4388**	**6946**

Source: Directorate of Marketing and Inspection, Ministry of Agriculture, Governemnet of India, Faridabad

Major organisations aiding Government in effective regulation of agricultural market

Though regulated agricultural marketing is a State subject, the Central Government plays a major role in framing the general policy, quality standards and in providing technical and financial assistance to the State Governments. The Central Government is aided and advised by two organisations namely:

1. **Directorate of Marketing and Inspection (DMI)**: DMI is headed by the Agricultural Marketing Adviser to the Government of India. The key functions served by the organisation are as follows:
    i. Providing advisory assistance on statutory regulation
    ii. Establishment and management of regulated agricultural market in the States/UTs.
    iii. Carrying out market survey, research and planning.
    iv. Under the Agricultural Produce (Grading & Marketing) Act of 1937 promote grading and standardisation of agricultural and allied products.
    v. Providing training programmes for personnel involved in marketing.

2. **National Institute of Agricultural Marketing (NIAM)**: NIAM started functioning with effect from 8th August, 1988 to cater to needs of agricultural marketing. The objectives of NIAM are as follows:
    i. Augmentation of the marketing infrastructure of the nation by promoting teaching, research and consultancy programmes.
    ii. Designing and conducting training courses for the personnel involved in the marketing infrastructure.
    iii. Promoting research to enable better management techniques and finding solutions to the identified problems.
    iv. Looking into implementation of the existing facilities in the marketing system.

Different sections of regulated agricultural market

Under the provisions of the Agricultural Produce Marketing Regulation Act, the state government presents its action plan to bring a particular area by demarcating market areas, market yard, main assembling market and sub-market yard within the peripheral of the principal regulated market. The different sections of the regulated market are explained as follows:

1. **Market Area**: Market area is the central area of the market committee from where agricultural produce swiftly flows to the principle market.
2. **Market Yard**: Market yard is a specified region of the market committee where different activities like purchase, sale, processing and storage of agricultural commodities are being carried out.

    Depending on the need and type of services rendered by the market yard, the market structures in market yard can be categorised into four types
    i. For sale and purchase of agricultural commodities: This includes Platforms, Storage Godowns, Shops, Drying floors
    ii. For Buyers/Sellers convenience: This includes Sanitary facilities, Electricity and Water facilities, Farmers rest house, Animal shed, Parking place and Security Post
    iii. Amenities: This includes Canteen, Bank, Post Office and Input Selling shops
    iv. Miscellaneous: Yard boundaries, Internal roads, Staff Quarters, Firefighting equipments
3. **Assembling Market**: Assembling market is defined as the principle market yard based on the number of transactions and income generated by the market committee.
4. **Sub-Market Yard**: Sub-market yard is a sub- yard of the assembling market characterised by small size and comparatively lesser income than the principal assembling market.

Features of Regulated Market

The key features of regulated markets are as follows:

1. **Market Committee**: The market committee are corporate bodies consisting of representatives from all sections such as farmers, traders, sellers, cooperative marketing societies, banks, local bodies (*panchayat samiti* and municipal board of the area and the state government officials. Farmers are generally in the majority. However, the structure of the market committee varies from state to state. Its main functions are as follows:
    i. Effective management of the market yard and sub-market yard and run them in favour of the farmers.
    ii. To prescribe the trading hours in order to regulate and control transactions.

iii. To issue, renew or withdraw licences of market functionaries.
iv. To fix market levies for various services.
v. To disseminate timely and correct market news among the buyers and sellers.
vi. To settle disputes among market functionaries.
vii. To provide amenities in the market structure wherever necessary for the smooth functioning of market
viii. To provide facilities for grading and standardization of the agricultural produce.

2. **Method of Sale**: The sale of agricultural produce in regulated markets is carried out by either of the two methods, *i.e.* open auction method and close tender method. The sale is carried out in the presence of an official of the market committee. These ensures competitive price for the produce and prevent any form of handicaps in market functioning.
3. **Grading of Produce**: The produce in the regulated market are sold after grading is carried out. Because of the absence of the grading equipments and facilities, it is not fully implemented in all the regulated markets of the country.
4. **Weighment of the produce**: In order to eliminate short weights and malpractices, weighment of the produce is carried out using standard weights, electronic weighing machines, weigh bridges and platform scale by a licensed weighman.
5. **Market news service**: Regulated markets provide timely and correct dissemination of price prevailing in the market through notice-boards and speakers. Market Yards also provides the market information on the online portal of AGMARKNET.
6. **Market levies or fees**: With the establishment of regulated markets, illegal charges were abolished, while market levies such as brokerage, weighment, commission etc were specified which was in proportion to the services rendered by the different market functionaries involved in the supply chain.
7. **Payment**: It is mandatory on the buyers' side to make prompt payment for the purchased produce without any deduction which was prevalent in case of unregulated market. However, informal agreements between sellers and traders still continue to take place.
8. **Licensing of the market functionaries**: In order to carry out the business, it is obligatory for all the market functionaries working in the regulated market to obtain a license from the market committee after paying a pre-determined fees. Any violation of rules may lead to the suspension and at extreme conditions cancellation of the license by the market committee.

Advantages of regulated agricultural market

1. Due to regulation of the market, market practices are regulated and undesirable activities are controlled raising the efficiency of market.
2. Time to time inspection and verification of weights and scale ensures correct weighment.
3. Market levies are clearly pre-defined and specified.
4. Disputes are settled through proper arrangements.
5. Reliable and daily market news is made available to the farmers.
6. Suitable quality standards are efficiently enforced in the market.
7. Reliable statistics of data such as arrivals, prices, stocks are maintained.
8. The goal of agricultural improvement is more effectively carried out.

Problems encountered

Although, market regulation brought its impact in terms of providing better price, elimination of illegal charges, providing different amenities and facilities for the effective sale of the produce. But this impact varied from place to place based on the availability of the infrastructure facilities in the markets. This led to a series of problems on account of some unidentified reasons. These include:

i. Lack of market infrastructural facilities directly impacts the benefits that could be received from regulation of the market as they vary directly in proportion with the level of infrastructural facilities.
ii. Lack of effective emphasis on implementation of the exact provisions of market regulation in real scenario. Rather the committee member bodies focused more on creating structures and collection of market fees
iii. Heavy physical loss of produce in the process of cleaning, sieving, loading, unloading and transportation.
iv. Several malpractices took place in different parts of the nation due to bureaucratization in the management of the regulated markets.
v. The smooth movement of agricultural produce in the country gets affected due to heterogeneity in legislations of different state marketing.
vi. Regulated markets indirectly led to the monopolization of trade.

The State Agricultural Produce Marketing (Development & Regulation Act, 2003)

The State Agricultural Produce Marketing (Development & Regulation) Act came into effect from 9th September 2003 with an objective to develop and regulate agricultural marketing. Consequently, the Preamble of the Act was redrafted to develop efficient marketing system, promote facilities for agri-processing and agricultural exports and also lay down provisions for establishing effective infrastructure for the marketing of agricultural produce. The APMC have been made specifically for the following reasons:

i. In order to assure complete transparency in the pricing system and the transactions taking place in the market space
ii. In order to endow with market-led extension services to farmers
iii. Ensuring quick payments as on same day of the sale of agricultural produce
iv. Promoting value addition in agricultural produce
v. Publishing statistical data on arrivals and prices of agricultural commodities
vi. Endorse public private partnership for efficient management of the agricultural marketing system
vii. Development of strong quality diagnostics infrastructure to encourage quality standards in agricultural commodities.
viii. Development of media and cyber infrastructure that is pertinent to the efficient marketing of agricultural and allied commodities

Need for strengthening of regulated agricultural market

While regulated markets helped in mitigating the market handicaps but overall it could achieve only limited success as the restrictive legal framework couldn't match with the growing competitive market structure. The infrastructural facilities developed so far in the nation are not

adequate to meet the current marketing requirements. Even today, half of the villages lack proper road connectivity to the market place. As a result of lack of storage capacity, every year lots of wastage takes place in market area.

In order to overcome the bottlenecks associated with it, there is a need to create viable and managerially competent market committees headed by trained professionals and managers. Further, the present number of regulated agricultural market is not enough and also the existing markets lack proper infrastructural amenities. Therefore, there is need to remodel the market committees accordingly by linking all the market structures together in the marketing chain. Public-private partnership with suitable incentives packages should be encouraged to promote overall market regulation even in remote areas. In order to meet with the rising global competition, we need to currently focus on transforming this market committee into growth epicentres for our farmers.

Conclusion:

As the agriculture sector witness driving growth with emerging technologies, there is a need to establish dynamic and efficient marketing system. Proper regulation will lead to the establishment of an effective linkage between production, value chain and agri-based industries. Keeping this in view, the State Government should take steps for amending their existing APMC act in order to facilitate integrated marketing system in the nation. There is a need to expand all the services that will enhance the agricultural marketing system with regard to investment needs, marketing infrastructure, market information system, use of ICT, export promotion and human resource development. The success of the agricultural marketing system at present depends not only on regulation but also redefining it to make it inclusive for our farmers.

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AGRI INPUT MARKETING MODELS AND MARKET PERSPECTIVE

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Introduction:

Agriculture producers are essential clients for producers of all agricultural inputs, including seed, fertilizer, chemical, and equipment dealers, financial organizations, and seed businesses. This is because agricultural producers account for a sizable portion of the income generated by these sectors. Farmers only engage in agricultural inputs and tools that are appropriate for their degree of expertise. This information helps agricultural input providers match their offerings and services to the needs of their customers.

The public debate over agricultural goals has become increasingly reliant on long-term forecasts for global agriculture, food, and the environment. Recent events, such as sharp increases in food and agricultural prices in 2007, 2008, 2010, and, for some commodities, 2012, as well as projections for persistently higher medium-term real commodity prices compared to the early twenty-first century (OECD/FAO, 2013), raise concerns about the world's food supply system's ability to keep up with rising demand.

Because of the long-time lags involved with advancements that affect the future directions of agricultural markets, commerce, and the environment, the discussion stretches well beyond events in the next ten years. Scenarios, which are predictions of a system in which complexity and uncertainty necessitate more precise language than "likely" or "most plausible" developments (Zurek and Henrichs, 2007), can provide alternative views of the pathways as well as a tool for testing policy strategies. Scenarios are predictions about potential future developments and alternative strategies for influencing those predictions.

India is a significant player in the global agricultural business, with agriculture providing a living for over 58% of the population. India is the world's biggest producer of spices, milk, and pulses. Furthermore, it has the largest cropped region for wheat, rice, and cotton, as well as the largest cattle herd (buffaloes).

Agriculture in India started around 9000 BCE with the cultivation of plants, crops, and domesticated animals. People started to establish life almost immediately with the help of agriculturally related methods (Bowman and Rogan, 1999). Harvesting was done twice a year due to the double rainfall (Baber, 1996).

It ranks second in terms of farmed vegetables, farmed seafood, farmed fruit, farmed rice, farmed cotton, farmed sugar, and farmed cotton production. India, which has the world's second-largest agricultural land area, employs roughly half of its people in agriculture. As a consequence, farmers are critical to the economic sector that produces our food.

A primary objective of policymakers is to assess how policy reforms affect stakeholders; therefore, it is critical to provide an ex-ante analysis to assess the impact of these policies on various groups. Many governments actively intervene in agricultural product markets,

particularly food markets, through taxation and subsidization. The key objectives are to redistribute income, generate public revenue, correct market failures, and provide incentives to producers (a quantitative assessment of the impact of policy changes on the desired objectives is important because it helps inform and shape the policy debate on reform alternatives) (Croppenstedt *et al.,* 2007).

Greater transparency is also beneficial to the people. Policymakers are currently focusing on destitution and hunger-reduction. These problems continue to be primarily rural: the rural poor account for roughly 70% of the world's poor population. Nonetheless, recent urbanization processes have raised the number of urban poor and food-insecure people. As a result, the role of agricultural-based growth is increasingly being recognized and stressed in promoting rural development, slowing the rate of urbanization, and adding to equitable and sustainable overall development. To promote a better understanding of the links between agricultural policies, a focus on the welfare of the rural population and its interdependence with the welfare of urban areas, as well as the interlinkages between agricultural and off-farm activities, is required.

Previous research has shown that more than half of India's populace is dependent on agriculture and related industries. Despite shrinking agricultural acreage due to the global green revolution and crop failure conditions in India in 1961, crop protection and fertilizer have allowed a tremendous increase in output. Agri-inputs, in addition to farming mechanization, include seeds, fertilizers, and crop protection goods. Markets for agricultural inputs have a major effect on farmer welfare. High-quality inputs may increase farmer productivity, whereas low-cost inputs may lower producer production expenses and increase farmer net income.

Agri inputs:

Agricultural inputs include all the working materials necessary to produce crop products, such as seeds, fertilizer, irrigation, crop protection, growth-regulating chemicals, fuel, and energy. The term "input characteristics" refers to transgenes that improve or take the place of alternative agriculture inputs. They include features that can replace pest-controlling crop protection agents, such as herbicide, insect, and disease resistance. The use of input traits is merely the most recent development in a long line of production-improving technologies in agriculture (Castle *et al.,* 2006). For the development of agriculture and these agricultural inputs, there is a need to develop an underrated market.

Fertilizers, seeds, crop protection goods, along with agricultural mechanization, make up the agri-input sector. Markets for agricultural inputs have a significant impact on farmers' welfare. On the one hand, high-quality inputs may boost farmers' productivity, and on the other, low-cost inputs could minimize producers' costs of production and boost farmers' net income. India's productivity and production have increased throughout the green revolution as a result of higher input use, high-yielding cultivars, fertilizer, and irrigation. This trend persisted throughout time with increased public sector expenditure in research and development (R & D) (Pal, 2017).

Seed sector:

The technological change process is put in motion by the seed, which acts as a trigger. The quality of the seeds has a major impact on financial returns. Seed the major source of agri-input is growing at the rate of 10% and helps in increasing the turnover of agricultural input markets. So many companies are shifting their work from agrochemical to the seed sector or

modified seeds sector as the agrochemical sector are currently facing high cost and lower returns (Bonny, 2017).

Seed Act 2011:

The Seed Act of 1966 and its 1968 regulations regulate the seed business in India. In reaction to the changing dynamics in the seed industry and technology, the Government of India introduced the Seed Bill 2004. The bill is presently pending in its current iteration from 2011, after having undergone numerous revisions since then. Singh and Chand (2011). The 2011 Seeds Bill, in theory, was designed to guarantee that regulations were in line with the circumstances at the time. Significant modifications have been made concerning registration, transgenic varieties, farmer compensation, export and import regulations, and penalties for fake seeds since the Seed Act of 1966.

Challenges:

The absence of high-quality seeds, fake seeds, the policy conundrum surrounding GM technology, a lack of investment in research and development, and government regulatory interventions are the main challenges facing the seed industry. A top priority in the industry is ensuring high-quality seeds and preventing fake seeds.

Marketing and distribution of seeds

Most of the seed sold by seed firms is distributed by a network of independent dealers. In the nation, there are hundreds of privately owned businesses, but the size and volume of seeds distributed by each vary greatly. The majority of businesses are small retailers that do not have in-house breeding programs and sell only popular varieties and hybrid seeds, as opposed to bigger businesses that produce and market hybrid seeds.

There are two seed distribution channels in trend.

The first is an organized, formal seed business made up of public seed agencies (NSC, SSCs), private seed firms, and agricultural research organizations. Through a network of distributors, dealers, and retail stores, a seed is distributed through this route. To distribute seeds, public seed agencies work with cooperatives and state farm offices.

The second method of seed distribution is an unofficial, locally driven seed delivery system (SDS) in which farmers acquire, produce, preserve, enhance, and distribute seed in an unorganized, unregulated open market. The main attributes of an informal channel are: (a) operating at the local level; (b) a variety of exchange methods; (c) meeting the immediate needs of farmers; and (d) relying on confidence. Nearly 70% of small/marginal landowners use their seeds or purchase them through this route (Acharya and Agrwal, 2021).

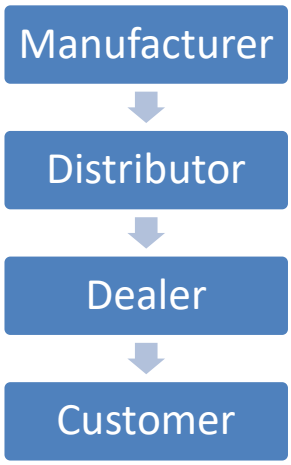
Pesticides sector:

The global pesticide market is already worth more than $50 billion at the distributor level, and it is anticipated to grow by 6 to 8% per year (Uttelly, 2014). In India, 6.700 tonnes (1.7%, or 67,000 tonnes) of the 3.52 million tonnes of insecticides (active ingredient) used globally are used. China uses the most pesticides, followed by the United States, the European Union, Brazil, and Argentina, which account for 90% of all pesticides used globally (FICCI, 2015). Insecticides account for 39% of all pesticides, fungicides account for 38.7%, herbicides account for 18.8%, and rodenticides account for 3.6% (Subash, 2017). In India, fungicides and herbicides are expected to grow at a pace of about 12%, outpacing insecticides (FICC,I 2015).

Challenges:

Pesticide manufacturers encounter several regulatory challenges. A novel invention takes at least five years to develop, whereas incremental innovations (newer formulations) only take 1-2 years. A novel molecule requires a large expenditure of 1200-1400 crore and a period of 9-10 years to develop. This inhibits companies from creating newer molecules. The time needed for regulatory approval could be cut in half to 2-3 years, promoting data generation following Good Laboratory Practices (WHO, 2009).

Marketing and Distribution of Pesticides



Every formulation must be recorded with the government following the submission of an official application. The producers or formulators appoint distributors for each area to market pesticides. Most of these distributors are found in urban areas and work for either the cooperative or the private industry. Through a network of dealers, they organize to deliver plant protection chemicals to farmers. The quantity of dealers differs from substance to substance and location to location. These dealers either work for cooperatives or the commercial sector, which includes agro-service centers, agri-clinics, and agri-business centers. Plant protection chemical marketing is a challenging and skilled job due to the lack of technical knowledge on the part of farmers or dealers and the complementary need for tools like sprayers or dusters. Misuse of it could jeopardize human life.

In India, there are about 1.79 lakh outlets (sale places) for pesticides. These are run by government organizations or NGOs with the final 7% by cooperatives and almost 90% by private businesses (Acharya and Aggrwal, 2021). Plant protection chemical marketing is complicated by farmers' or dealers' lack of technical expertise and the additional need for tools like sprayers or dusters.

Fertilizer sector:

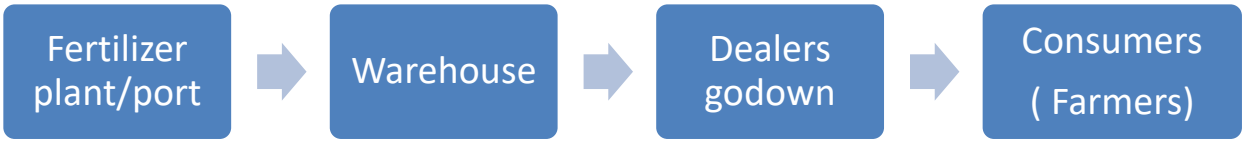
The top five nations account for between 50 and 80 percent of the world's fertilizer production capacity (Hernandez and Torero 2013). Latin America and Sub-Saharan Africa both depend on shipments from these nations, and South Asian nations have recently shown a similar trend (FAO 2015). India is, after China, the country that consumes the most fertilizers altogether (Sharma and Thaker 2011). About 25% of India's urea needs, 90% of its phosphate needs (either as raw materials or finished fertilizers; DAP/MAP/TSP), and nearly 100% of its potash needs are imported.

Challenges:

Choosing between consumers and farmers as beneficiaries are one of the biggest challenges. Should small and marginal farmers or big farmers be the beneficiaries? How can the subsidy component for various fertilizer classes and the subsidy component from company to company even for the same product be handled? In addition to these, infrastructure provisions, such as those related to network connectivity and devices, must be handled on a priority basis.

Marketing of fertilizers:

The flow of fertilizers from manufacturing plants and imported fertilizers from plant to consumers are:



Although manufacturers would prefer to regularly transfer fertilizer stock from plants to merchant godowns, this rarely occurs because dealers only need fertilizer during the selling season. Due to uncertainty regarding the anticipated demand for fertilizers from farmers during the upcoming sowing season, dealers are hesitant to buy and stockpile fertilizers during the off-season. To prepare for their dispatch to the retail outlets in the sowing season, fertilizer is typically transported to each district headquarters and stored in warehouses.

All over the nation, there is a sizable and extensive network of warehouses or godowns run by both the public and private sectors. In the selling of fertilizer, agricultural credit is crucial. Farmers almost always seek credit when buying fertilizer. For purchasing fertilizer, cooperatives or nationalized banks offer institutional credit to farms. Fertilizer dealers also offer to finance their most important clients.

Farm machinery:

Mechanization of agriculture is essential for raising agricultural output and efficiency in underdeveloped nations. Small and marginal land holdings (less than 2.0 ha) make up 85% of all land holdings in India, where the average farm area is a meager 1.16 ha. It is against "economies of scale" for individual ownership of farm equipment to mechanize a small and non-contiguous collection of small farms. The trend towards mechanized agricultural equipment over conventional human and animal power-operated equipment is used to analyze the state of farm mechanizatio in India. It was found that the availability of farm electricity and productivity exhibited a direct correlation (Mehta *et al.*, 2014).

Challenges:

Mechanization is against economies of scale, especially for land preparation and harvesting tasks. Power-operated small and non-contiguous groups of tiny farms. As the average farm size continues to decline, more farms will enter the adverse group, making individual ownership of agricultural machinery increasingly more expensive.

Marketing of farm machinery

Pump sets:

The degree of biochemical technology, the demand for labor and energy, the relative costs of labor, fuel, and oil compared to pumping sets, the expansion of canal irrigation, and the exploitation of groundwater all affect the demand for pump sets, which includes submersible pumps and diesel engines. In India, there are 600 pump manufacturers. Manufacturers need to forecast demand so they can modify their production plans. The government has promoted the purchase of pump sets by farmers through its credit strategy. Monopolistic rivalry prevails in the pump sets market. There are numerous brands of pump sets, and each manufacturer attempts to make their product more well-known by offering different prices and engaging in sales promotion activities (Mehta and Chandel,2014).

Power tiller

Power tillers are becoming more and more in demand and available across the nation. Imports were added to the supply in the early 1970s as local output could not keep up with demand. But since then, local production has risen to the levels necessary to satisfy demand. Over the past 25 years, the market has grown significantly. Sales reached as high as 32000 in 2017–18. Power tillers will likely become more popular in the years to come as crop production is intensifying quickly in many places, particularly in the irrigation command regions (Tiwari et al.,2019). To promote the manufacture and sale of power tillers, the government had been exempting certain items from excise taxes.

Models of agriculture input marketing

India's agricultural input markets are changing significantly in terms of size, involvement, and diversification. Various organizations use different marketing models for the marketing of agriculture input products

Basic target model

The agricultural input supply market entry model, also known as the agricultural Inputs Rural Guaranteed Enterprises and Training ideal, is evaluated in this research. Non-Governmental Organizations that create programs based on the aforementioned basic ideal refer to themselves by their mine plan as well as ideal. The agricultural inputs rural guaranteed enterprises and training ideal is distinguished by money lending assurance fund and retail center headed, business guidance elements that interact with the manufacturer and their intermediaries of farm consumable agri- inputs in low developed countries for expansion and growth of village markets. In this model farm input, the supplier sells their product to a rural retailer and the financing will be done with the help of government funds. In the second stage with the help of the BDS trainer the farm, inputs will be marketed to the farmers and further transformed into output markets.

Multi-Market model

While some marketplaces in multi-market models do include direct and indirect effects. In that sense, they are preferable to single market partial equilibrium analysis. These models, which typically have a producer and consumer core, can be used to analyze the impact of price and non-price policies on production, factor use, prices (for non-tradable), incomes, consumption, government revenues, and expenditures, and the balance of trade (Sadoulet and de

Janvry, 1995). Markets that are considered to have substantial supply- or demand-side interconnections are the focus of the analysis. The analysis of the agriculture sector has proven to be an especially popular application of multi-market models. The World Bank created multi-market models for Senegal, South Korea, and Cyprus in the 1980s to examine the effects of price policy changes on output, demand, income, trade, and tax collections (Lundberg and Rich, 2002). The single market surplus technique has been expanded by this model to take into account income distribution and a few general equilibrium factors. To quantify and assess the effects of alternative pricing strategies aimed at reducing the deficits in the Korean grain management fund and Fertilizer Fund (Braverman *et al.*, 1983).

They specifically assess the effects of the various options on the following factors: I production and consumption of rice and barley; ii) real income distribution, including the distribution of income between rural and urban sectors; iii) rice import levels; iv) rice self-sufficiency; and v) the government's spending plan.

Conclusions:

Each input (seeds, pesticides, and fertilizers) has its own market structure. The presence of both public and private firms managing different niche portfolios distinguishes the seed and fertiliser sector. While the pesticide industry is completely private, current policies are protective in the seed sector, subsidized in the fertilizer sector, and regulatory in the pesticide sector. In all three sectors, the availability and quality of inputs is a crucial issue.

The reality that agro-input dealers faced a variety of obstacles (high transport costs, low demand, a lack of markets, a lack of market information, a lack of storage facilities, and a lack of skills and knowledge) is especially concerning because the majority of these issues are serious infrastructure issues that call for strong political will to be solved. This demonstrates the gap in the market that prevents the private sector from fully assuming farm input supply functions, despite ongoing market liberalization designed to downplay government control of businesses and encourage the private sector to take over such business undertakings for increased efficiency. Therefore, it is crucial for the efficient growth of the agro-input market to create institutional and policy environments that support private agro-input dealer operations and investment. This lowers risk and raises rewards.

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ORGANIZATIONAL STRUCTURE OF EXTENSION SERVICE

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Introduction:

An agricultural extension service provides technical aid to farmers on any agricultural issues. In order to assist and boost their agricultural productivity, it strives to provide them with the necessary supplies and services. Agriculture extension operations help farmers learn new methods and concepts that have been produced by scientific research centres in the field.

In organization of extension services, there are two main strategies. The first describes a specific entity that is just concerned with extension, whereas the second identifies an agricultural or development organisation that is also in charge of research, marketing, and extension (Axinn, 1988).

The primary goal of extension is to teach and educate farmers and extension staff on the newest technical advancements while also serving as a feedback mechanism for the research system by developing appropriate techniques and procedures (Hassan and Adhiguru, 1998). Agriculture is the foundation of the rural livelihood security system; it is the cornerstone of the Indian economy. As agriculture has a strong trickle-down impact on lowering poverty and regional inequality in the nation, it is at the centre of planned economic growth in India.

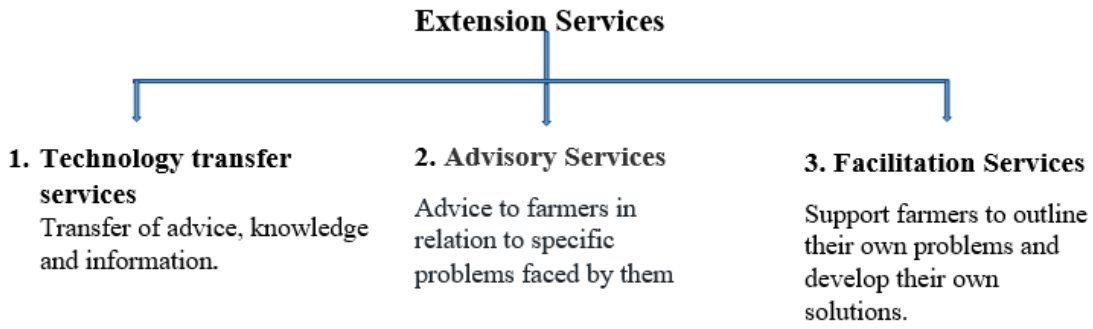
In the 1950s that agriculture extension became a national organisation with the goal of integrating rural development throughout India. As a result of the Orissa famine commission's findings in 1866, India's history of agricultural expansion and growth began. After the publication of the famine commission report in 1901, the Imperial Agricultural Research Institute and Agricultural College in Pusa, Bihar, was founded. The Community Development Programme (CDP), which was launched in 1952, established extension activities across India.

Extension services:

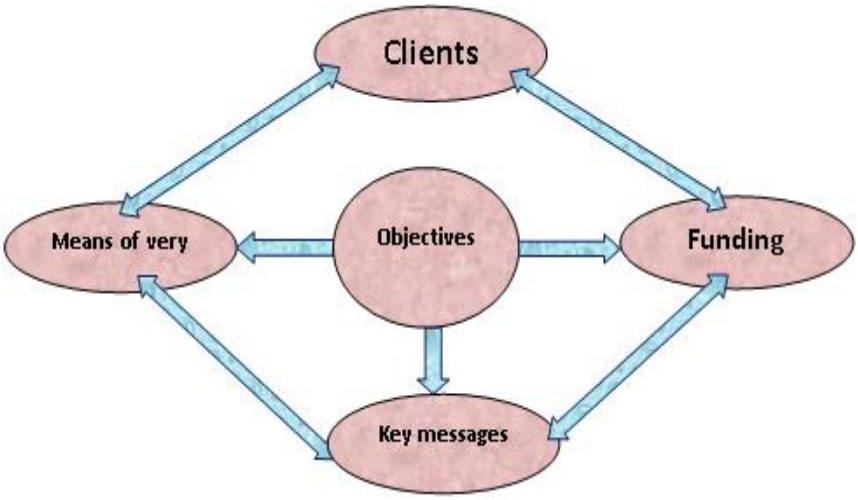
An agricultural extension service provides technical aid to farmers on any agricultural issues. In order to assist and boost their agricultural productivity, it strives to provide them with the necessary supplies and services.

1. Types of extension services

Technical services, facilitation services, and advisory services are some of the several kinds of agricultural extension services. Each of these services has a distinct advantage in educating farmers about the best agricultural techniques to increase crop output and increase the value of their harvest.



2. Elements of extension services



ICAR frontline extension services

The Indian Council of Agricultural Research (ICAR) provided farmers with front-line extension services in the 1970s through the creation of Krishi Vigyan Kendras (KVKs), which are Farm Science Centers, the Implementation of Operational Research Projects (ORPS), and the Land-to-Land Programme (LLP).

The primary goal of extension is to teach and educate farmers and extension staff on the newest technical advancements while also serving as a feedback mechanism for the research system by developing appropriate techniques and procedures (Hassan and Adhiguru, 1998).

Thrust areas of division of agriculture extension of ICAR

- Technology or product evaluation, refinement, and demonstration.
- Farmers' training.
- Extension workers training. A single point of contact for technology products, diagnostic services, and information via Agricultural Technology Information Centers.
- Development of gender-specific technology.
- Raising farmer awareness of enhanced agricultural methods.

University extension services

- Performing adaptive trials on farmer's fields of new study discoveries.
- Creating early prototypes of innovative agricultural technology.
- Organizing whole-farm demonstrations, as well as block demonstrations and

- Through educational endeavors, farmers, farm adolescents, and farm women are being trained.

Organizational structure:

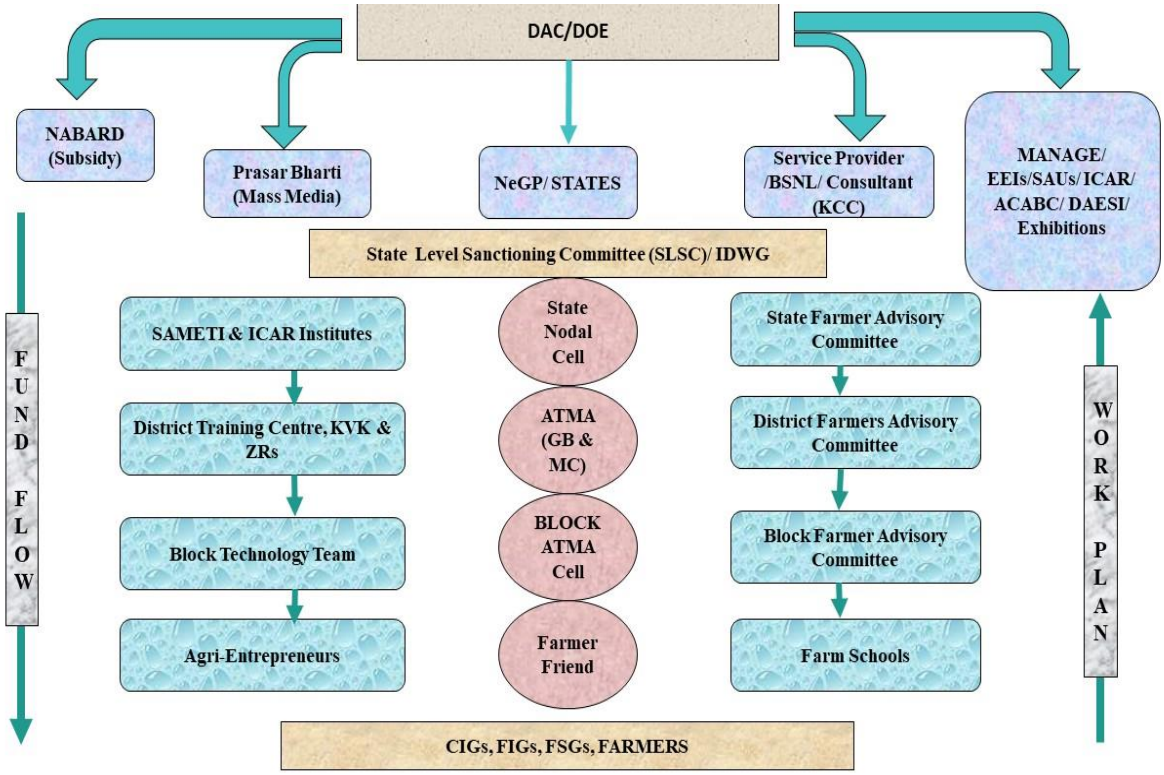
Organizational structure refers to the systematic deployment of human resources inside an organization with the goal of attaining agreed business objectives (OS). It specifies each employee's roles and responsibilities so that work and information can be easily exchanged, allowing an organization to run efficiently.

ATMA (Agriculture Technology Management Agency)

Constitution and working:

- Setting up the organisation
- Setting up the operation
- Vital Roles
- ATMA Management Committee Farm Information and Advisory Center (FIAC) at the Block Level Block Technology Team (BTT)
- Advisory Board for Farmers (FAC)
- Police from the village
- zone-based research station (Z.R.S)
- Krishi Vigyan Kendra (KVK)
- State-wide Inter-Departmental Working Group (IDWG)
- Flow of Funds Mechanism ATMA Planning and Finance Processes

Organizational set up:



There is a Governing Board provision under ATMA, which serves as a body for formulating policies, offering direction, and assessing the organization's development and

operation. The daily actions will be planned and evaluated by a different Management Committee established under ATMA. According to the ICAR (1998), NATP publication, the Governing Board and Management Committee's membership and primary responsibilities are listed below:

1. National Level

- T.D.M.C., Technology Dissemination Management Committee, Ministry of Agriculture, Government of India, New Delhi.
- Technology Dissemination Unit (TDU) under the D.O.E. Government of India, New Delhi.
- The Hyderabad-based National Institute of Agricultural Extension Management (MANAGE)

2. State Level

- Inter Departmental Working Group (IDWG), led by the Secretary of Agriculture.
- Agricultural Department Nodal Department (DOA).

3. District Level

- Agro Technology Management Organization (ATMA).
- Board of Directors (G.B.).
- Advisory Board for the ATMA (AMC).

4. Block Level

- The Block Technology Team (B.T.T).
- Farmers Advisory Committee (FAC).
  5.Village Level
- Officers from the line department at the village level.
- Associations for Farmers (F.Gs. SHGs, FIg ETC).

Functions of ATMA:

1. Examine and accept the yearly work plans and the Strategic Research and Extension Plan (SREP) that have been created and submitted by the involved units.
2. Take in and examine the yearly reports that the participating units submit, giving them comments and guidance as necessary for the many research and extension projects that are being run within the district.
3. Get funding for projects and distribute it to carry out important research, extension, and associated tasks in the district.
4. Promote the establishment and growth of farmers organisations and farmers interest groups within the district.
5. Encourage more participation from businesses and organisations in the private sector in terms of helping farmers with inputs, technical assistance, agro processing, and marketing.
6. Promote the expansion of agricultural lending institutions' access to financing for resource-poor and marginal farmers, particularly SC, ST, and women farmers.
7. Promote the establishment of farmer advisory committees by each line department, as well as the KVK and ZRS, to give feedback and insight on each program's R-E initiatives.
8. Sign contracts and agreements as necessary to advance and fund agricultural development initiatives in the district.

9. Investigate additional financial resources that might be used to assist secure the long-term viability of the ATMA and its member units.
10. Make plans to have ATMA's financial statements periodically audited.
11. Approving and revising the ATMA's rules and bylaws.

KVK (Krishi Vigyan Kendra's)

The agricultural science centre's known as Krishi Vigyan Kendras, or KVKs, were founded as cutting-edge institutes for providing vocational training to working farmers, school dropouts, and field level extension employees.

Objectives

- The creation of a platform to track different KVK resource usage and activity
- To develop a database with comprehensive information and learning resources for the numerous KVK-organized programmes
- Utilising mobile and web-based technology to assist farmers in finding answers to their questions
- To give information on the different KVK facilities and activities, as well as links to other pertinent data such as market and weather data
- Farmers and Agricultural Officers can register and request various KVK-related information by registering themselves.

Farm support activities

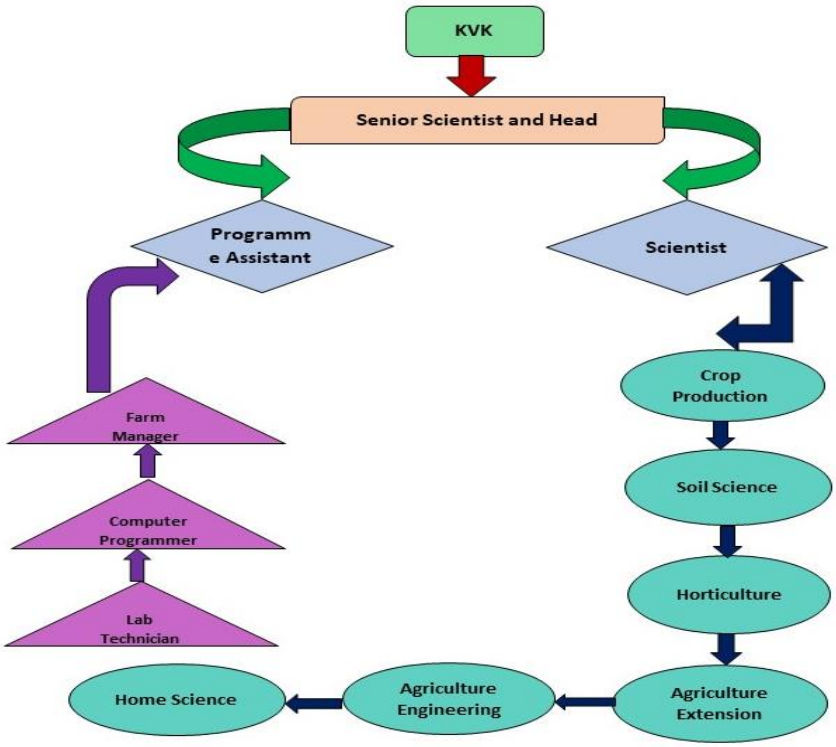
The Krishi Vigyan Kendra offers a variety of agriculture assistance services, including training, awareness-raising, and the distribution of technology to farmers. The following actions are carried out by KVKs in the adopted communities to accomplish the aforementioned goals:

- Using ICT and other media to provide advice to farmers on a range of topics that are relevant to them
- Several sorts of people's training programmes
- Extension functionaries are being trained through a programme.
- Strengthening the ability of farmers and extension workers to stay knowledgeable about and proficient in cutting-edge agricultural technology
- First line on the farms, a demonstration to determine the technologies' potential for productivity.
- Farm testing to evaluate the location-specific use of agricultural technologies under diverse farming methods.

It is started from KVK as a whole and divided in the following categories:

- Firstly, in any KVK the Senior Scientist or Head looks after overall functions and activities
- Secondly the Senior Scientist guide or look after Scientist and Programme Assistant.
- Follow up by other Scientist handle other activities of different departments includes:
  1. Crop Production
  2. Soil Science
  3. Horticulture
  4. Agriculture Extension
  5. Agriculture Engineering and Home Science (Community Science)

- Lastly Programme Assistant handle other departments which contribute to smooth functioning of KVK which includes:
  1. Farm Manager
  2. Computer Programmer and
  3. Lab Technician



Mandate of KVK

1. On-farm testing
2. Frontline demonstrations
3. Capacity development-boosting
4. Multi-Sector Support
5. Advisory Services

Scope of extension:

All rural development-related activities are included. Programs for extension should be dynamic and adaptable. The following list of areas indicates the range of Extension:

- Improving the productivity of agriculture.
- Improving the effectiveness of the marketing, distribution, and use of agricultural inputs and outputs.
- Increase natural resource preservation, development, and utilization.
- Develop suitable farming and household management.
- Improve family life.
- Development of young people.
- Growth of leadership.
- Improve growth of rural and community areas.
- Enhancing public affairs to promote progress on all fronts.

Conclusion:

Agricultural Extension Services are of three types in India: 1. technology transfer services; 2. advisory services; and 3. facilitation services. Each of these services has a distinct advantage in educating farmers about the best agricultural techniques to increase crop output and increase the value of their harvest. ATMA works on the district level, and KVK is run by agricultural universities; agriculture extension activities are managed by the state government. Agricultural extension helps in Improving the productivity of agriculture, Improving the effectiveness of the marketing, distribution, and use of agricultural inputs and outputs and Improve family life.

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NEW TRENDS IN AGRICULTURAL EXTENSION

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In order to improve the lives of farmers, extension programmes were initially designed as a service to "extend" research-based information to the rural sector. Thus, technology transfer, more general rural development objectives, managerial skills, and non-formal education were all included in extension. In developing nations, the conventional understanding of extension was heavily centered on boosting output, enhancing yields, educating farmers, and transferring technology. Today's definition of extension includes helping farmers work in groups, dealing with marketing problems, and collaborating with a wide range of service providers and other agencies. It also goes beyond technology transfer to facilitation and beyond training to learning. Consequently, agricultural extension can be summed up as the entire group of institutions that assist those involved in agriculture in their efforts to solve problems, connect with markets and other actors in the agricultural value chain, and acquire knowledge, skills, and technologies to better their lives. The foundation of study and development is extension. Unfortunately, due to a weak extension lobby, poor initial organizational setup, a general lack of trust by most research organizations, and historically subpar career development conditions in the profession of extension, a somewhat unhealthy perception of extension prevails in many developing countries. If extension workers don't contribute information about the farmers' identified and unresolved field issues, agricultural research agendas will continue to be mainly academic. While extension focuses on user acceptance and adoption of those technologies, research concentrates on the technical elements of developing usable technologies. Strong extension services, first public, now public and/or private, have always been available in nations with highly developed farmland, such as the United States of America, Canada, Australia, and Denmark.

Globalization, market liberalization, privatization, pluralism, decentralization and devolution, client participation in decision-making, natural and man-made disasters, rural poverty, food security, the HIV/AIDS epidemic, and a focus on integrated, multidisciplinary, holistic, and sustainable development are some of the major global developments. For both commercial and subsistence farmers in developing countries, these changes are generating new learning requirements. These requirements are challenging the decades-old mandates and operations within conventional extension systems, particularly when viewed in the context of the information technology transformation. In order to enable the extension function to be performed to the highest standard in line with a global challenge to their economies, particularly to their agriculture sector, the time is indeed ripe for policymakers in developing countries to challenge and revisit the discipline of extension within a global context.

The repeated training of staff in stereotypical agricultural topics will have little effect, as will cosmetically changes to the current state extension systems. The modernization and reform of the national agricultural extension system is a significant undertaking that calls for careful

analysis of the situation, understanding of the national policy on rural and agricultural development and food security, the leadership's vision of the country's development over the next 20 or so years, and finally making bold policy decisions, some of which may have political repercussions, cost a lot of time, money, and energy, and require extensive resources. Therefore, it is crucial that decision-makers examine current national extension patterns first to determine whether the system needs to be expanded.

Recent trends in extension

Globalization and market liberalization

When globalization is taken to its logical conclusion, it results in a world that is governed by a singular common law system and has no restrictions on how people move around. But that's still just a pipe fantasy. The current scope of globalization is limited to increased interaction and links between nations in the areas of trade, information exchange, and finance, encouraging open competition through the removal of trade and other national safeguard barriers, ostensibly under fair and relatively equal conditions for producers of goods and services regardless of where they are located, so that they can benefit from cross-national contacts and opportunities. No matter the benefits, drawbacks, potential, or dangers of globalization, the question of fair and equal conditions for producers is at the centre of the debate. This is due to the fact that, in the current global marketplace, developing countries cannot compete with established countries in terms of exports, export quality, or production. The general perception is that globalization will result in poor countries becoming poorer and wealthy countries becoming richer, as evidenced by the now common demonstrations at economic summits. In addition to its political effects, globalization will subject farming communities to opportunities and risks in less developed nations. The national agricultural extension systems will largely be responsible for educating and preparing the communities to adapt their agricultural operations in light of globalization, and they must get ready in advance to handle the impending task.

Liberalization is an integral part of globalization, which calls for removal of trade barriers, tariffs and other regulatory measures that are usually put into force by countries to protect their own industries and products to discourage the inflow of the articles produced elsewhere in the world. Globalization, which calls for the removal of trade restrictions, tariffs, and other regulatory measures typically implemented by nations to safeguard their own industries and products and deter the importation of goods made elsewhere in the world, is inextricably linked to liberalization. Therefore, liberalization calls for market opening or deregulation to allow free trade of products between nations. In order for the market to fairly determine the price of different commodities and products based on their demand, supply, and quality, and for consumers to freely decide what is best for them, it also advocates the removal of artificial price controls and public support for the farming industry in the form of farm subsidies. Market liberalization will inevitably have an impact on millions of subsistence farmers as well as commercial farmers in developing nations, either directly or indirectly, at some point. To prepare these farmers for this eventuality, national agricultural extension services will need to have the necessary expertise.

Privatization

The commercial sector now manages and provides a vast array of services that were previously administered by governments. In countries with developed economies, this is particularly true. Banks, railroads, post offices, airlines, businesses, hospitals, academic institutions, and other institutions and services are progressively transitioning to the private sector in many developing nations. The underlying cause is governments' shrinking budgets and permanent employees' attitude of "business as usual," which makes public organizations less effective and efficient, leading to financial losses and public unhappiness. Contrarily, the private sector has more resources, creative ideas, and a profit-driven incentive, making it eager to provide effective and superior services to its clients. Major multilateral and bilateral donors are actively pushing for the privatization of state extension services. The central claim is that state agricultural extension programmes have fallen short or, at best, fall short of meeting farmers' needs. Another equally compelling argument is that since extension advice benefits farmers and government funds for public services are shrinking, the cost of providing this advice should be covered by fees charged to the audience. Another argument in favour of privatizing extension services is that since the private sector is already actively engaged in the sale of agricultural equipment and inputs, why shouldn't it also handle the task of advising farmers on agricultural matters, which is generally performed more effectively by the private sector? There is also the argument that healthy competition among service providers will result in higher quality and lower service costs. Since subsistence farmers in developing countries were never asked to pay for extension guidance, the tendency to privatize extension services will undoubtedly sour the historically cordial and informal relationship between government extension staff and them. The national extension services should be well-versed in the advantages and disadvantages of this crucial problem, excluding the query of whether total, partial, or no privatization of extension is required in developing countries.

Numerous politicians and economists have criticized extension in the past and continue to do so because of its financing and expense. In order to accomplish the desired change, Extension Systems had to make changes, including restating the system's mission, creating a new future vision, and creating plans for the necessary transition. Government agencies and agricultural groups have put forth at least three scenarios for the privatization of extension:

- ✓ Only public services that directly affect the general population are financed by taxpayers.
- ✓ Direct charging, with the possibility of differentiating rates for particular circumstances or target groups, for some individual services that result in a direct return in the form of increased revenue.
- ✓ A combination of public and private professional association contributions, with a delayed return, for services like applied research, agent and farmer training, and the development of Extension tools and techniques.

Around the globe, extension services have historically been planned and provided by the public sector. As a result, whenever the term "extension" is used, it is usually in reference to public extension services. Similar to this, there is a propensity to only take the business sector into account whenever the private sector is mentioned. Contrary to the constrained scope of the corporate sector, the private extension includes all pertinent private organizations.

The goal of privatizing extension services is not to replace public extension services with commercial ones. In reality, privatization has taken on a number of shapes incorporating various stakeholders. The paper analyses the participant configurations of the main stakeholders, including private corporate companies, credit institutions, farmer's associations, non-governmental organizations, and media organizations.

The efficacy of planning at four levels—policies, programmes, projects, and strategy—determines the success of an extension service. While projects and strategy can be developed by private extension groups, policy and programmes must be determined by the public extension system. There will probably be competition between the different extension providers when private extension organizations start supporting farmers in this way, leading to more effective and customer-driven service. The private extension organizations take good care of both technical and allocative efficiency, which are fundamentally economic in nature, leading to cost minimization, profit maximization, and optimal resource use, which are justified in a competitive environment

Public extension services frequently only consider programme continuity when determining programme viability. Sustainability is distinct from continuity, which includes aspects related to the environment and justice. In terms of the aforementioned two dimensions, the private extension agencies, particularly NGOs and media groups, offer a valuable service in assuring programme sustainability. In addition to providing one-of-a-kind and innovative projects that the public extension service can also imitate, the private extension system in India provides the following services for farmers. Certain services include:.

- Cost sharing by farmers' groups
- Cost recovery on selected services offered to farmers
- Contracting services to small groups
- Paid extension services for affordable farmers
- Value addition by agro-processing firms
- Consultancy services (both technical and managerial)
- Privatized service centers for farmers
- Self Help Groups of farmers
- Information support through media organizations

Commercialization and agri-business

Everywhere in the world, commercial agriculture has been practiced for centuries by land-rich individual farmers, colonial powers in their respective colonies, socialist and communist regimes through state farms and cooperatives, as well as domestic and international commercial agricultural companies. The fact that millions of subsistence farmers produce only enough food for their own consumption and, occasionally, a small surplus for selling has prevented them from engaging in commercial agriculture. A massive effort is presently being made to commercialize farming, even on a small scale. Whether it makes sense to let the subsistence farmers carry on as they have for generations or whether their operations should be changed towards agribusiness, rural enterprise, rural industries, or commercialization is an issue that has both ethical and technical implications. Given the evidence that rural poverty has persisted, if not gotten worse, and the fact that rural young people, unlike their parents, are less

likely to remain in villages and continue farming in many countries, these issues seem to be relevant. If privately owned and cultivated small units of land are to be merged or combined to form bigger, commercially viable plots, appropriate agricultural policies and laws will be needed. The agricultural extension services will need to develop strategies to assist subsistence farmers in organizing themselves for profitable commercialization of their activities without losing the pride of land ownership.

Democratization and participation

More than ever, the civil society is arguing that democracy, participation in decision-making, openness in governmental affairs, and good governance are essential for the eradication of poverty, the eradication of corruption, the welfare of disadvantaged and vulnerable groups, the optimum utilization of human and natural resources, sustainable livelihoods, and overall human development. In many cases, the level of economic assistance that bilateral benefactors will provide to developing nations will depend on how well-run and respectful of human rights their governments are. These strong forces are challenging long-standing customs in almost every aspect of life, including politics, economics, and societal issues at the local, governmental, and international levels. There have been many strategies developed in recent years that claim to guarantee inclusive decision-making and the participation of all stakeholders in coordinated planning and implementation. These conceptual thrusts have had an impact on grassroots level service organizations, including agricultural extension services. However, the majority of developing nations still struggle with how to put the idea of farmer involvement into practice through their national agricultural extension systems. This is due to the fact that the majority of them have been using top-down extension methods for decades.

Environment concerns

Following the 1992 Rio de Janeiro Earth Summit, a worldwide movement to preserve a healthy environment was born and has been gathering strength ever since. No matter the technical emphasis, there haven't been many national or international meetings on development without mentioning the environment. National ministries and institutions have been established in both developed and developing nations to manage environmental issues, in addition to specialized departments within international development organizations. Similar teaching and research initiatives have started in academic institutions all over the globe. Freak storms, devastating floods, torrential rain, biblical-sized forest fires, a noticeable rise in ocean level, an increase in shark attacks on humans, the rapid melting of ancient glaciers, obvious disruption of wildlife patterns, and even the occurrence of earthquakes have all been linked to global warming. NGOs like Green Peace have a history of frequently intervening in government actions that jeopardize the environment's health in any manner. A job like farming, which is reliant on the natural world, cannot be conducted without having an effect on the environment. The degree to which environmental friendliness is incorporated into the national agricultural extension networks' routine activities is also under review.

Rural poverty, hunger and vulnerability

All those organizations that work with the rural population will undoubtedly be involved in the new anti-hunger programmes initiatives that are currently under way. Agricultural extension services that frequently interact with rural residents will inevitably become involved in

these global initiatives to combat rural poverty, hunger, and susceptibility. To successfully fight against these human sufferings, they must devise the right strategies.

Sustainable development

The importance of sustainable development has grown globally, in line with environmental concerns. Everywhere in the world, people want to avoid depleting the environment to the point where future generations will face hunger and destitution. Environmentally friendly technologies are necessary for the sustainable rural and agricultural development, as is raising awareness among farming communities about the need to wisely use and conserve natural resources, particularly those that are used by the community at large, such as common grazing grounds, forests, and fishing ponds. Deforestation, excessive fishing, and the overuse of chemical pesticides and fertilizers must all be decreased, and effective on-farm water and soil management must be implemented. There are expectations that agricultural extension organizations will not only become aware of the need to conserve natural resources but will also educate farming men and women to adopt environment- and natural resource-friendly agricultural practices. Practices like organic farming and integrated pest management are being promoted.

The institutional response to global forces

In reaction to the forces of change at work around the world, a number of nations as well as bilateral and multilateral donors have felt the need to reform their national agricultural extension systems. Three international projects are currently focusing on the changes:

- The Neuchatel Project is the first (NI). The World Bank, IFAD, USAID, and FAO are members of the NI, a loose coalition of important European bilateral donors. Since 1995, the NI Group has gathered annually to discuss potential changes to national agricultural extension networks, primarily in sub-Saharan African nations. The NI has recently been talking about overseas extension adventures.
- A revised AKIS/RD is the second proposal from FAO and the World Bank jointly (agricultural knowledge and information systems for rural development).
- The National Agricultural Extension Systems Reform Initiative is the third programme from FAO (NAESRI). In order to reform the national agricultural extension networks in developing nations, the institutions have created a variety of publications that contain reform principles.

Pluralistic extension system

Pluralistic extension systems, a method of using both public and non-public organizations to provide extension services to farming communities, are becoming more and more common. The obvious justification is the pooling of all resources available to lessen unhealthy rivalry, eliminate service redundancy, and make up for the agriculture ministries' low budgets. Many NGOs, commercial businesses, and semi-autonomous bodies are involved in providing extension guidance to farmers in some developing nations.

Client-orientation

Client-focused strategies are progressively replacing the outdated practice of disseminating the same technical messages to all farmers using the same extension methodology. Subsistence farmers, commercial farmers, rural youth, women, physically disabled people, and

most recently, families of farmers impacted by HIV/AIDS, are among the extension clientele, and each group has distinct needs. Terms like client-oriented extension and gender-sensitive extension are a result of this realization.

Decentralized extension services

A number of nations have abandoned the traditional, multilayer, center-focused organizational structure in favour of a dispersed system. The new focus is on having a relatively small entity at the national level to handle policy, coordination, and training functions while giving the provincial, district, or municipality government responsibility for programme planning, execution, and even budgetary authority. The decentralization has frequently given the ministry of local government or ministry of home affairs control over farm extension. Decentralization is beneficial in theory, but the early phase presents significant extension challenges.

Criticism of public extension services

A significant critique of public agricultural extension programmes in almost all developing nations has gained international traction. The services have come under fire for a number of reasons, including the fact that they are supply-driven, technically unsound, favour only large farmers, don't reach out to enough farmers, use a top-down extension strategy, etc. Some of the criticism is justified, while others have been made without understanding the underlying factors that are beyond the control of extension workers, such as inadequate pre-service training, scant in-service education, the burden of non-extension duties, low salaries, low status, the lack of opportunities for professional career development in comparison to other agricultural services, and the requirement to provide coverage for a very large number of farmers dispersed over a very large area without adequate resources. Unsurprisingly, the first casualty of any significant economic change has typically been the extension services. For instance, structural adjustment steps suggested by significant donors have resulted in a significant reduction in the number of public extension workers. Additionally, as part of the decentralization process, outreach services are marginalized and demoted. Additionally, NGOs are growing covering the remote regions that extension agents hardly ever visit due to a lack of transportation infrastructure. Alternatives such as the contracting-out of extension work, the privatization of extension services, and the farmer-to-farmer extension mode have been urged by critics worldwide.

Integrated, multi-disciplinary and holistic development

A multidisciplinary, integrated, and holistic strategy to growth is strongly preferred on a global scale. The argument is that concurrent, multi-sector development is more significant than sector development done one at a time. More and more businesses are choosing to change their organizational structures in this direction. A recent example is the reorganization at the Asian Development Bank, where multiple technical departments have been incorporated into each newly created country department, as opposed to the organization's prior focus on having a number of separate technical departments to cover all member countries. The "integrated rural development strategy," which was used in many nations during the 1960s, is making a comeback in a revised form that includes elements of bottom-up emphasis, stakeholder involvement, emphasis on eradicating rural poverty, and gender sensitivity. The old project method has been

replaced with a programmed approach by many multilateral donors, including UNDP. As a result, there are more multi-disciplinary and combined programmes available.

Participatory extension

The strong trend towards involving farmers in decision-making has given rise to participatory farmer group extension, client-oriented extension, gender-sensitive extension, research-extension-farmers linkages, and the creation of participatory tools like the PRA (participatory rural appraisal) and KAP (knowledge, attitude, and practice) survey. Support for empowering producers has grown significantly. The pilot experiment's yield increases were so impressive that the government decided to replicate the strategy in 100 villages, and a new FAO project has been authorized to give technical support for the program's training components.

Application of electronic information technology

The growth of rural and agricultural areas is already advancing thanks to cutting-edge information technology. Telecentres are being tested in a number of nations, including Laos, Vietnam, and Mali. These centres have already proven useful in a number of West European nations. The FAO is attempting to introduce VERCON (Virtual extension, research and communication network) in Egypt as one example of the virtual linkages being created to bring research and extension together. Internet and interactive e-mail facilities are being created at the municipality level as part of an FAO initiative in the Philippines to support decentralised extension staff. Then, expert systems are being created to partially offset the infrequent trips to farmers' fields by subject-matter experts. Cellular phone use is now commonplace, and in Bangladesh, the technology is being used for an initiative to develop rural areas. In Estonia, more than 30% of extension workers use the Internet. On the World Wide Web, one can discover programmes like "virtual farms" and "virtual gardens". The primary issue is figuring out how to use the capabilities of cutting-edge information technology to the advantage of extension agents and farmers without undermining the significance of people and specific local factors.

Disasters and emergencies

In this era of civilization and scientific advancement, human suffering is increasing for a variety of reasons, some of which are caused by human activity and others by natural catastrophes. Conflicts, wars, famines, storms, earthquakes, epidemics, and many other calamities cause severe human and physical suffering and disturb daily living. Disasters have affected people in both metropolitan and rural areas. Land mines in the fields prevent farmers in some nations from cultivating their property. Seed, water, and soil are essential farming inputs that are not always readily accessible. Farmers no longer have access to technical guidance due to the disappearance of extension services. Farm input delivery and transit are now impossible due to infrastructure destruction. Although NGOs and food aid organizations have been busy in disaster-affected areas, food handouts only go so far. These enormous obstacles are too great for agricultural extension agencies to handle alone. They must cooperate with pertinent organizations to assist the rural population in producing enough food to survive using whatever resources are accessible. Disasters have been ruthless agents of change, and we are still waiting for a thorough response from national agricultural extension agencies.

Unified extension service

To maximize resource usage and create a more effective administration, the extension services are being unified. Indeed, individual visits from so many extension agents, each of whom represents a different agricultural field, cannot and should not be a waste of the farmer's time. In many nations, including Indonesia and the Philippines, the establishment or strengthening of multi-disciplinary subject-matter specialists teams during the decentralization of extension services is a common practice.

Fully or partially privatised extension

Many industrialized nations have privatized their farming extension services entirely or in part. The push for privatization is linked to the new phrases like contracting out extension, cost-recovery for extension services, and outsourcing extension. In a special scheme in Costa Rica, the government gives farmers vouchers for extension services that they can use to consult with private experts. The advantages include boosted productivity, enhanced quality, client-centeredness, staff job satisfaction, and increased marketing possibilities for farmers. The issues include the loss of government power, the failure of the government to fulfill its financial commitments, and weakened communication with the stakeholders as a result of their increased competition. Farmers should pay for extension guidance, according to those who favour privatizing extension services. There is a real concern, though, that the zeal for expense recovery will prevent small farmers from receiving the services. Small farmers either don't think the extension guidance is valuable enough to pay for, or they are unable to pay. This is true even for some established nations, like England. The conventional wisdom would suggest that in emerging nations, commercial farms should pay for extension assistance while small producers should receive free extension services from the government.

Information and technology break-through

The transformation in information technology is currently underway. The speed of this field's development is fundamentally altering how people have lived on this world. Almost every aspect of existence has been impacted by this development, which has effectively dwindled the world. Never before have people living elsewhere in the world been able to immediately learn about an event that is taking place in a distant location. Organizations have the ability to leverage the enormous power of information technology for the good of humanity. The services for agricultural extension are unable to remain distant from the widespread use of information technology in everyday living. Agricultural extension agencies can take advantage of this opportunity to improve their own capabilities and instruct the media-accessible rural populations. When it comes to face-to-face interactions with farmers and researchers, extension organisations in developing countries encounter two significant challenges: first, physical distances, and second, a lack of transportation options. Through the creation and use of suitable, interactive information mechanisms, the new information technology could significantly remove these physical obstacles.

Paradigm shift in extension education

In the past, extension services were thought to be the means of getting agricultural technologies from the research establishment to the farmers. However, the method has come under harsh criticism for failing to have the desired effects on development in underdeveloped

nations. Extension is being considered to play a larger role with a diverse set of objectives, including: better connecting farmers to input and output markets, reducing vulnerability, enhancing the voice of the rural poor, and developing microenterprises. These objectives are being considered in light of changing agricultural conditions, rising trends of globalization, commercialization, and the drive towards sustainability. The context in which agricultural research and extension systems are working is having an impact on their organisational structure, management style, and field operations, and this is known as a paradigm shift in agricultural research and technology development. These environmental changes' fundamental patterns are founded on numerous partnerships, multilevel participation, and the expansion of the scene from national to supranational levels. In addition to changing from a top-down extension model to a participatory approach to technology evaluation and adoption, it was necessary to move away from a single commodity, mono-disciplinary basis and towards a farming system.

New perspectives

1. **Farming system perspective: -** The idea of a farming system perspective suggests taking the farmer's take on events. It implies that researchers ought to employ an FSP even if they're focusing on a unique product and/or disciplinary issue. FSP calls for researchers to be aware of how farming systems interact, to comprehend how they work, and to use this knowledge when developing and assessing new technologies that are made available to them. From farm borders to household systems, the idea has evolved.
2. **Participatory research methods: -** The key aspect of the new strategy is the learning process' reversal, where researchers and extension specialists are learning from farms. The focus on people rather than "things," decentralization, participant empowerment, value and work on what matters to participants, and learning from the beneficiaries rather than teaching them are the key components of the new paradigm. Location and responsibilities are also highly valued, with farms and farmers being viewed as the centre rather than study facilities, labs, and scientists.
3. **Action research: -** Action research is a study philosophy or approach that places a particular emphasis on "learning by doing," in which concepts and ideas are taken from other places, tested, and then adjusted to local conditions. Action research, which is also referred to as participatory research, collaborative inquiry, emancipator research, action learning, and contextual action research, is essentially a process by which reform practitioners try to study their problems systematically (scientifically) in order to direct, improve, and assess their decisions and actions.
4. **National agriculture research system (NARS):-** Research and development professionals used public sector agricultural research institutions (NARIs) as a means of advancing agricultural development for a sizable amount of time. The NARIs framework had developed to enable significant investments in farming technology to boost food output and encourage the production of export cash crops.
5. **Agricultural knowledge and information system (AKIS):-** FAO and the World Bank defined AKIS as a group of agricultural organizations and/or individuals, and the links and interactions between them, engaged in such processes and the utilization of knowledge and information, with the purpose of working synergistically to support

decision-making, problem-solving, and innovation in a given country's agriculture, in their 2000 report.

Some other initiatives taken by ICAR in Extension

- **Knowledge Systems and Homestead Agriculture Management in Tribal Areas (KSHAMTA)**: KVKs across the nation carried out 34958 frontline demonstrations and 6009 on-farm trials as part of the KSHAMTA initiative. Through training initiatives, 60136 extension workers and 607936 farmers/farm women had their capacities developed. The KVKs arranged extension activities that benefited 971423 participants. Seeds (33121 q), planting materials (58.84 lakh), livestock strains, and fish fingerlings (15.64 lakh) were among the technological inputs created by KVKs. Additionally, mobile advisories on different aspects of agriculture were sent to 36.12 lakh farmers after 86040 samples of soil, water, plants, and manure were analyzed.
- **In-situ Crop Residue Management**: 60 KVKs in Punjab, Haryana, Uttar Pradesh, and Delhi are working on the "Awareness for In-situ Crop Residue Management" project, with a focus on promoting agricultural machinery and conducting training, demonstrations, and other Information, Education, and Communication (IEC) activities for in-situ management of crop residues. Selected communities in the three states covered by IEC activities were targeted to educate residents about the negative effects of residue burning, the advantages of in-situ residue management, and government programmes that make subsidized equipment available. More than 100 panel talks and other awareness programmes were broadcast on DD Kisan, and more than 4.5 lakh stakeholders received promotional materials. Similar to this, 75 Kisan Melas with about 2 lakh participants and about 700 awareness events at the village, block, and district levels were organized. Similar to this, 250 schools and colleges and about 40000 pupils participated in the campaign to stop residue burning. To engage as many stakeholders as feasible, environmentalists and religious saints were enlisted. For an additional 20000 farmers, tractor owners, and machine operators, 400 practical training sessions were arranged. Over 12000 hectares of frontline demonstrations were planned. Over 10000 farmers were introduced to the technologies during approximately 200 exposure trips, 250 field days, and harvest days. The occasion known as "No Agricultural Residue Burning Day" was Baisakhi. As a consequence, there were significantly fewer burning incidents in Punjab, Haryana, and Uttar Pradesh in 2019 than there were in 2018, 2017, and 2016.
- **Linking KVKs with Common Service Centers (CSCs**): On July 16, 2019, a Memorandum of Understanding (MoU) was inked with the Ministry of Electronics and Information Technology of the Government of India. As a result, 3.5 lakh CSCs have been connected to KVKs to offer technological solutions to farmers who visit CSCs with technological issues pertaining to agriculture.
- **Role of KVKs in Jal Shakti Abhiyan of Ministry of Jal Shaki:** In total, 243 KVKs under the Jal Shakti Abhiyan organised 466 melas with the involvement of 257408 farmers and schoolchildren in the first phase up to 30.09.2019. Similar to this, 91 KVKs organized 91 melas as part of the Jal Shakti Abhiyan with the involvement of 56746 farmers and students. Numerous events were held, including discussions on water

efficiency and the use of micro irrigation systems, live demonstrations of drip and sprinkler irrigation systems, Nukkad Natak, farmer-scientist interactions, water management quiz competitions, drawing and rangoli competitions, film screenings on the significance of water conservation and micro irrigation, demonstrations of roof top rainwater harvesting, sharing of farmers' experiences, and method demonstration on measurement of soil moisture with electronic moisture meter, exhibition, distribution of saplings of trees, felicitation of farmers, etc.

- **Establishment of District Agricultural Meteorological Units (DAMU) under KVKs:** District Agro-Met Units (DAMUs) have been established in the grounds of 199 KVKs in accordance with an agreement with the India Meteorological Department (IMD) to provide Agro-met Advisory Services in local language throughout the nation through KVKs to assist the farming community in different Agro-climatic zones to serve the farming community in order to reduce the risk due to climatic aberration and improve productivity. Under the initiative, the KVKs hired 116 SMSs and 93 Agro-met Observers, of which 103 staff have received training.

ICT Initiatives:

- The Krishi Vigyan Kendra Knowledge Network Portal, **a web portal,** was launched on July 8, 2016, to regularly monitor KVKs and to educate and advise farmers.
- **mKisan Portal**- More than 5 crore farmers are given mobile agro advisories by the KVKs using the mKisan portal for timely and need-based information about the weather, market, different field operations, outbreak of pest and disease incidence and their control measures, etc. to the farming community.

Conclusion:

For farmers, extension has a crucial role to perform. Extension has historically worked to support new managerial and technological advancements, inform farmers, and serve as a facilitator or middleman for rural communities. Extension can now assist in connecting field practice to new policies. It is now widely acknowledged on a global scale that agricultural extension needs to change in order to accomplish a variety of goals. This includes strengthening and supporting farmer organizations, better connecting farmers to input and output marketplaces, reducing vulnerability and enhancing the voice of rural poor people, developing microenterprises, and reducing poverty and protecting the environment. Extension is being compelled to accept an obligation that has expanded but has actually always existed but has rarely been addressed. There is a growing understanding that new extension methods must develop locally, based on experimentation, learning, and adaptation to existing circumstances. This is due to the limitations of a single extension model for all types of situations. In the case of Indian agriculture, which is characterized by declining land and water availability, degradation of natural resources, an unfavorable price regime, low value addition, particularly in rural areas, and rising competition from import of agricultural commodities, the need for this new and expanded trend of extension is evidently emerging. As a result, the production and market world is becoming ever more complex, and the need for information and services is growing.

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ENTREPRENEURSHIP OPPORTUNITIES IN FLORICULTURE AND LANDSCAPING

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Introduction:

Since time immemorial the use of flowers and ornamental plants are associated with our civilisation. The seals of Mohen - jo – daro serve as evidence for the use of *pipal* tree as an ornamental plant. The seals of Harappa provide another instance from the same time period that illustrates the usage of a decorative plant that resembles a weeping willow. Gardens and flowers have also been mentioned in our earliest classic writings and scriptures as well.

Although loose flowers were grown for domestic purposes like making veni, gajra, garlands, etc., as well as for different celebrations like weddings, birthdays, religious offerings, and other social gatherings, the commercial cultivation of cut flowers for domestic and international use is more recent.

Floriculture is an important branch of horticulture that deals with the study of cut or loose flowers, ornamental plants, dried flowers, essential oils, and landscape gardening. The cultivation, processing, and sale of ornamental plants in relation to the landscaping of small or large areas and the upkeep of gardens in order to make the surroundings look aesthetically pleasing are all aspects of the field of floriculture. It also has become an integral part in order to maintain a pollution-free environment in cities through the practice of gardening.

The field of floriculture is emerging as an important commercial crop sector in India both from the perspectives of domestic and international markets. There is a steady rise in demand for floricultural products. The three main factors that contribute to the industry's rise to prominence are—increased employment, guaranteed greater earnings for rural residents, and generation of more foreign exchange.

Our floriculture industry comprises of the cultivation and production of flowers and marketing of the flowers, nurseries for sale of potted ad ornamental plants, planting materials such as bulbs, seeds and corms of various flower or ornamental crops. Other than the plants or

planting materials numerous value-added products such as essential oils and edibles pigments or colourants and their marketing are also dealt with in floriculture. Services such as plant rentals for occasions or for decorative and indoor purposes is also being offered in recent days.

Landscaping

Now that we have also considered the opportunities involved in landscaping, it is essential to know what the term refers to. Landscaping is an act of enhancing the beauty and appeal of a piece of land. As it enhances a location, brings tranquilly and freshness to the surroundings, and raises the value of a property, landscaping is growing more popular and has become common these days. It is crucial for businesses like offices, homes, schools, and supermarkets since the façade of the structure and exteriors influences people's initial impressions about the institution. People also unwind and appreciate nature's beauty in the forms of parks and gardens. Lawns are an integral feature in gardens and are laid to enhance the aesthetic sense of the place.

With this background about the history and different aspects of floriculture and landscaping, in this chapter you shall discover the scope, current status and the enormous entrepreneurship opportunities offered in this field of horticulture.

Scope of Floriculture:

- A lot many entrepreneurial opportunities has been created by the floricultural sector due to its expanding trade, greater job prospects with income rise and high returns.
- It is one of horticulture industry's most promising segments, which is significant from an aesthetic, social, and economic perspective.
- It has the ability to earn foreign exchange and create year-round job possibilities.
- The primary agricultural exports from many nations are various value-added goods from the floriculture industry.

Present status of floriculture in India

The demand for floriculture has significantly risen as a result of changes in people's lives and increases in their per capita income (N. V. Anumala and R. Kumar, 2021). With the current increase in demand for flowers and their products, it is currently one of the profitable markets. The largest flower-producing states of India include Tamil Nadu, Karnataka, Andhra Pradesh, West Bengal Maharashtra, Madhya Pradesh, Gujarat, and Haryana (NHB database).

Cut flower production, loose flower production, dried flower production, nurseries, potted plants, seed business, extraction of essential oils, and value-added goods are few of the different revenue-generating activities in floriculture. To accommodate the demand for flower seeds, various seed companies have set up production facilities in areas with significant flower-growing industries. Production of seasonal flowers and seeds is a well-established industry in Punjab, Karnataka, and Maharashtra. Six agri-export zones for floriculture have been established by the Indian government in the states of Maharashtra, Sikkim, Tamil Nadu (two zones), Uttarakhand, and Karnataka. The major countries that import Indian floricultural products are the United States, Germany, the United Kingdom, the Netherlands, and the United Arab Emirates. India's floriculture industry is in charge of export, promotion, and development under the authority for the development of agricultural and processed food products (APEDA).

Entrepreneurship opportunities in floriculture and landscaping

Loose flowers production

As per the third advance estimates of the year 2021-22 Tamil Nadu is the state that produces the loosest flowers (571.23 MT), followed by Karnataka (439.22 MT). The loose flower sector offers opportunities like Farm Managers for contract farming of loose flowers grown especially essential oils, pharmaceutical and nutraceutical compounds.

Cut flower production

Roughly 98.5% of flowers are produced in open fields, and just 1.5% are planted in greenhouses. The hi-tech floriculture sector is still developing in India. The majority of the floriculture initiatives use technology that was developed in Israel or the Netherlands. Around 60% of global trade is made up of cut flowers, with the remaining 40% consisting of live plants, cut foliage, dry flowers, etc., The state of West Bengal takes the lead in cut flower production followed by Karnataka. Jobs like Production Executive, Greenhouse Manager, Plant Protection Expert, and Manager (Post Harvest) are available in the private sector through the protected horticulture industry.

Nursery and plant rental services

The sale of pot plants is the second crucial floriculture component that makes up a significant portion of the worldwide bloom industry after the cut flowers. Poinsettias are the most popular blooming pot plant traded globally, with the USA accounting for 80% of global trade. Similar to this, among the foliage plants, kalanchoe is the most widely traded product. India is home to a wide variety of attractive plants that may be cultivated in pots and marketed on the domestic and international markets (Vahoniya *et al.,* 2018).

Due to the increased urbanization, depletion of lands under agriculture is occurring at a fast pace. The current generation is in search of plants for their homes and personal spaces. This trend has opened up possibilities for the commercial production and sale of potted indoor and ornamental plants for interior scaping. This arena of floriculture sector has job postings for nursery managers, sales executive, production managers and relationship officers (for rentals).

Essential oil production

Essential oils are concentrated forms of volatiles oils obtained from the plants. Rose, jasmine, tuberose, other popular flowers are used for the extraction of essential oils. Brazil, China, the United States, Egypt, India, Mexico, Guatemala, and Indonesia are the top manufacturers of essential oils. And the the top three consumer countries are the USA (40%), Western Europe (30%), and Japan (7%). A tremendous opportunity exists for the large-scale cultivation of essential oil-bearing crops and their processing as the demand for essential oils is growing at a pace of 7-9% per year. The opportunities offered include managerial posts for production, sales and testers for fragrance testing.

Dry flowers

By cutting and drying one's favourite flowers, one may take advantage of the freshness of a flower garden throughout the year. Different drying techniques are used for different flowers based on the nature of the flower being used. Dry flowers make up to almost 40–50% of Indian floriculture exports. The business is currently poorly organised and is dependent on the plant material found in forests, and has no infrastructure for cultivating specialty flowers anywhere in the country. There is a lot of opportunity for Indian business owners because the demand for dried flowers is growing at an astounding pace of 8–10%. Similar managerial posts, skilled and unskilled workforce, sales managers are recruited in private industries.

Natural pigments / dyes from flowers

Marigolds are cultivated in large-scale in some regions of India in collaboration with the extraction industries. In addition to its application in the food and textile industries, the marigold pigment is extensively utilised in the poultry sector to improve the colour of the meat and egg yolk. Similar to native plants, many local flowers also contain important pigments that may be extracted and utilised in a variety of ways, including in medicine. The pigment industry offers opportunities like Processing executive, Production and sales manager.

Florist and floral decorations

The extravagant arrangements at social, political, entertainment, and sporting events are driving up demand for flower decorations in the recent years. Despite the unstructured nature of this industry, it does have a sizable amount of business and offers opportunities for designers, Decorators, Floral Designers etc.,

Landscaping

Due to increased industrialisation, stricter environmental regulations, and a desire to make the surroundings more beautiful, the opportunities for corporate landscaping are rapidly expanding. Corporate landscaping development has complemented the expansion of the traditional nursery sector, which now focuses on certain products like turf grass, succulents, cactus, aquatic plants, etc. this sector provides workplace opportunities like landscape designers, consultants, visualizers, golf course managers, turf managers, hotel lobby managers, etc (Singh *et al.*, 2017).

Other than the above discussed opportunities jobs are also offered in public and private sectors such as research institutes as technical officers, teaching assistants, professors in Krishi vigyan kendra and other agricultural universities.

Prospects of floriculture in India

India has a long-standing heritage of flower cultivation. It is regarded as a high-growth business in our nation. The government's efforts through schemes and policies have led to a surge in export-focused flower production. The scope of floriculture in India are as described further.

Also, there is a growing market for floricultural plants and the goods they generate, like potpourri, bouquets, garlands, and veni. They are used for a variety of festivities and events.

The geographic location of our country is strategically positioned between two important flower markets, namely Europe and East Asia which favours the floriculture trade. India has far better opportunities and possibilities in the flower trade than its Asian competitors since it is located relatively near to major flower-consuming nations. India benefits from the harsh winters of the major flower-producing European nations, especially in places like Bangalore, Pune, Hyderabad, Nasik, and the North East (for orchids and anthuriums), which have year-round mild climates (Janakiram, 2017).

The diverse agro-climatic conditions present in India allows for the cultivation of all types of flowers in one or more seasons throughout the year.

Urban horticultural developments *via* landscaping, not only adds aesthetic beauty but also preserves the environment by lowering the air and noise pollution in its surroundings. It also promotes and supports ecotourism, thus making landscaping a crucial aspect of urban horticulture. The installation and maintenance of lawns is now a profitable industry that is essential in landscaping. Both skilled and unskilled human resources are needed for this purpose and hence creates employment opportunities to the citizens. The use and scope of turf or lawn grasses, vertical gardening, roof gardening, etc., is expanding as a response to climate change.

Potted plants production and commercialization opportunities have been created by rising industrialization and the depletion of agricultural land. They have also made it possible to rent plants for interior decoration in hotels, offices, and other buildings. Nursery businesses are

emerging as a thriving venture with excellent profits. High-quality flower seeds are in high demand, and our nation has a bright future for protected or high-tech cut flower farming. To improve floricultural exports, one might expand the area dedicated to intense flower production. Another significant activity is the extraction of pharmaceutical and natural products from floral plants, including essential oils, natural colours, and pharmaceutical and naturopathic substances.

Conclusion:

Due to its quick growth rate, rising purchasing power, and increased public awareness, floriculture is developing as the most varied and prospective sector of the horticulture industry on both a national and worldwide level. It is giving India's youth more prospects for higher income, profit, and employment while also encouraging greater participation from women and increased exports. In comparison to other crops, it also helps farmers' livelihoods, and the trend in the average unit price realised from exports shows that floriculture output commands greater prices in comparison to other crops and thereby helps to improve farmers livelihoods.

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RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY

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Rural Sociology

- Sociology is derived from Latin word '*Socius*' meaning companion or associate and the greek word '*Logos*' meaning a study of science.
- Father of sociology- Auguste Comte
- The word 'Sociology' introduced for the first time by- Auguste Comte
- Sociology as the science of social phenomenon subject to natural and invariable laws, the discovery of which is the object of investigation. (Auguste Comte)
- Rural Sociology- It is the study of human relationship in rural environment. (Bertnard)
- Urban Sociology- This branch of sociology deals with the city or the urban community with urbanization.
- Society- A group of people who have lived together, sharing common values and general interests long enough to be considered by others and by themselves as a unit. (Chitambar)
- Community: Groups of mutually dependent people, living in a geographical area, having a sense of belonging and sharing common values, norms and acting collectively in an organized manner. (Chitambar)

Social Group

Social Group: A social group is two or more people between whom there is an established pattern of interaction.

Group Norm: It is a guideline that instructs the person on how to act in a given setting.

Group Cohesion: The degree of attraction between group members and their willingness to stick together.

Role: A set of behaviour guidelines associated with a role or position in a social setting.

Stages of Group Formation:

1. **Forming Stage:** Orientation stage. There is a tremendous lot of ambiguity and doubt at this phase regarding the group's organisation, goal, and leadership.
2. **Storming Stage:** Conflict, confrontation, and criticism define this period. Throughout the meeting, unspoken anxiety and a struggle between one's own interests and those of the group are both visible.
3. **Norming Stage:** The third stage shows how the group's cohesion and intimate relationships grow after certain standards are established.
4. **Performing Stage:** Highest level of group maturity. Teamwork, role clarity, and task completion characterise this phase. By group discussion, conflict is identified and resolved.

5. **Adjourning Stage:** There are two causes for adjourning groups. The group has finished its duty, therefore after that, the members decide to split up and say goodbye while harbouring nostalgic thoughts.

Classification of Social Group:

1. **Based on quality or type of relationship**

(a) Primary Group: Face-to-face relationships are characteristic of certain groups. E.g:- Family, Community.

(b) Secondary Group: Secondary groups are those that offer impersonal relationships. E.g:- Political group, Trade union

2. **Based on mode of organization and functioning**

(a) Formal Group: They are formally set up and have a constitution established by laws etc. E.g:- Labour Union, Village Council

(b) Informal Group: They lack prescribed structure and are not formally organised. E.g:- Family, Friendship group etc.

3. **Based on structure and type of membership**

(a) Voluntary Group: Based on his decision, a person joins the organisation. E.g:- Friendship Group, Play Group etc.

(b) Involuntary Group: People join the group by birth, domicile, location, etc. rather than by their own choice. E.g:- Family, Neighbourhood

4. **Based on Social Class**

(a) Horizontal Group: In terms of rank or place within the social class structure, the group's members are comparable or similar. E.g:- Caste

(b) Vertical Group: The group's membership crosses vertically across society's horizontal divisions because its members come from many social classes. E.g:- Race, Nation etc.

5. **Based on personal feelings**

(a) In group: Based on the members' opinions towards their own social groups, people in this group believe they are a part of it. E.g:- My family, my class etc.

(b) Out group: Because of their attitude, people in this group don't feel like they belong there. E.g:- Their family, their class etc.

6. **Based on the size of the group**

(a) Small Group: The number of members is less than 30.

(b) Large Group: The number of members is more than 30.

7. **Based on Participants**

(a) Unsocial Group: Members of the group do not interact with other groups. They exist solely for themselves. Other groups are not interacted with by them.

(b) Pseudo-social Group: Take part in a wider social group, but mostly for one's own benefit.

8. **Locality Group:** This classification bases itself on the region or locale that members occupy as a means of tying groups together. E.g:- Neighbourhoods, Communities.
9. **Reference Group:** The reference group is the group to which the individual turns for recommendations on various topics. Even when the standards are in opposition to earlier

membership group standards, reference group gives the standards that serve as behaviour guidelines.

Social Stratification

- **Social Stratification** is the division of population into two or more layers, each of which is relatively homogeneous and between which there are differences in privileges, restrictions, rewards and obligation. (Lundberg)
- **Types of Social Stratification**

1. **Based on Sex:-** Male, Female
2. **Based on Age:-**

   Infant (0-2 years) Young (20-29 years)
   Child (2-6 years) Middle Age (30-50 years)
   School Child (6-12 years) Senior Citizen (>50 years)
   Adolescence (13-19 years)
3. **Based on Caste:-** General, Schedule Caste, Schedule Tribe, Other backward caste
   Caste in Hindu religion (Varna): Brahmin, Kshatriya, Vaishas and Shudras
4. **Based on Class:** Upper Class, Middle Class, Lower Class

   Caste: A caste is a social category whose members are assigned a permanent status within a given social hierarchy and whose contacts are restricted accordingly. (Lundberg)
   - The term 'Caste' is derived from the Portuguese word 'Casta' meaning lineage or breed or race.
   - The Sanskrit word for Caste is 'Varna' which means colour.

Class: A social class in a given society is made up of all the people who have essentially the same social standing.

Difference between Caste and Varna:

Caste	Varna
1. Based on birth.	1. Based on occupation.
2. Change of caste is not possible.	2. A man can change his Varna by changing his occupation.
3. Caste is determined by birth.	3. Varna is based on individual qualities.
4. Caste is rigid.	4. Varna is flexible.

Difference between Caste and Class:

Caste	Class
1. The caste system is not universal, it is peculiar to India.	1. It is universal in nature
2. Caste is ascribed status.	2. Class is achieved status.
3. Caste is closed system & restricts social mobility.	3. Class is an open system and it provides social mobility.
4. It is closely associated with Hindu tradition.	4. It is secular. It is not connected with religion.
5. It is more conservative, orthodox and reactionary.	5. It is more progressive and permits greater social mobility.
6. Caste is endogamous.	6. Class is not endogamous.

Cultural Concept

- Culture is a very broad concept that encompasses all aspects of our lives, including our conduct, ideologies, ethics, morals, etiquette, and customs.
- Man cannot survive as man without culture.

Definition –

Culture is a collection of ideas, ideals, and artefacts. It is the societal that we burned in from the previous generation.

Types of culture:

(a) Material Culture:

It consists of manufactured items like houses, tools, food, and other things.

(b) Non-material culture:

It consists of actions, attitudes, convictions, customs, rituals, and other events.

Types of culture:

Two types of culture

a) Tangible: Cultural heritage which have physical reference is called tangible cultural heritage.

E.g- Monuments, Buildings, Objects etc.

b) Intangible: Cultural heritage which do not have physical reference is called intangible cultural heritage. E.g- Cultural practices, oral traditions, language skills, dance, knowledge, crafts, designs etc.

Ethnocentrism:- A society has a propensity to view its own culture as superior and others as inferior. Own culture is the best than the other culture.

Cultural Lag:- Cultural lag occurs when some aspects of a people's culture change more slowly than other aspects.

Cultural Change:- Cultural change involves both the introduction of new procedures and the modification of previously used methods.

Marginal Man:- A man who is a part of two or more cultures but is not entirely accepted in any of them.

Social Control:-

Social control is a pattern of behaviour used by a society to uphold established norms and order.

(a) Formal Control – Governing society through rules, regulations, the use of force by the military or police, etc. Infringers receive punishment.

(b) Informal control – It comprises morals, religion, and public opinion. Violators would not receive a specific punishment. Primary social groups are more conducive to informal control.

Enculturation:- Gaining knowledge of one's own culture via watching family members. It is also learned in official settings, such as schools.

Acculturation:- Gaining knowledge of another culture through media, travel, exploration, films, television, etc.

Customs:- The socially permitted ways of acting are the customs of society.

Folkways:-

Folk = People, Ways = Behavioral habits

- Folkways are the expected course of action in particular circumstances; they are not strictly enforced.
- Folkways violations are not penalised formally; instead, offenders face rumour, slating, and mockery.
- Being immune from legal sanctions.
- Instantaneous action. E.g - Greeting others with folded hands or saying hello when answering the phone.

Mores:-

Mores are the positive actions that ought to be done and the violation may result in severe social action.

Mores are more compulsive than folkways.

E.g= Saluting the national flag, standing during playing of national anthem, monogamy.

Taboos:-

Negative more is known as taboos.

Negative action that ought not and should not be done,.

E.g- Not smoking in front of elders., denying eating in Hindu religion, denying eating pork in Muslim religion.

Rituals:-

Rituals are supposedly done on a regular basis and are religious forms of behaviour for some events.

E.g – Playing with crackers on diwali, performing the marriage ceremony

Conventions:-

These are more significant social behaviors. Cultures which are influenced by foreign culture.

E.g= Eating using knife and spoon instead of hand, dating- engagement/ ceremonies.

Tradition:-

It is a long-standing belief or behaviour that members of a certain community or group have maintained.

Sanction:-

It speaks of the incentives or penalties applied to create social control. It may be positive or negative.

Positive sanctions used verbal methods such as praise, giving rewards, medals, titles etc.

Negative sanctions includes gossip, threats etc

Law:-

The most effective formal tool for social control in contemporary society is the law. Law is created by the appropriate legislative body. Penalties and punishments are meted out for breaking the law according to the power of the state. Police, courts, and the armed forces all enforce the law. Greater formality. Strict regulations and rules.

Leadership

Leader: Leader is a person who exerts an influence over a number of people.

Leadership: It is described as a process whereby an effort is made to persuade individuals to work together in order to accomplish a goal that the group deems desirable.

Styles of leadership:-

Autocratic:-

- In this type of leadership, the leaders are fully in charge or authorised to make choices..
- The subordinates are not given the chance to offer suggestions or participate in decision-making. They must follow the directive.

Democratic:-

- It is just opposite to autocratic style.
- The decision-maker consults with the followers before acting.
- Subordinates can satiate their ego and social needs by participating in decision-making.
- They become more devoted to their company as a result.

Lassiez faire style:-

- In laissez faire style the leader leaves decision making to the subordinates.
- They enjoy full freedom to decide as and what they like.
- The biggest limitation of this style is that due to full freedom of the subordinates it creates chaos and mismanagement in decision making.

Types of leaders:-

a. Traditional leader:-
   Traditional leadership is characterised as a form in which the leader is given authority based on prior customs. Nearly all leaders in the past were regarded as being conventional, and their power was a falsehood to their predecessors
b. Caste leader:-
   The leader's caste is shared by the followers. On topics pertaining to the caste, the leader serves as the leader.
c. Opinion leader:-
   These are the people to ask for guidance and opinions on various matters.
   Moreover, opinion leaders act to legitimise and sway decision-making by opinion seekers.
d. Political leader:-
   At present they are most important leaders both in rural and urban society. They arise out of political system. E.g.:- M.L.A, M.P, Chief Minister. Etc.

Social Institutions:

Institutions-

The systematic or organised relationship with human society that shares common ideals will meet the needs that are fundamental to human civilization. e.g. Family, marriage, economic, education. Political and religious.

Marriage:

It is an institution where both genders are socially permitted to create families and have children..

Types of Marriage:

a. **Monogamy**:
   - It is different as marriage with only one person at a time or the practise of having only one mate.

b. Polygamy:

It is of two types:

1. Polyandry:
   The practise or situation of having multiple husbands or male partners at once is known as polyandry.
2. Polygyny:
   Having more than one wife or female mate at a time is referred to as polygyny.

c. Companionate:

A suggested marriage arrangement in which various childless couples, acting in concert, would use legalised birth control.

d. Experimental:

- To find out the compatibility of the two person.
- Live in relationship.

e. Hypergamy:

- Women from lower castes marry men from higher castes..

f. Hypogamy:

Upper caste woman marries a lower caste ma.

g. Anuloma:

- Men of higher caste marry women of lower caste..

h. Pratiloma:

- Males from lower castes marry women from higher castes..

Rules of Marriage:

a. Endogamy:

- Marriage within your caste, sub caste, class and territory.
- It is the custom to only marry inside one's own social, caste, or ethnic group, disqualifying those from other groups as candidates for marriage or other intimate relationships..

b. **Exogamy:**

- Marriage outside your caste, sub caste and class.
- It is the social arrangement where marriage is allowed only outside a social group.

Forms of marriage:

a. Brahma Marriage: Brahma marriage means is known as the best marriage & it means arrange marriage.

b. Dev Marriage: Dev Marriage is known as marriage with priest.

c. Gandarva Marriage: It means love marriage.

d. Asur Marriage: When a man purchases a woman to marry her.

e. Pishacha Marriage: A man kidnapping a girl and marry her.

(Hindu marriage act was established in 1995)

Family:

- It is the oldest institution.

- The Word "family" derived from Latin word familiar means servant and also derived from Roman word fabulous means servant.
- Family is the basic unit of civilization.

Types of family:

A. According to size of the family:

1. Nuclear family: Father, mother, and their on married children.
2. Joint family: Father, mother and their married children with their good parents.

B. According to the Blood Realtion:

1. Conjugal: Father, mother with their adopted children.
2. Consanguine: Father, mother and their own children with their parents.

C. According to the Marriage:

1. Monogamy: The practice of marrying or state of being married to one person at a time.
2. Polygamy: The practice or custom of having more than one wife or husband at the same time.

D. According to Residence:

1. Matrilocal: After getting married, the husband moves in with wife.
2. Patrilocal: Following marriage, the wife moves in with her husband to live there..
3. Neolocal: After getting married, the couple moved in together but kept their respective homes separate.

E. **According to Authority**:

1. Patriarchal: In family male person is the dominating unit of family.
2. Matriarchal: In family, female person is the dominating unit of the family.
3. Egalitarian: There are no dominating your family. There is mutual understanding in family.

F. According to inheritance of Surname:

1. Patronymic: the children inherit the surname according to father's surname.
2. Matronymic: The children inherit the surname according to mother surname.

Religion:

It is the way we are having faith that supernatural powers exist when controls human life and nature.

It is of two components.

1. Ritual: It is the behaviour emotionally connect with God. E.g Fasting, prayer, offering flower to God.
2. Belief: It is the attitude of human behaviour which are strictly followed with some rituals without this, some bad luck may happen.
3. Atheism: Believe that God does not exist.
4. Theism: Believe that God exists.

Forms of Religion:

1. Monotheism: Belief in one God
2. Polytheism: Belief in more than one God
3. Totemism: Worshiping animals & trees believing them God

4. Animism: Worshiping the spirit.

Government & Political:

- It is the youngest institution.
- Panchayati Raj system was approved in 1957 and was established in 1959 in Nagpur district of Rajasthan.
- The Balvantary G. Mehta study team was appointed in January 1957 by Govt. of India

3 tire system:

i. Gram Panchyat
ii. Panchyat Samiti
iii. Zilla Parisad

} All are directly elected

Education:

- The world Education, derived from Latin word "Educare" means bringing up.
- Major education started in 2001.
- Atal Bihari Bajpeyi started "Sarba Sikhya Education" in 2001.
- Mid-day meal started in 2004.

Economics:

The institution which is involved in provide the basic amenities like food, clothing and shelter.

Primary Economic: Production part of economics. E.g. Shop

Secondary Economic: Directly involved in money. E.g. Bank, Co-operative

- Bhartiya Mahila Bank was established in 2013.
- Bhartiya Mahila Bank was merged with SBI in 2017

Basic Social Process

- Social process means the various modes of interaction between individuals or groups including cooperation and conflict, social differentiation and integration, development and decay. (Ginsberg)
- **Social Interaction** is the foundation of society.
- Social interaction is the dynamic interaction of forces in which interaction between individuals and groups influences participants' attitudes and behaviours.
- Major basic social process or forms of interaction are- Cooperation, Competition, Conflict, Accommodation, Assimilation, Acculturation

Cooperation:

- Cooperation is the process by which the individual or groups combine their effort, in more or less organized way for the attainment of common objective. (Fairchild)
- Cooperation is derived from 2 latin words- 'Co' meaning together and 'Operari' meaning to work.

Types/ Forms of Cooperation:

Direct Cooperation	Individuals participate in this kind of cooperation to carry out the same kind of task. E.g:- Playing Together
Indirect Cooperation	People or groups are working independently to accomplish a shared goal. E.g:- Farmers, spinners, weavers, dyers, tailors are working separately for producing clothes.
Primary Cooperation	Found in the same family or core group. Each team member strives to make everyone better. Each member receives a portion of the benefits.
Secondary Cooperation	Incredibly formalised and focused. Each person works on their allocated task and aids others in their work so that they can each individually reap the rewards of their collaboration..
Tertiary Cooperation	Found between two or more political parties, tribes, religious groups and so on. It is often called Accommodation.

Competition:

- Competition is when two or more people work towards a single, finite objective that none of them can share.

Forms of Cooperation:

- **Absolute Competition:** Only one of the competitors succeeds in achieving the objective. E.g:- Among two or three competitors one person becomes the President of India.
- **Relative Competition:** The extent to which more than one competitor can accomplish the aim or purpose. E.g:- In the Olympic game, a person can gain only gold or silver or bronze medals in a particular event. He can't take three medals on the same event.
- **Personal Competition:** The competitor makes an effort to defeat rivals.
- **Impersonal Competition:** Impersonal competition is focused on achieving a goal rather than on the personal lives of competitors.

Conflict:

- **Conflict** has been defined as the process of seeking to monopolize rewards by eliminating or weakening the competitors. (Horton)

Types of Conflict:

- **Personal Conflict:** Conflict within a group in society.
- **Corporate Conflict:** It occurs between two societies or groups within a society.
- **Caste Conflict:** When any conflict takes place between two castes to show their superiority is called Caste Conflict.
- **Class Conflict:** The conflict arises between social classes which have opposite interest.
- **Racial Conflict:** It takes place between two races due to psychological differences.
- **International Conflict:** The conflict arises between two or more nations due to political, religious, economic, imperialistic and other reasons.

Accommodation:

- Concept of Accommodation was first used by **J.M. Baldwin.**

- Accommodation is a process of developing temporary working agreements between conflicting individuals or groups. (Horton)

Forms of Accommodation:

- **Compromise:** When both parties are more or less on equal footing in terms of power and agree to make compromises through a "give and take" policy, accommodation is achieved through compromise.
- **Conversion:** In this type of accommodation, one side abruptly abandons its religious convictions, allegiance, and beliefs in favour of accepting the beliefs, perspectives, etc. of the other party.
- **Tolerance:** This approach to accommodation focuses more on preventing disputes than resolving them. Each party respects the other's opposing viewpoint while maintaining its own. Both parties adhere to the "live and let live" philosophy.
- **Truce:** A truce is an agreement to put an end to hostilities or war for a set amount of time.
- **Displacement:** Displacement involves termination of conflict by replacing it with another.

Assimilation: It is a process of mutual cultural diffusion through which persons and groups become culturally alike. (Horton)

- **Conflict** results **Accommodation and Assimilation.**

Acculturation: When two cultures interact continuously, either one or both of the cultures experience subsequent changes in their cultural patterns.

Rural Settlement:

1. **Migratory Village:**
    - As a place's food source is exhausted, the people migrate to another.
    - In such communities, people only spent a short time in the homes and obtained sustenance from wild fruits and animals.
2. **Semi- permanent village:**
    - Where people lived for a short time before leaving because the soil had lost its richness.
    - A group of people lived in one spot for a while before moving on to another.
    - The Jhum cultivation in some parts of the tribal areas of India is your typical example.
3. **Permanent Village**:
    - In such villages, the human population congregates and stays for decades or even centuries.
    - Hence, the development emphasises village, organism, and social relationships with the nearby communities..
4. **Grouped Villages:**
    - In this type of village, different cultures live together.
    - In the group village, the residents dwell in a cluster.

5. **Dispersed Villages:**
    - The farmers in this example of a dispersed village live apart on their individual farms.
    - As a result of their environment becoming fragmented, their social life changes.
6. **Co-operative Village**:
    - In this kind of settlement, individual farmers can develop their land either individually or collectively.
    - Demi received their common services from a cooperative store.
7. **Semi-collective Village:**
    - The collective body of the people owns and manages all sources of output in such villages, including the land.
    - Each individual receives a predetermined monthly or annual quota based on the village's overall income.
8. **Collective Village:**
    - All properties are owned and managed in an organised manner on a common basis under this system.
    - The Members receive all supplies of food, housing, clothing, education, cultural, and social services in exchange for contributing their labour to the common good
    - The entire community uses the same dining hall.
    - Couples are given their own homes. The common pool also provides care for elderly persons.
9. **Land lord type:**
    - Hitler type of rule.
    - Landlord is the dominant person of the village.
    - All the activities data take place under the rules and regulation of the landlord.
10. **Ryotwari Village**:
    - Here no dominant person of the village.

Pattern of Village:

1. **Isolated Village:**
    - The farmers' home is in the centre of the farmland in this button
    - The service facilities, such as retail shops, schools, hospitals, etc., may be far away.
    - This pattern is found in Kerela and Malabar coast.
    - This pattern has become universal in the USA.
2. **Line village:**
    - In this kind of community, homes are symmetrical, two-story constructions that are situated alongside a road or waterway, such as a canal.
    - The houses are located across from one another

3. **Circular village:**
    - All of the communal structures, such as the village, dispensary, schools, cooperative stores, and veterinary hospital, are situated in the centre of the circular design.
    - The village appears to be on wheels in the overhead view.
4. **Cross Road Villages:**
    - Cross Road is a location where people cross paths. In many regions of the world, rural settlement patterns resemble crossroads. This settlement is founded on geographic and economic grounds

5 **Hamlet:**

- A hamlet is a small settlement that has no central place of worship and no meeting point

Educational Psychology

Psychology- Derived from two Greek word 'Psyche' meaning 'Soul' and 'Logos' meaning 'Rational Course of study'.

- Psychology is the science of behaviour.

Branches of Psychology:

Pure Psychology	**Applied Psychology**
It focuses on the development of psychological principles, theories, rules, and processes and also offers a number of methods for analysing, evaluating, changing, and improving behaviour.	It talks about how to use psychological ideas, norms, and techniques in real-world situations.

Social Psychology: This area of psychology is concerned with interpersonal relationships and group dynamics.

Educational Psychology: Educational psychology describes and explains the learning experiences of an individual from birth through old age. [Crow and Crow, 1973]

Attitude: It can be defined as a tendency to act in some way towards some object, person, situation or idea. (Chitambar, 1997)

Attention: Bringing a clear idea object before the mind is what it entails.

Frustation: It is a condition wherein the goal directed behaviour of an individual is blocked or thwarted. (Guilford).

Thinking: Uses of ideas or symbols for solving problem in overt activity.

Behaviour

- Any manifestation of life is activity- Woodworth
- Behaviour is any activity which can be observed, recorded and measured. (Crowder)

Types of Behaviour:

Overt Behaviour	Behavior is observable and takes place independently of humans. E.g:- Playing cricket, Swimming
Covert Behaviour	Behaviour that takes on inside of humans yet is not visible. E.g.:- Thinking

Voluntary Behaviour	Humans are in charge of controlling behaviour. E.g:- Singing, Dancing
Involuntary Behaviour	A natural course of action. E.g:- Movement of heart

Behaviourism: The behaviourist approach to understanding behaviour concentrated solely on overt, observable behaviour that could be scientifically documented.

Cognitive Behaviour/ Psychology: In order to examine higher mental functions like insight, creativity, and problem-solving, it studies how people think, remember, speak, perceive, and reason.

Intelligence

Intelligence is The ability to learn from and adapt to relatively new and changing situations.

Types of Intelligence:

Social Intelligence	Understanding and interacting with people. E.g:- Political leader, Salesman
Concrete Intelligence	The capacity to comprehend and work with things, such as in skilled trades and technological devices. E.g:- Industrialist, Building traders
Abstract Intelligence	Capacity to communicate through both verbal and non-verbal symbols in order to comprehend, handle, and solve problems. E.g:- Professional People

Theories of Intelligence:

Unitary Theory	Intelligence consists of one factor, a fund of intellectual competence which is universal to all activities of the individual.
Multifactor Theory	Propagated by Thorndike. Also called 'Atomistic Theory'. Intelligence consists of a multitude of separate factors or elements.
Two Factor Theory	Given by Spearman. Intelligence consists of two factor i.e. general factor (G- factor) and specific factor (S-factor). The 'G-factor' is present in all mental activities but the 'S-factor' is present only in specific activities. Of the two factors 'G-factor' is more important because it provides the most important basis of predicting a person's behaviour in different situation.
Group Factor Theory	Given by Thurstone. Intelligence is an expression of the combination of group of traits or factor. Thurstone concluded that certain mental operation have a common 'Primary factors which differentiate them from other mental operation'. Thurstone and his associates have identified 7 primary factors. • Verbal Comprehension Factor • Verbal Fluency Factor • Numerical Factor • Perceptual Speed Factor • Reasoning Factor • Spatial Visualization Factor • Memory Factor

Intelligence Quotient (Q):

- William Stern, first coined the term 'Intelligence Quotient' in 1914.
- It is the ratio of an individual's mental age to his/her chronological age and it is found by the formula: $\frac{MA}{CA}X100$

  MA= Mental Age, CA= Chronological Age

  Motivation

  Term derived from latin word 'Movere' means 'to move'.

  A motivation is an underlying feeling that energises, activates, or motivates behaviour and channels it towards an objective.

  Need: Need is the difference between what is and what ought to be.

Biological Need	These are necessities for the human body. Ex- (i) Need for oxygen, water, food etc. (ii) Sleep after periods of wakefulness (iii) Protection for natural hazard
Socio-psychological Need	These requirements are not as vital to an organism's survival as biological requirements are. Nonetheless, these requirements are equally crucial for ensuring human welfare. (i) Need for freedom (ii) Need for love & affection (iii) Need for security (iv) Need to achieve status & recognition (v) Need for social company (vi) Need for self-assertion (vii) Need for self-expression or self-actualization

Drive: It is an aroused awareness, tendency or a state of tension that intend to cause reaction in an individual for increasing his/her general activity level.

Types of Motivation:

- ✓ Intrinsic Motivation: A person who is intrinsically motivated wants to do a task for the enjoyment of doing it.
- ✓ Extrinsic Motivation: Extrinsic motivation refers to the desire to perform an action in order to get something external or stay away from something negative..

Theory of Motivation:

1. **Hierarchy of Needs Theory:**
   - Given By A.H. Maslow.
   - According to Maslow, Human needs are in the form of hierarchy, ascending from the lowest to highest and he concluded that when one set of needs was satisfied, people drives for higher need.

Physiological Need	Lowest level of need/ basic need. Ex- Food, Sleep, Shelter, Clothes.
Security/ Safety Need	These are the needs to be free of physical danger and the fear of loss of a job, property.
Social Need	Belongingness with people
Esteem Need	Power, Prestige, Status and Self-confidence
Need for Self-actualization	Meditation, Nirvana

2. ERG Theory

- Given by Clayton Alderfer.
- The theory emphasised that when higher needs are frustrated, lower needs will return, even though they were already satisfied.
- **Existence Need**: Maslow's fundamental needs.
- **Relatedness Need**: Need for interpersonal relations
- **Growth Need**: Need for personal creativity.

3. Two-factor Theory

- Given by Frederick Herzberg.

Dissatisfiers/ Hygiene/ Job Context Factor	**Satisfiers/ Motivators**
Company policy & administration, Supervision, Inter personal relation, Salary, Working condition	Achievement, Recognition, Advancement, Responsibility, Work itself

4. Theory X and Theory Y: Given by McGregor.

Theory X	**Theory Y**
• Average human beings have an inherent dislike of work. • People must be coerced, controlled, directed and threatened with punishment. • Pessimistic, static, rigid.	• People are self-directed & self-controlled. • People not only accept responsibility but also seek it. • Optimistic, dynamic, flexible.

5. McClelland's Need Theory:

Need for Power	People for high need or power motivation possess the following qualities. I. Great concern for exercising influence & control over others. II. Seeking position of leadership. III. Good conversationalists. IV. Enjoy Public Speaking.
Need for Affiliation	People with high need for affiliation motivation possess the following qualities. I. Derive pleasure from being loved. II. Maintain pleasant social relationship with others. III. Enjoy a sense of intimacy and understanding. IV. Ready to console and help others in trouble.
Need for Achievement	People with high need for achievement motivation possess the following qualities. I. Set moderately difficult goals. II. Take a realistic approach to risk. III. Prefer to analyse & assess problems. IV. Tend to be restless & like to work for long hours.

Personality

- ✓ The organisation of a person's character, temperament, intelligence, and physical characteristics that determines how well he adapts to his surroundings is known as personality.
- ✓ Personality is the product of heredity and environment.
- ✓ - Personality is dynamic by nature, which means it is constantly changing and adapting..

Types of Personality:

1. **Hippocrates's Classification:**

Dominance of fluid type in the body	Personality Type	Temperamental Characteristics
Red Blood	Sanguine	Optimistic, happy, accommodating
Black Bile	Melancholic	Sad, depressed, pessimistic
Yellow Bile	Choleric	Irritable, angry but passionate
Phelgm (Mucus)	Phelgmatic	Cold, calm, slow and indifferent

2. **Kretschmer's Classification:**

Personality Types	**Personality Characteristics**
Pyknic (Short, stout and fat body)	Sociable, jolly and good natured
Leptosome or asthenic (tall & thin)	Unsociable, sensitive and pessimistic
Athletic (Balanced body)	Energetic, optimistic and adjustable

3. **Sheldon's Classification:**

Personality Types	**Somatic Description**	**Personality Characteristics**
Endomorphic	Soft, round and fat body	Comfort loving, sociable
Mesomorphic	Square and fat body	Active, energetic & aggressiveness
Ectomorphic	Slender small-boned person	Solitude reserved, pessimitic

4. **Jung's Classification:**

Introvert	**Extrovert**
• Turn inward • More theoretical, detached & aloof. • Dissatisfied, unhappy and possess refined tastes and interest. • Better in writing than speaking.	• Turning outward • Realistic, Practical & support theory with facts • Friendly, Talkative. • No patience for abstract or theoretical ideas.

Learning

Learning is the acquisition of new behaviour or the strengthening or weakening of old behaviour as the result of experience. (Smith, 1962)

Types of Learning:

1. Verbal Learning: Verbal learning refers to knowledge acquisition that is based on sensation, perception, memory, and thought. E.g:- Farmer's using mobile phone for agricultural information

2. Motor Learning: Learning that is primarily based on physical or motor activity and results in the acquisition of skill. E.g:- Learning how to drive a tractor

3. Concept Learning: A mental representation of a thing, person, or event is gained as learning.E.g:- Farmers can identify weeds from a crop as a result of concept learning.

4. Perceptual Learning: Learning that occurs as a result of prior experience by individuals who are capable of having several perspectives. E.g:- Farmer can predict the occurrence of blight disease of potato.

5. Problem Solving Learning: Using cognitive skills like reasoning, thinking, creativity, and making conclusions, learning aids in the removal of barriers..

6. Attitude Learning: Learning that entails altering our propensity to react favourably or negatively to things, people, situations, or abstract ideas.

Types of Learning Curve:

Negatively accelerated or Convex curve:

1. The task is simple.
2. The learner had a previous practice about the task or similar subject.

Positively accelerated or Concave curve:

1. When the task is difficult or new.
2. The learner has no previous knowledge or practice.

Combination type or Concave-Convex curve or S-shape Curve:

1. The learner has a fluctuating mentality.
2. The learning of a task starts from zero i.e. the learner has no previous experience.

Thorndike's Laws of Learning:

1. **Law of Readiness:** A person learns more quickly and efficiently when he is prepared to learn than when he is not.
2. **Law of Effect:** It is the law of rewards and results. This law states that learning can only take place effectively when people find it satisfying and enjoyable.
3. **Law of Exercise:** It is the law of use and disuse. This law speaks of the tightening of a tie to practise.

Adult Learning: It is a process if adults gaining knowledge, skills and competence. It is characterised as the philosophy and practise of adult education and instruction.

Teaching: It is the process of setting up situations in which the crucial lessons are brought to the students' attention, their interest is fostered, their desire is sparked, and action is encouraged.

Learning: It is the process through which a person alters their behaviour using their own efforts and skills

Process: A process is something that happens in a succession of events or actions that lead to the intended outcome.

- **5 elements of learning situation-** Learning, Teachers, Subject Matter, Teaching Materials, Physical Facilities.
- Learner occupies the most central position and all efforts are directed towards them.

Steps in Extension Teaching: AIDCAS (Attention, Interest, Desire, Conviction, Action, Satisfaction)

- 1st step in extension teaching is to make people aware of new ideas and practices- **Attention**
- Starting point for change- **Attention**
- Unfreezing the existing behaviour and motivating the people for change- **Desire**
- It is a stage of strong persuasion so as to convince the people about the applicability of new idea or practice in their own situation- **Conviction**
- Putting the idea or practice into operation- **Action**
- Satisfaction reinforces- **Learning**

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AGRICULTURAL MARKETING REFORMS

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Introduction:

India is a nation based on agriculture and one third of India's population is engaged in agricultural sector directly or indirectly. Agriculture has always been the main labyrinth of the Indian economy. Indian agriculture contribution to the national gross domestic product (GDP) is about 25 per cent. Since food is mankind's greatest need, the emphasis has been on the commercialization of agricultural production.

Agricultural marketing is a method that comprises storage, gathering, shipping, preparation, and delivery of different agricultural materials across the country. From farms to exporters and consumers, agricultural produce is a vital part of the food supply chain.

Agricultural marketing is important not only for increasing productivity but play a vital role in boosting the country's economic growth. Its active functions play a critical role in encouraging economic growth. As a result, it's been labelled "the most powerful multiplier of agricultural development". An effective marketing system is essential to sustaining and accelerating the pace of production growth driven by technological development, but for this program to be successful, producers must receive a remunerative price for their produce. Otherwise, they won't be interested in increasing production. It should provide food of enough quality at reasonable prices to consumers, and satisfactory margins to middlemen to ensure their continued participation in the trade.

Agricultural marketing situation

Pre-independent, after independent and current situation

Prior to freedom, the major concern of the government policies correlated to agricultural marketing was to keep the price of food for the consumers and agroraw-material for the industry in check. Accordingly, regulation introduced during nineteenth century mainly aimed at ensuring supply of pure cotton at reasonable price to textile mills in Manchester. The Karanjia Cotton Market was the first regulated market established in 1886 under Hyderabad Residency order. The first legislation was the Berar Cotton and Grain Market Act of 1897 which became model act for legislation in other shares of the country. Subsequently, in order to strengthen agricultural marketing system further and also to safeguard the interest of farmers by overcoming the defects of the system, Royal Commission on Agriculture in 1928 and Central Banking Enquiry Committee in 1931 suggested the introduction of regulations in agricultural marketing. For the purpose, Directorate of Marketing and Inspection (DMI) was established in 1935 and it was DMI only which prepared a Model Bill on regulations in agricultural marketing in 1938. DMI advised state governments to regulate markets to safeguard the interest of the producers by overcoming the prevailing malpractices in agricultural markets.

Today, in agricultural marketing, there are numerous transfers and exchanges that have to be carried out before the products reach their intended consumer. These products can be sold

directly to the buyers or they can be stored locally. Moreover, they can be sold as they are gathered from the field. They can also be processed and graded by traders or farmers. Processing may be carried out to satisfy customer demand or preserve a product's quality. A distribution system's job is to balance supply and demand by wholesaling and retailing in various locations across various markets, such as primary, secondary, or terminal markets. The majority of agricultural goods in India are sold by farmers in the private sector to village traders or moneylenders (to whom the farmer may owe money). There are several methods to sell goods. For example, it might be sold at a weekly village market in the farmer's village or in a neigh boring village. If these channels are not available, then produce might be sold at erratically held markets in a nearby village or town, or in the mandi.

Marketing system in India

An Effectual Marketing System Can Reduce post-harvest losses, enhance farmers' realization, reduce consumer price, promote grading and food safety practices, induce demand-driven production, enable higher value addition. Facilitate export. There has been concern in the current years regarding the efficiency of marketing of Agricultural produces in India. It is believed that meagre efficiency in the marketing channels and deprived marketing infrastructure is leading not only to high and changing consumer prices, but also to only a small proportion of the consumer rupee reaching the farmers. The regulated wholesale markets can help in improving the efficiency by measures such as increasing the direct contact with the farmers, increasing the number of buyers and sellers in the market, promoting the use of open auction at the market, and improving/ adding amenities and services such as cold storage, weighing, go-down, and transparency and access to internal and external market information.

1) Direct marketing

In this marketing bulk buyers like processors, retailer chain or exporters are authorized to directly source the farm produced goods from the farmers/farmers' fields. This helps the farmers by way of avoiding the need for transportation of goods to distant places. The market committees of the area issue such licenses.

2) Milk marketing through cooperatives

Most innovative marketing system for agricultural commodities ever evolved in India has been for milk, which is the most perishable and a liquid farm product. It was spearheaded by National Dairy Development Board, (NDDB), with headquarters at Anand in Gujarat. The NDDB conceptualized and implemented a series of programmes during the last five decades like Operation Flood, Perspective Plan and National Dairy Development Plan (still ongoing) to increase milk production and arrange its marketing (including processing) through a network of milk cooperatives. About 1.9 lakh dairy cooperatives are engaged in collecting milk and helping 1.7 crore milk producers in the country. Milk producers are provided market access and input services. Milk processing capacity in the cooperative sector is 81.5 million litres per day.

3) Unified Market Platform (UMP)

In Karnataka, UMP was launched in 2013, well before the launch of E-NAM at the national level. Under UMP, 157 mandies in Karnataka are using e-permits, e-payments, e-trading, and scientific grading and assessing services. There are reports to show that farmer's price realization has increased owing to the facility of UMP in Karnataka.

4) Electronic National Agricultural Market (E-NAM)

E-NAM portal was announced in 2015 and was formally launched in April 2016. This portal provides the facility of bidding by a trader for a lot of farm commodity put for ale in any physical market of the country. This has the advantage of providing fair price to the farmers by improving the process of price discovery. So far, 585 mandies have already been linked and other 415 are in the process. For a perfect E-NAM to emerge, there are several facilities that are to be developed in all the markets of the country. E-NAM will be an effective alternative to the APMC yards for buying and selling of the agricultural commodities. As and when, a perfect E-NAM takes shape, it will be a boon to the farmers as well as the entire agricultural marketing system.

5) Group marketing (FPOS and FPCs)

The idea of group marketing was operationalized in the case of milk by late Varghese Kurien in 1970s. Later in 2001, he extended the idea and conceptualized Farmer Producer Companies and also proposed a legislation to regulate FPCs and help farmers become the only shareholders and make these self-governed. In 2002, a Producer Companies Act was enacted. Later in 2013, policy and process guidelines for FPOS were framed by the Union Ministry of Agriculture and Farmers welfare (MOAFW) to enable cooperatives to convert themselves to companies, while ensuring the unique element of cooperative business intact. However, the real push from the government came in the 12th five-year plan (2012-17), when SFAC was mandated for promotion of FPCs and FPOS.

While cooperative model did not seem effective in all the areas and commodities (except milk/dairy and sugarcane in Gujarat, Maharashtra and North Karnataka), FPCS have shown promise for small landholders who have low marketed surplus. These helps reduce their marketing cost and increase bargaining power through aggregation. FPCs are also attracting private investment in agriculture. These have also triggered an increase in contract farming. FPO/FPCs are also helping farmers by way of futures forward trading for reducing price risks. Women farmers, fishers and small farmers of drought prone areas are also using FPOS/EPCs to market their produce at better prices The number of FPO/FPCs in the country has gone up to around 5000.

6) Contract farming/contract marketing

Contract farming or contract marketing essentially is an arrangement between the farmer-producers and the agri-business firms to produce certain pre-agreed quantity and of the Contract farming can be defined as a system for the production and supply of Agricultural/ Horticulture produce by primary producers under advance contracts, the essence of such arrangements being a commitment to provide an horticultural commodity of a type, at a specified time, quantified price and at a definite quantity to a known Buyer. Contract Farming is fetching an progressively important aspect of agribusiness, whether the products are acquired by multinationals, smaller companies, Farmer Cooperatives, Government agencies or individual entrepreneurs. Contract Farming concept, has, however, gained importance in recent times in the wake of the economic liberalization process. There are number of contract farming companies engaged in Contract Farming such as Agrocell Corporation Ltd., Atreyas Agro Organic Pvt. Ltd., Godrej Agrovet Ltd., Pepsi India, McCain, Saraf Foods etc.

Alternative marketing channel

Table 1: Government initiatives for direct marketing of agricultural produce in India

No	Marketing Institutions	Status/Key function
1.	Rythu Bazaar	The Rythu bazars were initiated by the Government of Andhra Pradesh on January 26, 1999. The number of Rythu Bazars have increased from 49 to 102 and now cover nearly 40,000 farmers of 2,800 villages
2.	Apni Mandi	Punjab's and Haryana's Apni Mandi (Our Market), established in the mid-1990s, and were the first ones directly linking vegetable producers and consumers. Farmer producers brings their produce for sale directly to the buyers or consumers.
3.	Uzhavar Sandhai	Uzhavar Sandhai initiated in Nov 1999 to establish direct contacts between farmers and consumers in Tamil Nadu.
4.	Hardaspar Vegetable Market	Hadaspar vegetable market is a model market for direct marketing of vegetables in Pune city. This is one of the ideal markets in the country for marketing of vegetables
5.	Shetkari Bazar	Shetkari bazaars were established in the Maharashtra state for marketing of fruits and vegetables. It will eliminate middlemen, links producers and consumers directly, reduce price spread, and enhance producer shares in consumer rupee. Thus these markets increase the farm income, wellbeing of the farmers and bring stability in prices of horticultural crops.
6.	Krushak Bazars	Government of Orissa established 40 Krushak Bazaars in year 2000-01. Government provides incentives for the purpose which include one or two acres of government land with all the infrastructure in the identified urban/semi urban area. The purpose is to empower farmer-producer to compete effectively in the open market to get a remunerative price and ensure products at affordable prices to the consumer
7.	Mother Dairy Booths	Mother dairy, basically handling milk in Delhi. But it was enquired to holder retail vegetable marketing. Mother dairy management has opened retail outlets in the city for providing vegetables to the consumers at reasonable prices.

New initiatives of operation green in India

Operation Greens aims to promote farmer producers organisations, agri-logistics, processing facilities and professional management. The operation purposes to aid farmers and help regulator and limit the erratic fluctuations in the prices of potatoes, onions and tomatoes. 'Operation Greens' launch on the lines of 'Operation Flood'. 'Operation Greens' shall encourage Farmer Producers Organizations (FPOs), agri-logistics, processing facilities and professional management *etc.*

Major constraints of present agricultural marketing system

1) Markets highly fragmented

APMC Act of the State divides the entire area of the State into various notified Market Committee areas and has delegated the responsibility of regulating agricultural marketing practices in such areas to the specific APMCs. The market of agricultural produce thus has become highly fragmented, not only across the country but even at the level of the State itself, which hinders both, proper market access for farmers and also the development of required infrastructure for handling the produce. Multiple license requirements for trading in a State and levy of market fee at multiple point points along with high incidence of fee and charges further have an incremental impact

2) Insufficient number of markets

There is a vast disparity in the density of regulated markets in different parts of the country, which varies from 118.78 sq km. in Punjab to 11215 sq km. in Meghalaya. The all-India average area served by a regulated market is 487.40 sq km, against the recommendation of the National Farmers Commission (2004) that a regulated market should be available to farmers within a radius of 5 km (corresponding market area of about 80 sq. km.). This designates that extant system has failed to run adequate number of markets to handle ever increasing marketed surplus efficiently and easy market access to farmers

3) Inadequate marketing infrastructure

The utilities and amenities present in regulated markets determine the advantages accessible to farmers. Only two-thirds of regulated markets, have covered and open auction platforms, and only one-fourth of those markets have shared drying yards. Only 9% of the markets have cold storage units, and less than a third of the markets have grading capabilities. There aren't many marketplaces where you can buy an electronic weigh-bridge.

4) High incidence of market fee/ charges

Market Committee is sanctioned to collect market fees ranging 0.30% to 2.0%, from the buyers/traders on the sale of notified agricultural produce. In addition, commission charges are to be paid to commission agents which varies from 0.5% to 4.5% in food grains, and 3.0% to 7.0% in case of fruit and vegetables. In addition to these, other charges, such as, various types of development cess, entry tax, purchase tax, weighment charges and hamal charges, etc are also required to be paid resulting in to higher transaction cost and low price realization by the farmers in a regulated market.

5) High post-harvest wastages

Study conducted by ICAR (2015), indicates that the range of post-harvest losses of various commodities ranges from 4.65-5.99% for cereals, 6.36-8.41% for pulses, 3.08- 9.96 for oilseeds, 6.7-15.88% for fruits, 4.8- 12.44% for vegetables, 0.92% for milk, 7.19 % for eggs and 6.74% for poultry meat. The total post-harvest losses of agriculture commodities have been estimated at about Rs 92,651 crores at average prices value of 2014. Losses data indicate need for further survey. The monopoly of Government controlled markets, infrastructure gaps and high incidence of market charge have cascading effect on present marketing system and limit private sector to invest in development of required marketing infrastructure in the country.

6) Restrictions in licensing

The licensing of commission agents in the regulated markets has led to the monopoly of these licensed traders acting as a major entry barrier in existing APMCs for a new entrepreneur thus, preventing competition. New licensing of commission agents requires space for shops within the market yards. The granting of new licences is frequently discouraged because many market yards that were founded decades ago lack sufficient space for the construction of shops. The traders, commission agents, and other functionaries group together into associations that, in general, make it difficult for new people to join, stifling the very spirit of operating in a competitive manner. Many States do not permit setting up of private markets, contract farming and direct marketing which hinder competition and do not allow access to alternative marketing channels for the farmers.

7) Market information asymmetry

It is often not possible for the farmers to obtain information on exact market prices in different markets. So, they admit, whatever price the trader offers to them. With a view to tackle this problematic the Government is using the radio and television to broadcast market prices regularly. The newspapers also keep the farmers posted with the latest changes in the prices. However, the price quotation are sometimes not reliable and sometimes have a great time-lag. The trader mostly offers less than the price quoted by the Government news media.

8) Inadequate credit facilities

Indian farmer, being poor, tries to sell his produce immediately after the crop harvesting though prices at that time are very low. The safeguard of the farmer from such "forced sales" is to provide him credit so that he can wait for better times and better prices. There is a necessity to strengthen the formal credit network in rural areas.

The need for reforms

Fragmented markets	• Each market functioned as a separate entity, hampering intra and inter state trade.
Insufficient market	• At the same time, there were not enogh markets to deal with growing produce.
Market fees & charges	• Taxes, various commisions raised the cost of the final product, While reducing the returns to farmers.
Inadequate infrastructure	• Despite market taxes, infrastructure in markets remained underdeveloped &not in tune with morden supply chains
Post harvest losses	• This inadequate infrastructure led to high post harvest losses
Restriction in licensing	• Entry as a licensed agent was resrticted, discoragging competition and encouraging cartelisation
High intermediation costs	• The fragmented system led to high intermediation costs, raising costs for consumers, while depressing prices received by farmers

Table 2: List of reforms by Government

Sr. No	Year	Reforms
1	**2001**	Expert committee report, Ministry of Agriculture
2	**2002**	Report of the Inter- Ministerial Taskforce on Agricultural marketing reforms
3	**2003**	Model Agriculture Produce Marketing Committee Act, 2003 circulated to States
4	**2004-6**	National Commission on Farmers
5	**2007**	Model APMC Rules, 2007 published
6	**2013**	Report of Committee of State Ministers, In-charge of Agriculture Marketing to Promote Reforms
7	**2015**	e-NAM Launched
8	**2016**	NITI Aayog Taskforce on Agriculture Development
9	**2017**	Doubling Farmers Income Committee Report, Model APLM Act, 2017
10	**2018**	Model Contract Farming Act, 2018, Operational Guidelines for GrAMs
11	**2019**	High Powered Committee of Chief Ministers
12	**2020**	3Historic Bills Introduced in Parliament to Reform Agriculture Marketing

Reforms

1. Expert committee on strengthening and developing of agricultural marketing, 2001 (Guru Committee):-

Under the chairmanship of Shri Shankar Lal Guru, (and S. S. Acharya as a member this committee was appointed in December, 2000 with the following terms of reference;

A) To review the system of agricultural marketing in the country in the context of increasing agricultural production and liberalization of international trade.

B) To examine the organizational set-up and functioning of the different State Agricultural Marketing Boards and Agricultural Produce Market Committees and to recommend measures to make them more effective instruments for provided that better infrastructure and services to the farmers, consumers and traders.

C) To make recommendations for promoting pledge finance, direct marketing and alternative marketing systems.

D) To study the requirements of additional investments in infrastructure, supply chain management from farm to the consumer and other facilities for the marketing system for the next ten years and to make recommendations for encouraging public private and cooperative sectors to make such investments.

E) To examine the requirements of market intelligence for the farmers, exporters, traders and consumers and to make recommendations in this regard.

F) To examine the requirements of market extension, research, and training for the agricultural marketing system and to make recommendations in this regard.

G) To recommend measures for effectively utilising information technology tools with special reference to E-Commerce and E-Business, for the development of a modern marketing system.

The Expert Committee submitted its report on 29th June, 2001 giving 45 recommendations on the above seven aspects. One of the recommendations of the Expert Committee was to make an investment of 270,000 crore in agricultural marketing infrastructure during the next 10 years (10th and 11th Five Year Plan), which was based on the detailed exercise done by a Working Group on agricultural marketing infrastructure established under the chairmanship of Dr. S.S. Acharya (a member of the Expert Committee).

2. Inter-Ministerial task force on agricultural marketing (JAIN)

As a follow up of the expert group/committee, an inter-ministerial task force was constituted by the Ministry of Agriculture, Government of India to operationalise the recommendations of Expert Committee on Strengthening and Developing of Agricultural Marketing under the chairmanship of Shri R.C.A. Jain, the then Special on 4th July, 2001. The task force identified nine areas on which the road map for development of secretary, agriculture agricultural marketing was prepared. These are:

A) Legal amendments necessary for efficient marketing
B) Direct marketing
C) Infrastructural development of markets
D) Pledge financing
E) Warehouse receipt system
F) Forward market system
G) Price support policy
H) Information technology in agricultural marketing
I) Market extension, trainings and research in identified areas

Separate inter-ministerial working groups examined each of these areas and assisted the task force in formulating its recommendations. The task force submitted its report in 2002. Based on the suggestions of the task force, a national seminar was held on 27th September, 2002 under the chairmanship of the Agriculture Minister, Government of India, at New Delhi, wherein all ministers and secretaries of Agricultural Marketing of State Governments, and Union Territories were invited for discussion and for chalking out a program of agricultural marketing reforms. The second phase of marketing reforms during the last 15 years have followed the pathway suggested by the Task Force.

3. Model Agriculture Produce Marketing Committee Act, 2003 circulated to States

As a follow up of the concerns expressed by the review committees, a New Model Act, called Agricultural Produce Markets Regulation Act was circulated to states in 2003. It had incorporated considerable changes in the original APMR Act. Some far reaching changes suggested in the Act were as follows:

A) Provision for establishment of wholesale agricultural produce markets by the private sector (private entrepreneurs, cooperatives or voluntary groups/NGOs).
B) Provision for wholesale purchases directly from the farm gate by processors or bulk buyers.

C) Provision for promotion of contract farming (mechanism for facilitating the tie- ups of bulk purchasers/companies with farmers or farmers groups, including prices, input supply, technical guidance and dispute settlement mechanisms).

D) Provision for establishment of farmers or consumers markets by the private sector, where farmers can directly sell to the consumers.

E) Provision for electronic trading (e-trading).

F) Provision of single point levy of market fee across the state (market fee to be paid only once). If a trader buys a produce in one market by paying a market fee, he/ she need not pay market fee again in another market of the state, if the produce is shifted there for sale.

G) Provision of single unified trading licence for trade in all mandies across the state. If a trader does business of buying selling in more than one market of the state, he/she needs only one licence for trade in all the mandies.

As per the Model Act of 2003, several state governments have acted positively and amended their original Acts. It may be noted that Kerala, J&K, Meghalaya, Manipur and Bihar do not have any APMR Act. Of the remaining 24 states, 21 have incorporated the provisions like direct purchases from the farmgate and contract farming while 20 states have made provision for establishment of private wholesale markets. Other provisions have also been incorporated by 15 to 18 states.

Fruits and vegetables (special provision)

Fruits and Vegetables were also in the list of commodities under the regulation. However, there were several issues and concerns related to these perishables. In the new Model Act of 2003, there was a suggestion to deregulate or delist these farm. Products, if the state government so desires. Several states took measures to facilities trade in fruits and vegetables. Some of these are as follows:

A) Some states have excluded or denotified fruits and vegetables from the list of agricultural commodities under regulation.

B) Some states have exempted F & V from the market fee or considerably reduced the market fee.

C) Some states permitted the traders to buy F &V from the farmers outside the market yards without any licence.

D) Some states exempted the market fee but imposed some user charges on buyers, if the trade takes place in the market yard.

As a outcome of these measures, several licensed private markets have come up and these are facilitating trade in fruits and vegetables in several states.

4. National Commission on Farmers, 2004-06

The National Commission on Farmers, chaired by Prof. M. S. Swaminathan, submitted five reports through the period December 2004 - October 2006. They focused on causes of famer distresses and the rise in farmer suicides, and recommends addressing them through a holistic national policy for farmers. Access to resources and social welfare entitlements are important issues. Point outlining the main conclusions and suggestions for policy in the areas of land reforms, irrigation, credit and insurance, food security, employment, agricultural output, and farmer competitiveness.

5. Model APMC Rules, 2007 published:

Model APMC Act, 2003 on agriculture marketing formulated in consultation with State Governments: Model APMC Rules formulated in 2007.

- Model APMC Act, 2003 adopted by 18 States

6. Report of Committee of State Ministers, In-charge of Agriculture Marketing to Promote Reforms, 2013

With a view to persuade the various State Governments/UTs to implement the reforms in agricultural marketing through adoption of Model APMC Act and Rules, to suggest further reforms essential to offer a barrier free national market for benefit of farmers and consumers and to suggest measures to efficiently disseminate market information, Ministry of Agriculture constituted an Empowered Committee of 10 State Ministers, in-charge of agriculture marketing on 2nd March 2010. The Committee held nine meetings in which it discussed various topics with States and other stakeholders, including farmers, including market reforms, the simplification of contract farming procedures, investments in the creation of post-harvest infrastructure, alternative channels of marketing, barrier-free national markets, the elimination of market fees on fruits and vegetables, compensation for losses resulting from the elimination of market fees on fruits and vegetables, etc. On July 2, 2013, the Committee gave the government its report on policy suggestions.

7. E-NAM Launched, 2015

To address some of these issues and make amendments to state APMCs more attractive, from April 2016 central government initiated an electronic trading portal for the APMCs called National Agricultural Market, popularly known as e-NAM. Small Farmers' Agricultural Consortium (SFAC) formed under the Ministry of Agriculture took the lead in rolling out the electronic marketing platform. Those APMCs which would join the initiative through amendments to their state APMC acts were provided with online marketing software, installation, and training for free by SFAC (SFAC, 2015). Now farmers could sell produce in the nearest APMC or any APMC of the state using their mobile application. State too would issue single registration for private entities to deal in any of the APMCs in their respective states. Only a single market fee would be charged irrespective of where the produce was sold in the state. This opened the possibility of intra-APMC electronic trading and intra-state integration of farm markets for better price discovery by farmers. While many APMCs joined this initiative, if their APMC acts had permitted, the prospect of entertaining buyers on the portal from other states directly also existed. There are close to 7000 APMCs in India and about 1000 of them from 21 states and union territories have participated in the E-NAM initiative with various degrees of integration.

8. NITI Aayog Task force on Agriculture Development, 2016

The Taskforce on Agricultural Development led by the Vice Chairman, NITI Aayog Dr. Arvind Panagariya held a consultation meeting with Southern States in Bengalaru today. Representatives from Andhra Pradesh, Karnataka, Kerala, Tamilnadu, Telangana, Puducherry, A&N Island and Lakshadweep attended the deliberations. The Task force was constituted in March, 2015 by NITI Aayog to operationalize the decisions taken in the first meeting of NITI's Governing Council in February 2016.

The task force assume significance in the backdrop of the fact that agriculture and allied activities employ about 49% of the nations' total workforce. However, this sector accounts for only 14% of the GDP indicating the dependence of a large worker population on a relatively small income. It implies that rejuvenation of agriculture is essential to provide relief to the vast population. This calls for new initiatives to address the issue of low and declining water tables, chronic water stresses in parts of southern, central and western India and bringing Green Revolution to eastern states and rain-fed regions. At the same time, for diversification beyond crops into horticulture, vegetables, livestock, poultry and fisheries, higher water use efficiency followed by the enhanced investment in seeds would also be required. Besides, there are continuing issues like achieving efficiency in fertilizer use (NPK balance) and improve soil health via soil analysis, soil health cards, soil health campaigns and reforming fertilizer subsidy. Investment and reforms in agricultural research and extension and agricultural marketing are also important. Access to credit and other government support to tenants through a transparent and credible land leasing act along with safeguarding the rights of the land owner.

9. Model Agriculture produce and Livestock Marketing Act, 2017

To replace the APMC Act (Agricultural Produce Marketing Committee) 2003, the Model Agriculture Produce and Livestock Marketing (Promotion and Facilitation) Act, 2017 (APLM act) was suggested in April 2017. The act aims to be an agricultural reform that helps farmers interact with buyers directly so they can determine the best price for their commodities.

Goals of the Model Law

The Model APLM Act's goal is to establish a single agricultural market where livestock and agricultural products could be sold under a single license.

Here are some of the law's key goals:

- The new model legislation recommends the establishment of a regulated wholesale agri-market every 80 kilometres. To accomplish this, it has been suggested that licenses be granted to new private players and traders who start a wholesale market. new independent players who start a wholesale business. Even cold storage facilities, private market yards, and warehouses would be allowed to function as controlled markets.
- All such regulated Agri-market transactions will be allowed within the province for farmers and traders. No particular fees are charged for various marketplaces.
- It specifies a single license for trading within the State and at the National level.
- For fruits and veggies and food grains, a market fee may not exceed 2% in total. For non-perishables and perishables, commission brokers' fees can increase to 2% and 4%, respectively.
- The mandis, which are governed by the Board of Directors, are given full regulatory authority by the office of the head of agricultural marketing in the State, who grants licenses to traders and new private players.
- It also has the option to promote agriculture market platforms online or spot (e-national agriculture market).

❖ **Salient Features**

- To eliminate market fragmentation within the State and Union Territory (UT) by eliminating the notion of "notified market area" from the Agricultural Produce and

Livestock Market Committee's regulations. (APLMC). A State or UT is recognized by APLM as a singular market, to put it simply.

- The Act permits the exchange of agricultural products without regard to geography, including commercial commodities like cotton, horticulture crops, livestock, fisheries, and poultry, in addition to cereals, pulses, and oilseeds.
- The Director of Agricultural Marketing and the Managing Director of the State/UT Agricultural Marketing Board have distinct roles and responsibilities. The former is in charge of performing regulating duties, whereas the latter would be in charge of handling the Act's developmental obligations.
- Integration of producers, exporters, processors, bulk retailers, and customers to disintermediate the food supply chain.
- Encouraging direct communication between farmers and processors, bulk purchasers, exporters, and end users in order to decrease the price spread for the mutual advantage of producers and consumers.
- Creation of a favorable climate for the establishment of operational farmer-consumer market yards and private wholesale market yards to increase competition among various markets.
- Permit the designation of warehouses, silos, cold storage facilities, and other buildings or spaces as market sub-yards to improve producers' access to and connections with the market.
- To encourage e- trading in order to increase market integration and trade operations' transparency.
- To give freedom to the agriculturalists to sell their produce to the buyers at the place and time of their choice.
- To offer provisions for single point levy of market fee across the State and unified single trading license to realize cost-effective transactions.
- To rationalize market fee and commission charges
- To encourage a national market for agricultural produce through provisioning of an inter-state trading license, standardization and grading and quality certification.
- Grants providing for Special Commodity market yards and Market yards of National Importance (MNI).
- Complete democratization of the Market Committee and State/UT Marketing Board.

❖ **Significance of APLM Act**

Several States and Union Territories declared the reforms of the agricultural marketing industry with the implementation of the APMC Act during the 1960s and 1970s. Even though they were an improvement over the other exploitative system controlled by village traders, they were unable to accurately and transparently achieve the goal of price discovery. Additionally, market functionaries have learned over time how to cartelize in order to accomplish the fundamental goal of marketing control. The APMCs have created market fragmentation, which has resulted in inefficiency over time and space. The Model APLM Act, 2017 has been created by the Union Government taking all of this into account.

❖ **Benefits of Model APLM Act**

- APLM helps farmers with better price realisation as they are allowed to sell their produce to the buyers of their choice.
- Allowing warehouses and cold storage to function as regulated markets expand the options for farmers to sell their products, creating a competitive environment and ending the APMC monopoly.
- Severe effects of multiple fees would be eliminated.
- The consumers would benefit from where the prices of agricultural products would come down.
- E- trading platforms make the price determination in particular, transactions, that gives access to markets to the farmers at national level.
- Assists the government to achieve the goal of doubling farm income by 2023.
- The Act helps the Reserve Bank of India (RBI) to maintain healthy food inflation.
- It raises the prospects of food processing industries as the raw material would be made available at lower prices.
- It aims to foster direct communication between farmers and agricultural product consumers, such as retail chains, exporters, and the agro-processing sector.

10. Model Contract Farming Act, 2018,:

The State/UT Agricultural Produce and Livestock Contract Farming and Services (Promotion & Facilitation) Act 2018 is the name of the ultimate Model Act. A "Model Contract Farming Act" has been created by the Ministry of Agriculture & Farmers Welfare with the aim of integrating farmers with bulk purchasers such as exporters, agro-industries, etc. for better price realization through mitigating market and price risks to the farmers and ensuring smooth agro raw material supply to the agro-industries. The promotion of contract farming and services contracts is heavily influenced by farmer's producer organisations (FPOs). They can negotiate with the sponsor on behalf of the producers.

Contract farming is a practise in which large buyers, such as agroprocessing, exporting, and trading units, enter into agreements with farmers to buy a predetermined number of agricultural commodities at a predetermined price.

The farmer typically promises to deliver predetermined amounts of a particular agricultural product. These must be provided at the time the buyer specifies and must satisfy their quality standards. The buyer agrees to buy the product in return and, in some instances, to help with production by, for instance, supplying farm inputs, preparing the land, and giving technical advice.

❖ **Salient features of Model Contract Farming Act, 2018**

- Because farmers are deemed to be the weaker of the two parties to a contract, the Act places a particular emphasis on protecting their interests.
- In adding to contract farming, services contracts all along the value chain including pre-production, production and post-production have been included.
- At the district, block, or taluka level, a "Officer" or "Registered and Agreement Recording Committee" is responsible for providing online supporter registration and agreement recording services.

- In operation crop and livestock insurance must cover contracted produce.
- Contract framing to be outside the domain of APMC Act.
- No perpetual structure can be developed on farmers' land/premises.
- Promotion of Farmer Producer Organization (FPOs) / Farmer Producer Companies (FPCs) to activate small and marginal farmers has been provided.
- FPO/FPC can be a contracting party if so, authorized by the farmers.
- No rights, title ownership or possession to be transferred or vested or separate in the contract farming sponsor *etc.*
- Ensuring buying of entire pre-agreed quantity of one or more of agricultural produce, livestock or its product of contract farming producer as per contract.
- Contract Farming Facilitation Group (CFFG) for promoting contract farming and services at village / panchayat level provided.
- Reachable and simple dispute settlement mechanism at the lowest level possible provided for quick disposal of disputes.
- It is a promotional and facilitative Act and not regulatory in its structure.

❖ **Benefits of Contract Farming**

- Integrate farmers with bulk buyers, such as exporters and intermediaries in the agro-industry. Wastages will be greatly reduced because the factories will be located next to groups of fields.
- Contract farming boosts market linkages and reduces dependence on.
- Better price realisation by reducing the producers' exposure to market and price risk. Better access to technology, crop diversification, extension services, funding, and crop insurance are all made possible by this.
- This reduces farmers' cost and, thereby, translates into augmented incomes. Ensures smooth agro raw material supply to the agro industries. Food-processing will get a increase as an employment generator.
- Farmers no need to transport their produce to the mandis, as sponsors usually collect the produce from the farm gate.
- Inspire the new generation to take-up farming instead of migrating to cities. Rural women, instead of being employed as farm labourers will work in sorting and grading of fruits and vegetables.
- It also gives farmers an alternative in cases where the procurement mechanism is ineffective.

❖ **Challenges in contract Farming**

- It's also important to consider how dependent producers are on businesses for their seeds and tools.
- Contract farming can be unfavourable by encouraging large monoculture farming.
- Contracting companies can take advantage of the monopsony scenario by giving farmers lower prices.
- High frequency of disagreements on product quality and quantity between farmers and purchasing organisations in some areas, as well as a high risk of post-harvest losses.

- Implementing agriculture reforms requires State collaboration because they are a matter of state law. Politics in the Center-States frequently thwart these changes.
- Contract farming agreements are frequently criticised for favouring businesses or large farmers while taking advantage of small farmers' weak negotiating power.
- Issues with growers including unfair quality cuts made to their products by businesses, late deliveries to the plant, untimely payments, low prices, and pest infestations on the contract crop that increased the cost of production.
- Contractual agreements are frequently informal or verbal in character, and even written contracts frequently do not offer the same level of legal security in India as they might in other nations. Contract violations by either side are possible if a clause is not enforceable.

❖ **How is it regulated in India?**

Regulated under the Indian contract Act, 1872.

- Contract farming is specifically covered by the Model APMC (Agricultural Produce Market Committee) Act of 2003, which includes rules for mandatory sponsor registration, dispute resolution, and contract farming.
- Ministry of Agriculture originated with a draft Model Contract Farming Act, 2018. The draft Model Act search for to create a regulatory and policy framework for contract farming. Based on this draft Model Act, legislatures of states can enact a law on contract farming.

11. High Powered Committee of Chief Ministers, 2019:

Prime Minister declared a high-powered committee to recommend structural reforms in agriculture, at the 5th meeting of the Governing council of NITI Aayog.

❖ **What is the Objective?**

- The planned committee would include some Chief Ministers.
- It would take a complete approach on the subject, including allied activities of agriculture.
- The key issues marked out for reference to the proposed committee include-
  - **i.** Logistics
  - **ii.** Private investment in agriculture
  - **iii.** Marketing support
  - **iv.** Value-addition
  - **v.** Irrigation, especially drip and other means of micro-irrigation
  - **vi.** Legislative changes required to overhaul agriculture and its allied activities

❖ **What were the earlier Committees?**

- The most famous among panels in this regard are –
  - **i.** The M S Swaminathan-headed National Commission on Farmers
  - **ii.** The Ashok Dalwai-led empowered committee on doubling farmers' income
  - **iii.** The Shanta Kumar-chaired committee on food sector reforms.
- The Swaminathan commission's report (2006) had wanted a paradigm shift in the focus of agricultural development programmes.

- It called for shift in emphasis from increasing production to raising farmers' income. But this took over a decade for the government to realize the status of this counsel and begin acting on it.
- However, many other equally sensible recommendations of this commission still remain unattended.
- The Dalwai committee's report (2018) had a key emphasis on the structural reforms and governance framework for agriculture.
- Being the latest, its recommendation was most relevant to the prevailing agrarian situation marked by prevalent farmers' distress.
- Besides, there is the government's own think tank, the National Institution for Transforming India (NITI) Aayog.
- The three-year action plan for agriculture crafted by NITI Aayog also addressed current challenges in the agriculture sector.

❖ **How effective will the new committee be?**

- Most of the matters marked out for reference to the proposed committee have been dealt comprehensively before by the above panels.
- They have come out with some well-judged inputs for reforming the key segments of the farm sector.
- But always, many of the workable and wise recommendations in these reports remain unimplemented. Given this, the real need for the new committee is highly contentious.

❖ **What are the real challenges?**

- Agriculture, according to the Structure, is a state subject.
- So, the truth is that the Centre has a very limited authority to intervene in matters related to agriculture.
- It can do little without the cooperation of the states which, frequently, is unavailable in adequate measure.
- The insufficient success of some of the Centre's key initiatives in agriculture stands as proof.
- E.g. the efforts at reforming agricultural marketing, legalizing land leasing and regularizing contract farming The model Bills drafted to serve as the guides for the amendment of the state laws have failed to deliver the desired results.

12. Three historic bills introduced in parliament to reform agriculture marketing, 2020

(A) Farmer's Produce Trade and Commerce (Promotion and facilitation) Act, 2020

- Efficient, transparent, and barrier-free trade and commerce outside the actual grounds of APMCs;
- Freedom of Choice for the Sale and Purchase of Farmers' Produce at Remunerative Prices.
- PMCs will continue to operate because: Act gives farmers access to more selling avenues
- No bearing on MSP.
- Payment to farmers must be made on the same day or within three business days when protocol calls for it
    - Allows for internet trading.

(B) Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020

- The legal structure for pre-harvest contracts between farmers and sponsors for the sale of farm products and the rendering of farm services.
- The Central Government's guidelines for model farming deals.
- The contract will include a specific price for the product.
- A clearly defined dispute settlement process that safeguards both farmers' and buyers' rights.

(C) Essential Commodities (Amendment) Act, 2020

- Act only in exceptional circumstances, such as war, famine, unusual price increases, and natural disasters.
- Importantly, these bills do not replace the current State APMC structure; rather, they only apply to horticultural produce and can only be imposed if there is a 100% increase in retail price and a 50% increase in retail price of non-perishable produce.
- Importantly, these bills do not demolish the current State APMC structure; rather, they offer competition to this system by opening up alternative marketing structures, direct buying, and contract farming.
- These bills do not replace the prevailing system of public procurement at MSP.

Farm reforms

No.	Before Reforms	After Reforms
1	Can only offer notified agricultural products in APMC mandis; cartels of traders could artificially keep prices low.	Freedom to choose whether to sell in the APMC mandi or in another location where a higher price can be realised through competition
2.	Once the produce is delivered to the mandi, the farmer must accept the price that is given.	can haggle prices even at the entrance
3.	Pay the mandi fee, commission, and other expenses that producers and customers are responsible for.	No charge or compensation significant cost savings for both producers and customers
4.	Large price difference Disparate markings long network of middlemen	greater producer shares of customer payments low transportation costs with little to no middleman
5.	Cannot sell straight to customers without using middlemen	able to sell straight to anyone while avoiding middlemen and charging more
6.	In many states, it was legal to trade produce outside of APMC mandis.	This freedom is available nationwide and for all agricultural products.
7.	Farmers not part of value chain	Farmers can be partner in value chain
8.	No chance for farm youth to trade Agri. Commodities	Rural farm youth will get opportunity to trade and run supply chain

9.	Small land holders do not have scale and bargaining power in input and output markets	Empowered to access to modern input, services and protection against price risk Farmer producer organisations help small farmers organise for better bargaining power

Other Government Initiative

1 In September 2018, government launched PM-AASHA:

- Since e-NAM did not yield expected results, the government reverted back to public price support measures through PM-AASHA.
- The primary goal of this plan was to give farmers a guaranteed price that would guarantee a return of at least 50% higher than the cost of cultivation.
- Several other crops required this protection as well, but they did not profit from the MSP-procurement system.The primary tenets of this programme were public procurement, deficiency payments, and private procurement.
- To reduce the financial expenses, the programme was limited to pulses and oilseeds, though

Reason for uninspiring performance of PM-AASHA

- Only public procurement was carried out in a evocative way.
- Deficit payments were only implemented on a pilot basis in Madhya Pradesh Private procurement was not initiated, even on a pilot basis, in any State.
- Budgetary allocation was meagre: only ₹500 crore have been earmarked in 2020-2021.

2 In 2019, PM-KISAN Yojana:

- The apathetic performance of PM-AASHA necessitated a more radical and direct approach which evolved in PM-KISAN scheme.
- This scheme had an annual fixed payment of 6,000 rupees to every farm household and a ₹75,000 crore budget.
- This programme has functioned reasonably well so far with many States topping up the amount at their end.

3 MSP (Minimum Support Price):

- The MSP, which is based on a calculation of at least 1.5 times the farmers' production costs, is the rate at which the government acquires crops from farmers.
- MSP is a "minimum price" for any product that the government deems "supportable" because it pays farmers a living wage.

Crops under MSP:

- The Commission for Agricultural Costs and Prices (CACP) recommends MSPs for 22 mandated crops **and** fair and remunerative price **(FRP)** for sugarcane.
- CACP is an attached office of the Ministry of Agriculture and Farmers Welfare.
- The mandated crops include 14 crops of the kharif season, 6 **rabi crops** and 2 other commercial crops.
- In addition, the MSPs of de-husked coconut and toria are fixed on the basis of the MSPs of rapeseed/mustard and copra, respectively.

What is the Need of MSP?

- The twin droughts of 2014 and 2015 forced the farmers to suffer from declining commodity prices since 2014.
- Demonetization and the introduction of the GST, two simultaneous shocks, crippled the rural economy, mainly the non-farm sector but also agriculture.
- The pandemic and the subsequent slowdown in the economy after 2016–17 have only made the situation more precarious for the majority of farms.
- Higher input prices for diesel, electricity and fertilisers have only contributed to the misery.

Conclusion:

In India, the selling of agricultural products is crucial. One of the many problems that directly affects a farmer's prosperity is agricultural marketing. Agricultural marketing, in its broadest sense, refers to all activities involved in transferring products and raw materials from the farm to the end consumer. One-third of the populace is employed in agriculture in the agriculturally-based nation of India. Consumers would receive goods at lower prices as a consequence of improved marketing mechanism efficiency, directly affecting national income. Policy reforms in agriculture continue to be a hot topic in public discourse since the last two decades. For several years, academic experts, stakeholders, and farmers' leaders pleaded for reforms in pre-budget consultations and meetings with NITI Aayog and the erstwhile Planning Commission. The recent initiatives certainly will help in strengthening the rural economy and would generate more rural employment. It would help in increasing productivity and in achieving goal of food security and inclusive growth in the country. Besides, these reforms in agricultural market will help India to meet the challenges posed by global markets in the era of globalization and liberalization. The reforms have generated optimism for India to become a global power in agriculture and a powerhouse for global food supply.

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AGRO-ENTREPRENEURSHIP: AN INTRODUCTION

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As we all know India is an agriculture prone country. Majority of Indian population depends on agriculture and it's allied activities. India is also second most populous country in the world. Hence, various kinds of problem such as poverty, unemployment, starvation, etc. are there for overcoming it government is trying really hard. It is really a tough task for the government to provide employment for everyone because currently India is having highest rate of youth. It is an opportunity as well as challenge.

Entrepreneurship:

Entrepreneurship means to create some-thing new, organizing and coordinating and bearing risk with economic uncertainty. Entrepreneurial activities are substantially different depending on the type of organization that is being started. It is the name given to the factor of production which performs the function of "Enterprise". Out of the five factors of production i.e. land, labour, capital, organization and enterprise, organization does the work of coordination between different factors and makes the production possible by taking upon itself the risk or more appropriately the uncertainty of production.

The term 'entrepreneurship' is often used synonymously with the term 'Entrepreneur' though, they are two sides of the same coin, conceptually they are different. Entrepreneurship is the indivisible process flourishes, when the interlinked dimensions of individual psychological entrepreneurship, entrepreneur traits, social encouragement, business opportunities, Government policies, availability of plenty of resources and opportunities coverage towards the common good, development of the society and economy. Entrepreneurship is the process of identifying opportunities in the market place, arranging the resources required to pursue these opportunities and investing the resources to exploit the opportunities for long term gains. It involves creating wealth by bringing together resources in new ways to start and operate an enterprise.

According to Cole "Entrepreneurship is the purposeful activity of an individual or a group of associated individuals undertaken to initiate, maintain and aggrandize profit by production or distribution of economic goods and services".

According to Higgins "Entrepreneurship is meant the function of foreseeing investment and production opportunities, organizing an enterprise to undertake a new production process, raising capital, hiring labour, arranging the supply of raw materials, finding site, introducing a new technique, discovering new resources or raw materials and selecting top managers for day to day operations of the enterprise". The above definitions highlights risk bearing, innovating and resource organizing aspects and an individual or group of people achieve goal through production or distribution of products or services. To conclude entrepreneurship is set of activities performed by an entrepreneur thus, entrepreneur proceeds entrepreneurship.

Entrepreneur

The word "Entrepreneur" is derived from the French verb 'entrepredre'. It means 'to undertake'. In the early 16th century the Frenchmen who organized and led military expeditions were referred as 'Entrepreneurs'. In the early 18th century French economist Richard Cantillon used the term entrepreneur to business. Since that time the word entrepreneur means one who takes the risk of starting a new organization or introducing a new idea, product or service to society.

According to J.B. Say, "An Entrepreneur is the economic agent who unites all means of production, land of one, the labour of another and the capital of yet another and thus produces a product. By selling the product in the market the pays rent of land, wages to labour, interest on capital and what remains is his profit". Thus an Entrepreneur is an organizer who combines various factors of production to produce a socially viable product. An entrepreneur can be regarded as a person who has the initiative skill and motivation to set up a business or enterprise of his own and who always looks for high achievements. He is the catalyst for social change and works for the common good. They look for opportunities, identifies them and seizes them mainly for economic gains. An action-oriented entrepreneur is a highly calculative individual who is always willing to undertake risks in order to achieve their goals.

According to Joseph Schumepeter, "An entrepreneur in an advanced economy is an individual who introduces something new in the economy, a method of production not yet tested by experience in the branch of manufacture concerned, a product with which consumers are not yet familiar, a new source of raw material or of new market and the like".

That is why the entrepreneur is termed as "Uncertainty Bearer" and his function as that of Uncertainty bearing. Haggen defines entrepreneurship as "the function of seeing investment and production opportunity, organizing and enterprise to undertake a new production process, raising capital, hiring labour, arranging the supply of raw materials and selecting top managers for day-to-day operation of the enterprise."

According to Cantillon "An entrepreneur is the agent who buys factors of production at certain prices in order to combine them into a product with a view to selling it at uncertain prices in future". To conclude an entrepreneur is the person who bears risk, unites various factors of production, to exploit the perceived opportunities in order to evoke demand, create wealth and employment.

The major factor for entrepreneurship is the achievement motivation. A society constituting individuals with a high level of need for achievement would come up as entrepreneurs. Entrepreneurship involves task accomplishment that embodies a reasonable challenge to the individuals, competence. Entrepreneurs have to work hard at tasks that involve a real challenge which imply only a moderate risk. Entrepreneur have many of the same traits as leaders.

According to McClelland entrepreneur is some-one who exercises some control over the means of production and produces more than what he can consume in order to sell it for profit. He executes the functions of coordination, organization and supervision. Entrepreneur is basically an innovator who introduces new combinations. An entrepreneur is one who creates a new business in the face of risk and uncertainty for the purpose of achieving profit and growth by identifying opportunities and assembling the necessary resources to capitalize on them. He

conceives an industrial enterprise for the purpose, displays considerable initiative, grit and determination in bringing his project into fruition.

During the process entrepreneur exhibits some of the following characteristics:

Desire for responsibility: Entrepreneur feel a deep sense of personal responsibility for the outcome of ventures he starts. He prefers to be in control of his resources and use those resources to achieve self- determined goals.

Preference for moderate risk: Entrepreneurs are not mere risk takers but are instead calculating risk takers. Their goals may appear to be high even impossible. But they see the situation from a different perspective and believe that their goals are realistic and attainable. They usually select only those areas for opportunity where those areas reflect their knowledge, backgrounds and experiences, which increase their probability of success.

Confidence to succeed: Entrepreneurs typically will take the challenges with confidence in their ability to succeed. They tend to be optimistic about their chances for success and their optimism is based in reality.

Desire for immediate feedback: Entrepreneurs enjoy the challenge of running a business avoiding risks and they like to know how they are running their business through constant feedback from the customers.

High level of energy: Entrepreneurs are more energetic than the average person. That energy may be a critical factor given the incredible effort required to launch a start-up company. Long hours and hard work are the rule rather than the exception.

Future orientation: Entrepreneurs have a well-defined sense of searching for opportunities. They look ahead and are less concerned with what was done yesterday than with what might be done tomorrow. Entrepreneurs see potential where most people see only problems or nothing at all. In contrast to traditional managers who are concerned with managing available resources, entrepreneurs are more interested in spotting and capitalizing on opportunities.

Skill at organizing: Building a company "from scratch" is much difficult task. Entrepreneurs know how to put the right people together to accomplish a task.

Value of achievement over money: It is a common misconception that entrepreneur starts his business to make money. But it is difficult to say what is the force behind an entrepreneur's motivation. Some-times money may be only a secondary force.

An entrepreneur puts his innovative ideas into effect in the process of economic development. The important factor of entrepreneurship is the ability to create new and useful ideas that solve the problems and challenges people face every day. Entrepreneurs achieve success by creating value in the marketplace by utilizing the resources in an innovative way to sustain the product competitively in the market. Which in return satisfies the customer's needs. Creative thinking is a core business skill which every entrepreneur needs to acquire. Entrepreneurship is the result of a disciplined, systematic process of applying creativity and innovation to needs and opportunities in the market place.

Entrepreneurship is a commitment to expand and grow the major determinants of industrial development which leads to economic growth of the country. It has been identified as an essential factor for economic development of the country. The basic objective of an entrepreneurship development should be to develop the man and competencies required to initiate, manage, and expand the entrepreneurial activity. Hence it is very much important to pay

attention towards conceptualization, planning, implementation and management of a business idea. It involves applying focused strategies to mould new ideas to create a product or services that satisfies customer's needs or solves their problems. Thus, business plan is a pre-requisite which helps an entrepreneur to execute his creative ideas into course of action.

Types of entrepreneurs:

Following are the classification of entrepreneurs on the basis of common characteristics

A. Clarence Danhof Classification: Clarence Danhof classifies entrepreneurs into four types.

1. Innovative: Innovative entrepreneur is one who assembles and synthesis information and introduces new combinations of factors of production. They are characterized by the smell of innovativeness. These entrepreneurs sense the opportunities for introduction new ideas new technology, new markets and creating new organizations. Innovative entrepreneurs are very much helpful for their country because they bring about a transformation in life style.

2. Imitative/ Adoptive: Imitative entrepreneur is also known as adoptive entrepreneur. He simply adopts successful innovation introduced by other innovators. These entrepreneurs imitate the existing entrepreneurs and setup their enterprise in the same manner. Instead of innovating, they just imitate the technology and methods innovated by others. These entrepreneurs are very helpful in less developed countries as they contribute significantly in the growth of enterprise and entrepreneurial culture in these countries. Further by adopting the technology, which is already tested, they generate ample employment avenues for the youth and therefore they are treated as agent of economic development.

3. Fabian: The Fabian entrepreneur is timid and cautious. He imitates other innovations only if he is certain that failure to do so may damage his business. They are very much skeptical in their approach in adopting or innovating new technology in their enterprise. They are not adaptable to the changing environment. They love to remain in the existing business with the age-old techniques of production. They only adopt the new technology when they realize that failure to adopt will lead to loss or collapse of the enterprise.

4. Drone: These entrepreneurs are conservative or orthodox in outlook. They never like to get rid of their traditional business and traditional machinery or systems of the business. They always feel comfortable with their old-fashioned technology of production even though the environment as well as the society have undergone considerable changes. Thus, drone entrepreneurs refuse to adopt the changes. They are laggards as they continue to operate in their traditional way and resist changes. His entrepreneurial activity may be restricted to just one or two innovations. They refuse to adopt changes in production even at the risk of reduced returns.

B. Arthur H. Cole Classification: Arthur H. Cole classifies entrepreneurs as

1. Empirical: He is an entrepreneur hardly introduces anything revolutionary and follows the principle of rule of thumb.

2. Rational: The rational entrepreneur is well informed about the general economic conditions and introduces changes which look more revolutionary.

3. Cognitive: Cognitive entrepreneur is well informed, draws upon the advice and services of experts and introduces changes that reflect complete break from the existing scheme of enterprise.

C. Classification on the basis of ownership:

1.Private: Private entrepreneur is motivated by profit and it would not enter those sectors of the economy in which prospects of monetary rewards are not very bright.

2. Public: In the underdeveloped countries government will take the initiative to share enterprises.

D. Classification based on the scale of enterprise:

1. Small scale: This classification is especially popular in the underdeveloped countries. Small entrepreneurs do not posses the necessary talents and resources to initiate large scale production and introduce revolutionary technological changes.

2. Large scale: In the developed countries most entrepreneurs deal with large scale enterprises. They posses the financial and necessary enterprise to initiate and introduce new technical changes. The result is the developed countries are able to sustain and develop a high level of technical progress.

In recent years, some new classifications have been made regarding entrepreneurs, which are discussed further.

Women entrepreneurs: Those women who think of business enterprise, initiate it, organize and combine the factors of production, operate the enterprise and undertake risks and handle economic uncertainty involved in running a business enterprise.

Inventors: Characterized by competence and inventiveness to invent new product and show interest in research and innovative activities. Eg. Scientist, who contributed for innovation.

Challengers: Entrepreneurs who plunge into industry because of the challenges it presents. Even after met the challenge, they look for the new one.

Life-timers: These Entrepreneurs take business as an integral part to their life. Usually the family enterprises and business run with their personal skill belongs to this category.

Social entrepreneurs: These Entrepreneurs involved in social activities. People who engaged their service in NGOs, voluntary organizations etc are noted in this category. Even if they run business, certain portion of the profit will be utilized for the social activities. Mostly shows high social responsibility.

Intrapreneurs: It is a new breed of Entrepreneurs who operate from within the organization itself. Emerge from within the confines of existing enterprise. Dependent on the entrepreneur for some activities (Eg.- Fund raising) but not fully bear the risks involved in the enterprise.

Agro-entrepreneurship:

Amidst the changing paradigms and demanding global structure, India, In order to remain a front-runner needs to primarily focus on the agriculture sector, the backbone of the economy. This specialization will develop agri-preneurs with distinct traits and skills to exploit opportunities galore in the field of agriculture. Among the various strategies to promote planned growth in this sector, focus on promoting viable enterprises will certainly help exploit its operational efficiency to the hilt.

Agriculture is the mainstay of the Indian economy because of its high share in employment and livelihood creation. 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 goods.

AGRICULTURE + ENTREPRENEUR = AGRIPRENEURE

Agripreneurship: It is defined as generally sustainable, community oriented, directly marketed agriculture. Sustainable agriculture denotes a holistic, systems oriented approach to farming that focuses on the interrelationships of social, economic and environmental process.

Need for Agri-entrepreneurship:

• Increasing demand of organic and quality food both in India and abroad.

• Competitive advantages for many primary production activities in agriculture. Ex: Rainfed farming, livestock and wild craft production is through low cost production technologies only.

• Private sector is willing to enter in to agribusiness at all levels of operation.

• To reduce mall nutrition as majority of women and children in the country are mall nourished.

Scope for entrepreneurship development in agriculture:

• 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.

On farm Activities: Depending upon the geographical situation and resources availability, the possible areas of entrepreneurship in agriculture are:

(1) Agro-produce processing units: These units do not manufacture any new product. They merely process the agriculture produce. e.g., Rice mills, Dal mills, Decorticating mills etc.

(2) Agro-produce manufacturing units: These units produce entirely new products based on the agricultural produce as the main raw material. e.g., Sugar factories, Bakery, Strawboard units etc.

(3) 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, agricultural implements etc.

(4) Agro-service centers: These include the workshops and service centers for repairing and serving the agricultural implements used in agriculture.

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, dari making, envelope and plastic bag making, agarbatti making, candle making, rope making, basket making, bamboo-work, distilled water making, oil extraction, chalk making, biogas mechanic, electric wiring, mason, carpentry, black smithy, solar mechanic, electrician, auto mechanic, welding, pottery, and 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.

Entrepreneurial traits of agri-preneurs:

What makes the entrepreneurs successful? Whether have they anything common in their personal characteristics? The scanning of their personal characteristics shows that there are certain characteristics or traits which are found usually prominent in them.

Few of them are discussed here. Achievement motivation, risk taking ability, leadership ability, decision making ability, innovativeness, management orientation, and self confidence,

attitude towards self employment and income generation and information seeking are some of the important entrepreneurial traits for any entrepreneur reported by various researchers.

Achievement motivation: The achievement motivation is one of the traits required by the agripreneurs. It is the basic urge for the entrepreneur to become enterprising.

Risk taking ability: Any enterprise or venture normally circumvents with all kinds of risks. Especially in agribusiness enterprises, it is unpredictable. Hence, agripreneurs should assumes more of risks than any other business venture. Randhawa (1987) and Goleman (1995) reported that agripreneurs should have the willingness to take risk, while facing tough situations. Agribusiness is complex and risky prone ventures in all spheres, agripreneurs necessarily exhibit the traits of risk taking ability.

Leadership ability: Agriventures as an enterprise is a group activity which demands team work and leadership abilities.

Decision making ability: The decision making ability is generally depends on education, better communication behaviour, large scale awareness about the developmental practices in that particular enterprise. Such factors will support the decision making ability of entrepreneurs. Taking right decision, at right time, at right place (Production and Post production activities) will be the most essential traits of successful entrepreneurs. Any failure will attributes for unsuccessful performance.

Innovativeness: innovativeness towards the developmental activities and new technologies in the Agri-enterprise innovativeness significantly affect the leadership qualities of entrepreneurship in the process of development.

Management orientation: Management orientation included orientation towards planning, production practices, marketing information and awareness about the new technologies and developmental practices to improve the productivity of agri-enterprises.

Self confidence: Literacy level and good exposure will certain extend to supports self confidence.

Information seeking: The people who have adequate education, innovativeness, enthusiastic will exhibits good information seeking behaviour. Any business enterprise requires wide variety of information related to production and post production. Hence an entrepreneur should possess adequate information seeking behaviour.

Need of Agri-preneurship:

1. Agricultural and Horticultural products are locally available.
2. These small-scale industries do not require huge infrastructure and complex scientific technologies.
3. These small-scale Industries are economically viable and ecologically sustainable too.
4. These enterprises do not require huge expenditure.
5. Agri-preneurship development has huge potential of creating new employment opportunities for rural youth.
6. Agri-preneurship helps in checking migration of rural youth from villages to urban centres and helps in improving living condition of farmers by providing alternative source of income.
7. Availability of land for agricultural purposes.
8. Requirement of funds for agricultural activities.

9. Requirement of literate and educated population.
10. Both backward and forward inducements and linkages of agricultural development for industrial development.

Role of Agri-preneurship in National Economy

1. Agri-preneurship plays various roles in the growth and development of national economy through entrepreneurship development which increases the income level and employment opportunities in rural as well as urban areas.
2. Agri-preneurship also play following role in the economic system, it helps in inducing productivity gains by smallholder farmers and integrating them into local, national and international markets.
3. It helps in reducing food costs, supply uncertainties and improving the diets of the rural and urban poor in the country.
4. It also generates growth, increasing and diversifying income, and providing entrepreneurial opportunities in both rural and urban areas.

Institutional support to business entrepreneurs:

Central Government and various State Government Institutions have the mandate to help the entrepreneurs by providing various kinds of support and facilities. Availability of the Institutional support will motivate the new entrepreneurs to get in to the venture. Here we can see the existing support structure available to entrepreneurs.

Specialized training institutions for agricultural human resource management

1. State Agricultural Universities: Recently, almost all SAUs in India focusing Agribusiness Education. While doing so it also simultaneously raises the agri-preneurship development among the future generations available for agribusiness and agri-ventures. To strengthen the agribusiness education and entrepreneurship development new degree courses (in Undergraduate and Post graduate level), training programmes have been introduced considering the growing demand. Eg. TNAU- has established separate Directorate of Agribusiness, MBA(ABM), Dept of PH Courses B.S.(ABM), B.Sc. (Ag)-: RAWE- EDP module.

2. Krishi Vigyan Kendra: ICAR sponsored KVK are available throughout the country, conducting various vocational training programme with broad objective of promoting agri-preneurship among farm youth. Eg. Some of the novel Training programme like Production of organic products and organic inputs, Special packaged foods for Sugar patient, Heart patient, packaged flower for special occasion and season promotes business entrepreneurship.

3. Agricultural Technology Management Agency: The existing

a. Structure of ATMA a district level agency provides wider scope and support to

b. promotes group specific agribusiness entrepreneurship. Eg. Group farming,

c. Group marketing using the provision of ATMA.

4. National Institutes of ICAR and Govt. of India:

a. Various National institutes of ICAR and GOI also started agribusiness programme with broad

b. Focus to promote agribusiness entrepreneurship among farm graduates especially in the first line and second line managers Eg. NIAM, MANAGE, NAARM

c. Conducting PG Diploma in Agribusiness.

5. Entrepreneurship Development Cell (EDC): SAUs and even traditional Universities started functioning entrepreneurship Development cell to promote entrepreneurship among students. Eg.

EDC of Bharathiar University, Coimbatore and Coimbatore Institute Of Management and Technology(CIMAT) are functioning well.

6. National Institute of Entrepreneurship and small business development (NISEBUD)

a. This institute in functioning at New Delhi. It imparts specialized training to various

b. categories of entrepreneurs. It establishes a forum between various agencies

c. involved in ED activities.

7. National Institute of Small Industries Extension Training (NISIET): It is functioning at Hyderabad. It gives training to entrepreneurs of small-scale industries. Apart from this it also supports the research on development of SSI. It also extends its consultancy services to SSI.

8. RUDSETI (Rural Development for Self-Employment and Training Institute): This organization is being promoted by Syndicate Bank. It operates the training institutes at Mangalore and Kannur. It conducts a residential entrepreneurial development programme for rural unemployed youths.

Infrastructure support to business entrepreneur

1. Special Economic Zone (SEZ)

• 237 SEZ in 16 states and UT

• 166 approved in Principle and 41 SEZ formally notified supporting entrepreneur

2. Agri- Export Zone (AEZ)

• To cherish the needs of agri-exporter

• Provision of cold chains to supply chain and logistics

3. APEDA (Agricultural & Processed Food Products Export Development Authority)

• Maximize foreign exchange through agro-products

• Create employment opportunity through value added products Eg; Grapes, Mango- Maharashtra, Karnataka

4. KINFRA (Kerala Infra structure Authority)

• Development of Industries

• Balancing social, cultural, regional and ecological

• Industrial Parks/ Township/ Zones

Institutional Finance to Business entrepreneurs: The following institutions providing finance to entrepreneurs.

• Commercial Banks

• State financial corporations

• Industrial Development Banks of India (IDBI)

• Industrial Finance Corporation of India (IFCI)

• Industrial Credit and Investment Corporation of India (ICICI)

• National Agricultural Bank for Rural Development

• YES Bank (Agri business)

• Small Industries Development Bank of India (SIDBI)

• Export- Import Bank of India (EXIM Bank)

• State Industrial Development Corporations (SIDC)

NABARD promotes rural entrepreneurs by means of establishing rural go-downs and storage structure. Submission of bankable projects in the recommended format with technical, economic, socially and environmentally viable indicators attracts finance to the entrepreneurs

without much of difficulty. The entrepreneurs also some time have the privilege to avail subsidy component being the part of promotion announced by the Government.

Development of Agri-preneurship in India

India has long been seen as having an agrarian economy. Agri-preneurship employs a number of mechanisms, including as forward and backward linkages with secondary and tertiary industries, such as the industrial and service sectors. Opportunities in agriculture and related industries can be found at many stages of the farming process.

The scope and potential of agricultural entrepreneurial prospects are currently expanding due to globalisation and a more integrated global market. Entrepreneurs have a lot of potential opportunities. Numerous inputs are required by the agricultural process, including seeds, fertilizer, insecticides, and cutting-edge, regional farm technology. The development and production of these inputs are thus made possible by the aforementioned domains. Entrepreneurship potential in fields including bio-pesticides, bio-fertilizers, vermicomposting, testing, and soil repair are particularly attractive. Still additional chances are emerging as organic farming receives more attention.

When it comes to seed development, there is a tonne of room for R&D. Even in difficult climatic conditions, these types of seeds are likely to function. Crop production should be increased for maximum income and better living conditions for our agricultural community, which is attainable with appropriate management practises and high-quality inputs. India can only produce an average of 50% of the global per-hectare output. Additionally, there is a huge market for agro-tech products. The use of chemical-intensive fertilisers and insecticides is gradually being replaced by natural manure and pesticides.

The production and commercialization of bio-pesticides, eco-friendly agrochemicals, and natural manures are once again seeing tremendous possibilities and opportunities as a result of this progressive transformation. At this stage of farming, maximising productivity and taking advantage of seasonal advantages are the main goals. The use of diverse crops and crop rotation to maintain, conserve, and improve soil quality, the use of agri-tech machines to lower the cost of cultivation and the drudgery of labor, etc. are all examples of innovative approaches that can be taken. Opportunities are felt in the value chain, output processing, and marketing phases after harvest. New enterprises are being able to flourish as a result of improvements in the farm product supply chain management.

To be more specific, there are opportunities for agri-preneurship development in the farming of vegetables, fruits, food grains, pulses, oil seeds, etc., in developing greenhouse concepts, in developing herbal plantations, in developing dairy and poultry, in developing animal husbandry, in grading and packaging of agri-products, in establishing food processing units, and in establishing cold. To determine the problems and obstacles preventing farmers from becoming agri-preneurs.

Barriers of entrepreneurship development

1. Agriculture is the primary source of income for the majority of farmers. Due to a lack of knowledge, resources, technology, and market connectivity, it is difficult for the uninformed small owner to turn their farming into a business.
2. Farmers, who are the clients of the many services offered by independent contractors, need to be made aware of the benefits of these services before they are advertised.

3. To advertise their services, government organisations should abandon the current practise of providing free services. In actuality, a lot of farmers, particularly the politically well-connected leaders, think that the government should provide extension and technical consulting services to farmers.
4. The independent technicians need constant assistance in the form of commercial and technical know-how, interaction with marketing companies, suppliers of necessary supplies and equipment, and research institutes working to develop cutting-edge technologies.
5. The development of the agribusiness, supported by the People's Organizations and Cooperatives, is hampered by a number of legal restrictions and hurdles. Private dealers that conduct this type of business frequently break these regulations and disrupt the fair-trade environment.
6. People's organisations frequently hesitate to take the chance of making significant investments and implementing cutting-edge technologies, which has an impact on profitability. Farmer members become disinterested in both their own businesses and the ventures of their leaders because to low profitability and antiquated technologies.

Challenges for Agri-preneurship dvelopment in India

There are some important challenges in the process of agri-preneurship development which are as follows:

1. **Inadequate Infrastructural Facilities:** Infrastructural development is a requirement for all development. Particularly in terms of facilities like transportation, communication, power, and marketing networks, rural India's infrastructure is woefully deficient.
2. **Lack of Entrepreneurial Culture Among People:** There are numerous regions in India where there is a very low entrepreneurship culture. A gap in the emergence of an entrepreneurial culture among rural residents is being caused by a lack of education and awareness.
3. **Migration of Skilled and Talented Work force from Rural Area to Urban:** People from rural areas are migrating to metropolitan areas because of the abjectly inadequate infrastructure and facilities in such places. This departure is creating a talent shortage in rural areas. It is brought on by a dearth of employment, educational, and professional options that can fully utilise talent. Even people who have specialised knowledge, training, and education are looking for jobs in a variety of urban industries. Young people from rural areas frequently move to cities in quest of better work possibilities.
4. **Poor Technologies and Equipment:** People may explore options, analyse situations, and make the best judgements possible at the correct moment with the use of information.
5. **Lack of Information:** The expansion of agribusiness has a considerable gap. Lack of knowledge of business practices, information technology, and agricultural machinery will hurt agri-preneurship.
6. **Farmers are having a lot of trouble marketing:** Due to a lack of adequate transportation, warehousing facilities, agri-product promotion facilities, marketing setup, destabilised prices for agriculture products, unequal demand, influence of local intermediaries, and a number of other issues, their products are less desirable.
7. **Inadequate Institutional Measure and Government Policies:** Although there are many government policies, problems like bureaucracy and corruption give the impression that

their implementation is improper. Due to their illiteracy and ignorance, rural communities are unable to become aware of government efforts and profit from them. In terms of government support, the expansion of the industrial and service sectors receives far more support from the government than the agricultural sector.

8. **Problems in Marketing of Agricultural Products:** Production has no value unless it is sold and consumed. Because of so many issues, selling agricultural products has become challenging for farmers.
9. **High costs of Physical Logistics:** Physical logistics are expensive, and there are many Indian communities that are not well connected to one another. Moving their goods to surrounding marketplaces is a challenge for farmers. They don't have access to warehouse space, therefore they can't store their goods. Moving the product to market is increasingly expensive for the former. Not just for the purpose of moving agricultural products, but also for acquiring agricultural inputs like seeds, fertilizer, and insecticides.

Recommendations

1. It is urgently necessary to encourage an entrepreneurial mindset among rural residents and to establish a vibrant environment for rural development by identifying attractive agriculture and related industries.
2. By offering technical training packages that are area-specific, we can help aspiring business owners obtain the necessary technical skills.
3. Establishing a development fund to aid in the establishment of agricultural incubation centres for agri-preneurship.
4. Extending support in terms of providing financial and marketing support Entrepreneurial education and training to the potential rural youth.
5. Improving rural areas' infrastructure Identifying key and focused areas for agri-preneurship development across the stages of the agricultural process' value chain and creating effective promotion tactics.
6. Promoting entrepreneurial culture among the people in rural areas and to create a vibrant environment for the development of rural areas.
7. Giving potential rural youngsters entrepreneurial education and training while enhancing the infrastructure in those areas to encourage the emergence of new businesses.
8. Identifying the trust areas for agripreneurial development across the stages of value chain of the agricultural process and designing appropriate strategies for the promotion.
9. Identifying promising agriculture allied areas of business to promote entrepreneurial activity.
10. Providing area specific technical training programs to develop the required technical competency among the potential entrepreneurs.
11. Establishing area specific entrepreneurial development organizations to facilitate focused efforts for the development of identified areas.
12. Establishing development fund, to support the start-up processes of Agri-preneurship.
13. Establishing agricultural incubation centres.
14. Providing financial and marketing support.

Conclusion:

The agriculture sector has a great potential for contributing to the national economy while at the same time it also provides direct employment and income to the comparatively bigger and vulnerable section of the society. Agri-preneurship is not only an opportunity but also a necessity for increasing the production and profitability in agriculture sector. Agri-preneurship development will help the economy to strengthen and to achieve tremendous growth in primary sector and also contribute for rural development. It also helps in achieving balanced economic growth in India. The government of India have to make various policies focusing on Agri-preneurship development and also developed organizations to support the process. Agri-preneurship development is going to give good results at rural level and small level also. Agri-preneurship development is going to give excellent results at rural level. In thisreference, it is widely believed that sustainable agri-business ventures can promote job-led economic growth in rural areas Agri-preneurship in sustainable agriculture like natural farming, organic farming, eco-friendly agriculture etc. has the potential to transform the face of rural India, the prime driver of our economy. So, there is a direct need of making suitable policies and frameworks with action plans for achieving the target of agri-preneurship. Agri-preneurship can make agriculture a more attractive and profitable venture. There is a scope for entrepreneurship in agriculture and this potentiality can be observed only by effective management of agri-elements such as soil, seed, water and market needs. An individual with risk bearing ability and a pursuit for latest knowledge in agriculture sector can prove to be a right agri-preneurs.

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INFORMATION TECHNOLOGY FOR AGRICULTURAL DEVELOPMENT IN INDIA

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Introduction:

The majority of countries' rural populations rely extensively on farming as their main source of income. The obstacles this sector has in boosting production are numerous. Technology offers the ability to help farmers overcome their issues and can raise the level of living in rural communities. Farmers encounter several issues and do not receive just compensation for their agricultural output. Due to the increase in the cost of fuel, fertilizers, and pesticides, the profit margin is extremely low. Market volatility and globalization slow down agricultural development. Technology gives farmers access to markets. It gives the possibility of raising income. Furthermore, provides vital data that will help create a climate that will make agriculture more lucrative. ICT infrastructure can be used to deliver the necessary information on new agriculture, fishing, animal husbandry, etc.

Information Technology:

Information Technology is the sensation technology nowadays. Technology is what makes it possible to communicate information quickly and easily. The globe is becoming a global village as a result of this technology, which also reduces the distance between or the differences between nations. The possibility to enhance their strategies and compete with the wealthy nations is provided by this technology for developing and underdeveloped countries. Information is the key to the development of every industry. It does not exclude agriculture. Agriculture can benefit greatly if the appropriate information is delivered at the appropriate time.

Information Technology is the buzz technology nowadays. It is the technology that is helping to exchange information in a fast and easier way. The globe is becoming a global village as a result of this technology, which also reduces the distance between or difference between the nations. Developing and impoverished countries now have the chance to develop their strategy and compete with industrialized countries thanks to technology. Information is the foundation for the growth of any industry. It applies to all industries, including agriculture. Agriculture can benefit greatly if the appropriate information is given at the appropriate time. By acting promptly, planning tactics for the upcoming season or year, speculating on market shifts, and averting unpleasant situations, one can succeed. So, the pace at which users are given pertinent information may determine how quickly agriculture develops. The information can also be delivered to the end users using more conventional means. They typically only communicate in

one direction and have untimed vaccinations. Information delivery and user feedback collection will take a lot of time.

It's time to consider the new technologies and approaches that will enable a growing country like India to become a superpower and which will benefit the world at large. Information technology can be used in a wide variety of ways to exchange information, including information kiosks that provide services beyond the basics like email and assist with agriculture and irrigation, education, health care, trading platforms, outreach programs, etc. Expert systems that help producers determine the best marketing alternatives and strategies, integrated sustainable farming systems for different crops, farm-level information systems, and more.

The Effects of IT on Agriculture

Positive effects have been seen when it entered the agriculture sector. These are some of its outcomes, to mention a few:

• **Better decision-making-** Farmers, whether large or small, may make better and more informed decisions about their agricultural activities by having the appropriate information. The communication channels that information technology delivers make it simpler for farmers to produce their crops and distribute them, whether it be in terms of where to buy their grains from or possibly whom to sell them to at home. Farmers are made more aware of the aspects to take into account before making decisions thanks to the flow of information from other nations and organizations.

• **Better planning** - IT has made it possible to develop farming software that can do just about everything needed to increase production and income, including keeping better track of crops, predicting yields, choosing the best time to plant and what to plant, intercropping or concentrating on just one product, and identifying the current needs of the crops. Farmers may better manage their crops by changing their agricultural practices. In order to maintain their farm's profitability and encourage future expansion, information gathering is crucial.

• **Community Participation** - A number of activities are made feasible by IT applications, and the level of community involvement in agriculture may also be raised. The output of locally produced commodities can be boosted when a community uses contemporary agricultural techniques. There are certain regions where the land and agricultural resources provide significant benefits to the local population. With the help of IT, local farmers can work together more effectively, which might boost community output and raise everyone's income.

• **Advances in agriculture** - Technology facilitates the dissemination of knowledge on the most recent advancements in agriculture. Farmers from all over the world may profit from the same innovations when scientists create new and superior grains or discover methods to make winter crops more resistant to the cold. This is possible simply by staying linked to the rest of the agricultural industry. It is considerably simpler to share knowledge to further everyone's growth when resources are made available and easily accessible via IT.

• **Agriculture for all** - Farmers are experts in their fields. Nonetheless, the way that contemporary technology has altered how agriculture is perceived may also be advantageous to interested individuals who may be referred to as backyard farmers. On a smaller scale, you may be able to grow your own sustainable garden of herbs, fruit trees, and other agricultural goods.

Gardening has many advantages, and having your own product also ensures the quality and freshness of the food your family consumes.

ICT advantages for agriculture

The advantages of agricultural development are as follows:

- Agricultural markets are made more effective and open.
- connects farmers to urban, local, and international markets
- enhances governance and services for the underprivileged in rural areas.
- encourages farmers to innovate in agriculture.
- enhances the management of natural resources and land.
- Encouragement to boost the rural economy.
- enhanced productivity, sustainability, and effectiveness.
- Describe how to control diseases and pests.
- current market data is provided.
- bolster the representation of and capabilities for farmers.
- cuts down on social isolation.
- Expand your horizons in terms of business.
- weather data is provided.
- increased quality of life.
- better and more affordable financial access.

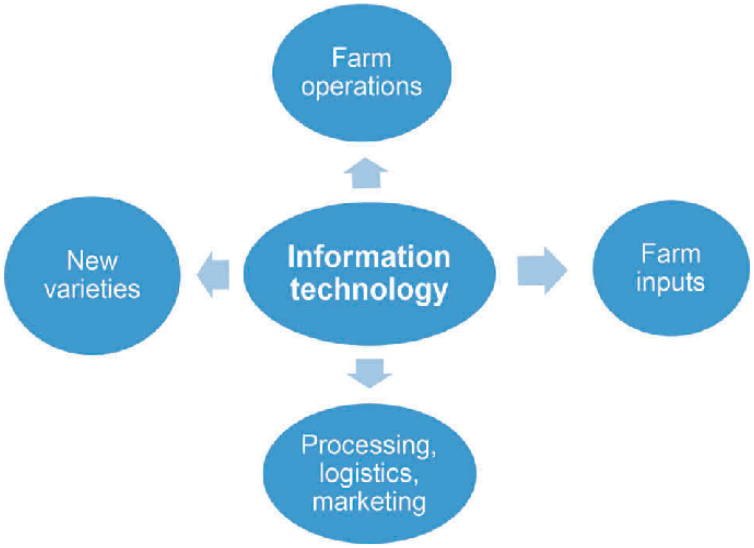


Figure 1: Role of Information Technology

Application of IT-based agricultural communication in India:

The nation has benefited much from the global communication revolution, and India is now opening up to the global economy. As a result, the circumstance has drastically changed. There is no denying that the old days and associated problems are a thing of the past, even though we still have a lot of catching up to do. Like everyone else, farmers desire the most recent, current, up-to-the-minute, and most recent information from any location in the world delivered to their door. A few years ago, it was challenging for Indian farmers to gather this

information, but today, Indian farmers have access to a wide range of outstanding, great, amazing, fantastic, excellent, and fabulous satellite-based communication tools.

There are cases of the application of information and communication technologies in extension that have made a difference in the delivery of extension services in rural India. Some of these include the Warana Wired Village Project in Maharashtra; Milk collection in dairy co-operatives (National Dairy Development Board); Information Villages Project (MS Swaminathan Research Foundation-International Development Research Centre); Information Technology application for Indian Rural Postal System (CMC Limited, Hyderabad); Network for grassroots innovations (IIM, Ahmedabad); Application of Satellite Communication for Training Field Workers and Extension Workers in Rural Areas(ISRO); Computerisation of Mandal Revenue Offices (MROs) and computer-aided administration of revenue department in Andhra Pradesh.

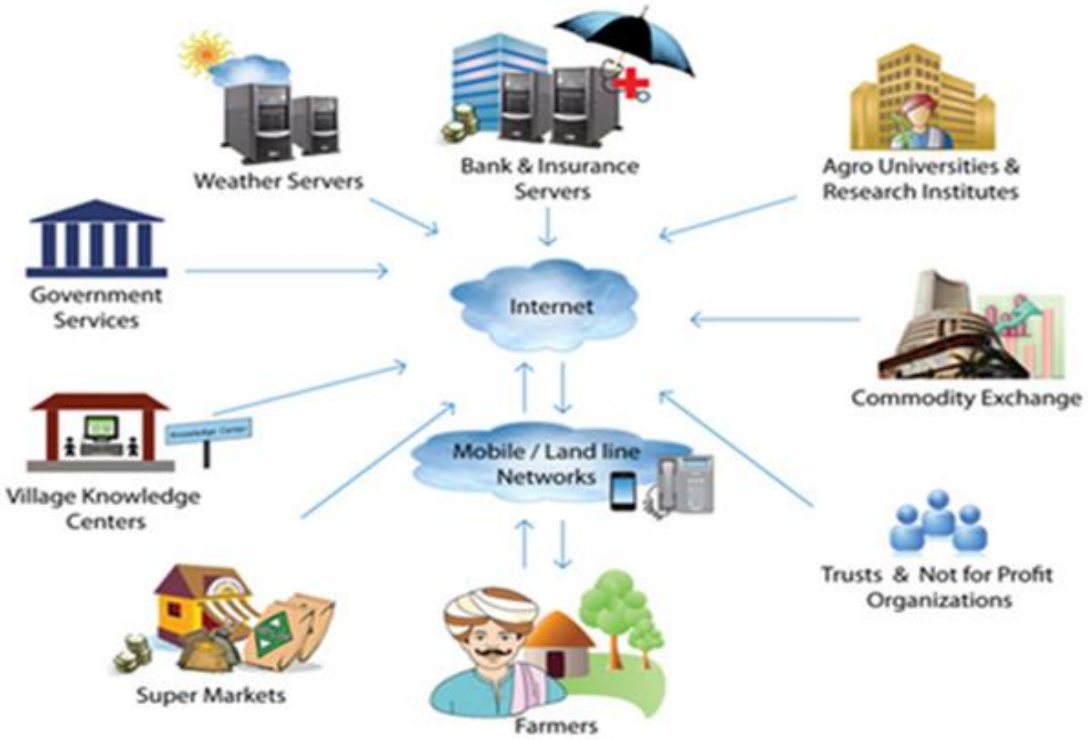


Figure 2: ICT services (courtesy: TCS)

Kisan call center

On January 21, 2004, Kisan Call Centers were opened nationwide by the Department of Agriculture & Cooperation (DAC), Ministry of Agriculture, Government of India to provide extension services to the farming community.

These call centres serve the objective of providing prompt, local language responses to farmers' concerns. Every state has call centres that are designed to manage traffic from all around the nation. These call centres handle inquiries regarding agriculture and associated industries.

An agricultural concern or question can be presented to the Kisan Call Center by calling the toll-free telephone number 1551 or 1800-180-1551 from any location inside the State. The Kisan Call centre operator will make an effort to respond to farmers' problems and inquiries right away. If the call centre representative is unable to respond to the farmer's question right away,

the call will be sent to designated agricultural experts. The Department of Agriculture's Agriculture Information Officer and Horticulture Officer are currently the assigned experts for Meghalaya.

The concept of the Kisan call center

The difficulties facing Indian agriculture are significant. To enable higher per capita income and consumption, this industry must expand more quickly than in the past. It is common knowledge that strong agricultural development is necessary for overall economic advancement. Agriculture is directly or indirectly dependent on about two-thirds of the workforce. Over 15% of exports and about 28% of the country's GDP are produced by this sector. Crop diversification will be fueled by both the desire of farmers for increased wages and growing consumer prosperity. Assuming India can preserve its comparative advantage as a relatively low-cost producer and fulfill the stability, quality, and presentation criteria sought by international trade and consumers, the export potential for agricultural products are also anticipated to increase.

Indian agriculture is faced with a wide variety of demands, possibilities, and prospects given its variety of agroecological settings and producers. Currently, well-endowed irrigated areas, which make up 37% of the nation's arable land, generate around 55% of agricultural production, while rainfed agriculture, which occupies 63% of arable land, accounts for only 45%. In contrast to those in irrigated areas, yields are not only poor but also extremely unstable, and technological transfer gaps are significantly wider. Information-based technologies will require more focus if we are to successfully address these concerns. The transmission of this information to farmers will require strengthened methods. The themes of resource management optimization by producers, sustainability, coping with diversity by tailoring technology more specifically to agroecological or social circumstances, and improving the economic efficiency of agriculture will require more attention than ever before from both technology generation and transfer. More communication between researchers, extension agents, and farmers will be required in order to increase the effectiveness of knowledge transfer.

A paradigm shift is necessary for the public extension system to move away from top-down, generalised distribution of technological packages and toward equipping producers with the knowledge and understanding they need to address the problems unique to their geographic regions. The most important aspect of agricultural extension is continuous two-way communication between farmers and agricultural experts.

The Extension Systems of State Departments of Agriculture, State Agricultural Universities (SAUs), KVKs, NGOs, and Private Extension Services are now addressing the concerns through a variety of extension approaches to the transmission of technology. The public and private extension systems continue to struggle with a constraint in the Transfer of Technology (TOT) concept. With the advent of the telephone and the Internet, it is now possible to close this gap to a significant degree by combining the right technology.

The Kisan Call Centers were established by the Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India, with the goal of utilizing the developed telecom infrastructure in the nation to provide extension services to the farming community. These call centers' main function is to continuously and immediately address issues brought up by farmers in their native tongue.

Operational strategy

Information & Communication Technology (ICT) and Agricultural Technology, two formerly distinct fields of technology, have been combined to create the Kisan Call Center. Both have distinct professional fields and work cultures. It was suggested to fully leverage the professionally managed Call Centre mechanism and integrate it with the specialised Subject Matter Specialists' knowledge of Agricultural Scientists and Extension Officers, to facilitate its reach to the farming community, in order to maximise the strengths of both of these systems.

As a result, it is suggested that Subject Matter Experts in agriculture, horticulture, animal husbandry, marketing, and other related fields make use of the existing specialised infrastructure of call centres (which is typically industry-driven and serves high-end and frequently mission-critical service sectors) and make this communication backbone available to them. The Kisan Call Center has three levels: Level-I (the basic Call Center interface), Level-II (Subject Matter Specialists on concerned important crops and enterprises), and Level-III (the Management Group to ensure ultimate answering and resolution of all the farmer's queries that are not resolved at Level-II, coordinated by the Management Group).

Level -I

At first, the call is answered by a call center operator (level I functionary), who after a brief greeting records the caller's contact information and question. The operator personally enters these specifics into a computer that is placed close by. The inquiry posed by the farmer would likewise be entered into the computer by the call's first-level recipient. Preferably, first-level operators should be agricultural graduates from rural areas who speak the local language. Additionally, they should be proficient communicators. They would be in a position to respond to the majority of the farmers' questions.

Level-II

At this level Subject Matter Specialists (SMS) working at research stations, ATICs, KVKs, and agricultural colleges help compensate for level II of the workforce. If the first-level operator is unable to respond to the query, the operator transfers the call to the relevant Subject Matter Specialist (in call-sharing mode). Along with the call, the Level-II functionary's computer receives data about the caller, including the question posed. In order to avoid duplication, the specialist's computer also displays the information and questions asked when he answers the forwarded call. The assumption is that all overflow questions from the first level will typically be answered at this level. There is a system in place to get back to the caller via mail, fax, email, or phone within 72 hours if it is not possible to answer. Prior to choosing the experts, it is crucial to determine the state's main crops and the difficulties that will likely be raised during the interview process. The majority of the questions that are expected to be posed should be addressed by these specialists. For the selection of specialists, there may be two possibilities.

One choice may be to choose a commodity-wise specialist, in which case all inquiries regarding a specific crop or commodity would be forwarded to that specialist, who would then respond to the inquiry. A different choice may be to choose generic experts who could handle a range of issues that might come up. Ideally, the specialists should be found in a city. They ought to be proficient in their native tongue and have strong communication skills. These experts must have a minimum of 10 to 15 years of practical experience in their fields of expertise.

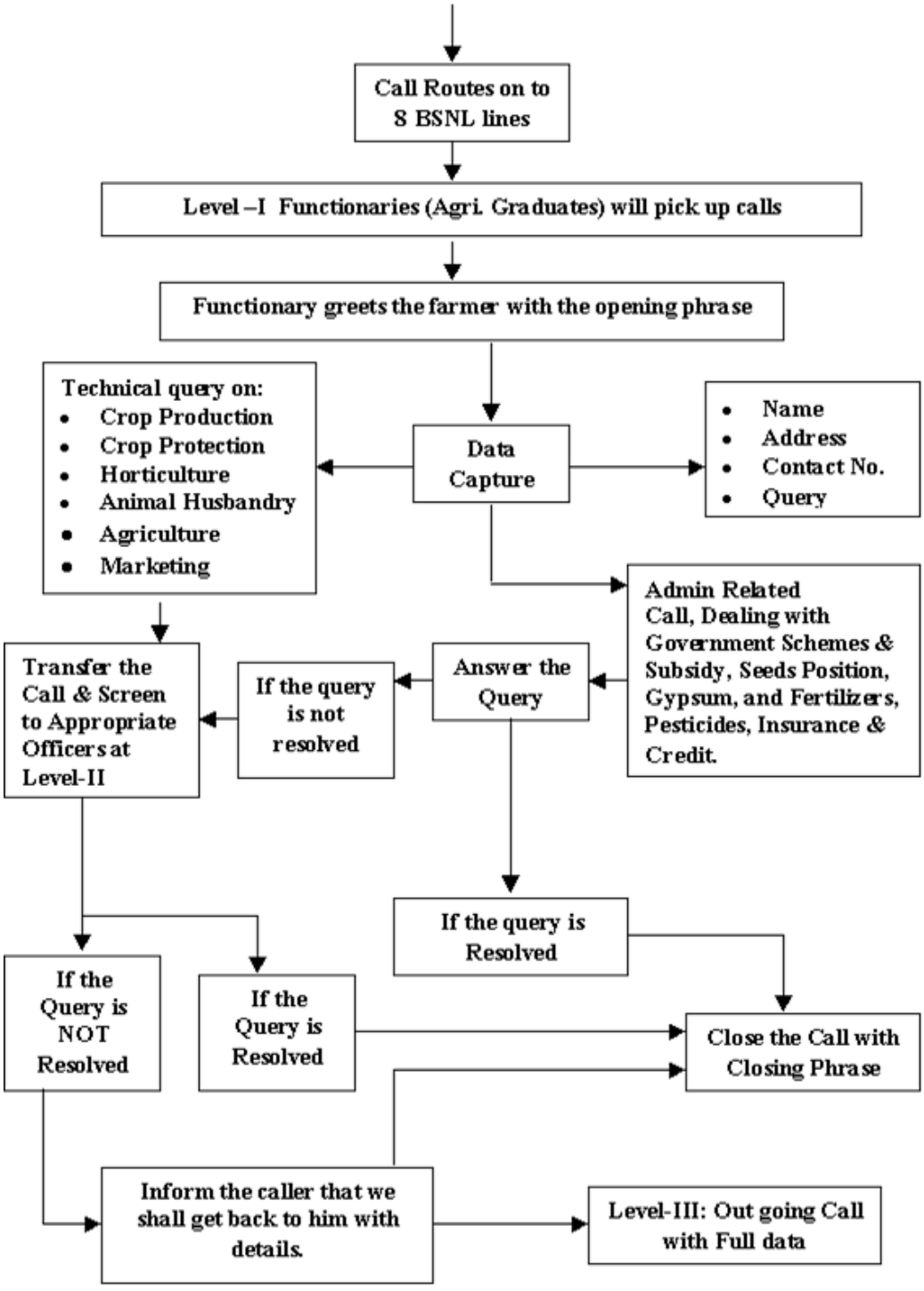
Level- III

A designated cell at the Nodal Office makes up Level III. This would be the place where the first and second level unanswered questions would go. The nodal cell would then formulate appropriate answers to these queries after consulting with the relevant experts who were available inside or outside the State. Within 72 hours after receiving the query, the answers will be swiftly given to the farmers via mail, email, fax, telephone, etc.

Schematic Representation

Farmer Dials Helpline Number

1551 or 1800-180-1551



Infrastructure for the Kisan Call Center is located in three places, including

- A professionally managed Call Center (Level-I)
- A Response Center in each organization, where services of Subject Matter Specialists are made available (Level-II)
- The Nodal Cell (Level-III)

The most crucial and intricate technical infrastructure is found at Level-I. The farmer's call reaches a switch at BSNL and is routed (on a first come, first serve basis) to one of the 8 hunting lines at the Call Center premises. Two recent graduates in agriculture will be the ones taking these calls and recording the information.

The hunting lines will have a connection to the local area network (LAN) at a call center's location to make this possible. The Kisan Call Center will include two LAN nodes with two computers, two telephones with headphones and teleconferencing capability, server support, and Internet connectivity. The Call Center will make the complete backup support system, including the Uninterrupted Power Supply (for the server and the nodes), Air-conditioning System, and other logistics, available. The Nodal Officer must ensure that two recent graduates in agriculture are hired to work as Level-I functionaries and Agri-communicators at the designated Call Center. Call Center Management will own and operate the whole Level-I technical infrastructure (including a dedicated line with a toll-free number designated by the Ministry of Agriculture, Government of India).

Infrastructure at the Level II:

A Response Center that will serve Level-II officials is envisaged to be located in each institution's or agency's operational area. A dedicated high-bandwidth telephone line (ideally a 128 kbps ISDN line), a desktop computer system with Internet access, one printer, a 2 KVA UPS system, and suitable logistic support in the form of a private room with air conditioning make up the basic infrastructure at Level II. The Nodal Agency will coordinate this at the designated resource institutions.

Infrastructure at Level III:

The designated Nodal institutions will be in charge of managing the Level-III operations. A dedicated high bandwidth telephone line (ideally a 128 kbps ISDN line), a desktop computer system with Internet access, one printer, a 2 KVA UPS system, and the necessary logistical support will all be part of the Level III basic infrastructure. A Senior Officer from the Nodal Institution should staff the Level-III. The infrastructure will also include the necessary software for call data analysis and reporting mechanisms, including daily, weekly, and monthly reporting systems with support for crop/enterprise-, region-, and issue-specific reports. For this system to consistently enable effective Level-III logging, analysis, documentation, and reporting, it needs the assistance of an ICT Facilitator of the Nodal Institution. The Nodal Institution will host this on their property.

Warana Wired Village Project:

A key focus of the "Wired Villages" initiative is the cluster of 70 villages known as Warana Nagar in Maharashtra. In order to achieve socioeconomic progress, a visionary like Tahasaheb Kore promoted the concept of co-operatives in Warana Nagar in 1960. He demonstrated how doing so could unite all of the farmers, encourage information sharing, and

boost output and profitability. The "Warna Nagar Co-Operative Society" was founded as a result. The society has a chairman and a board of members, is unaffected by politics, and the members are free to choose who serves on the board. Under this primary society, there are roughly eight sub-cooperative organisations, including the Warna Women's Cooperative Society, Warna Co-operative Bank, and Warna Foods. The main crop in this region is sugarcane, and this Society processes the majority of the sugar produced in the two districts of Kolhapur and Sangli. 200 to 300 farmers from each village are registered as society members.

Mr. Vinay Kore, the son of Mr. Tahasaheb Kore and the current Chairman of the Warna Co-operative Society, started the "Wired Village" project two years ago, and practical execution got under way in April 1998. The Warana Co-operative Society, the Government of Maharashtra, and the Government of India have all worked together to develop the project, with a 50:40:10 financial assistance split among them. The Warna Co-operative Society is responsible for paying the labour and maintenance costs. The project area is a collection of 70 villages, 46 of which are in the Kolhapur district of Maharashtra and 24 of which are in the Sangli district.

This project was started to meet the information needs of farmers, all the way down to their village level, about various crop cultivation practises of major crops, sugarcane cultivation practises, pest and disease control, marketing information, dairy and sugarcane processing information, etc. The hardware and software configuration was handled by NIC, Pune, and the interconnection of WAN links such VSAT and dial-up connections was handled by NIC, Delhi.

The NIC, Pune, has created the system's necessary software, like as web page design, database design, and client-based apps utilised by farmers, like dairy and sugarcane information systems.

Network Connectivity:

Central Hub

The Tahasaheb Kore Institute of Engineering Technology in Warna Nagar is home to the Central Hub, the primary server facility for "Wired Villages." This is outfitted with Pentium II servers that have 64 MB of RAM, 4.1 GB of storage, and a 32x CD-ROM drive. In order to connect to NIC, Pune's network and the wider world network, a gateway WAN link with a 64 kbps capacity VSAT connection has been constructed. This makes it possible for the primary computer centre to get the most recent information from NIC, Pune, or the world network. The router is used to create a WAN connection from the main computer centre to distant computer booths. Currently, the router can accommodate 10 simultaneous connections, meaning 10 people can access data simultaneously.

Computer Booths

For the farmers in their villages, the computer booths act as information hubs. The booth operator, who controls the computer booth, serves as the primary conduit between the farmers and the information gateway centre. The information needed relates to crop production methods, land development, pesticides, details on the control of illnesses, details on marketing, payment of bills for sugarcane and dairy products, etc. In Kolhapur, 46 computer booths are currently operational and providing the farmers with the information they require. Computer booths and related gear have been installed in the remaining 24 villages of the Sangli district and are awaiting connection to the central server station.

Two client-based applications are available in addition to information retrieval to meet the demands of farmers. These are (1) Dairy Information System (2) Sugarcane Information System.

(1) Dairy Information System: This database contains details on every farmer who works in the dairy industry. The amount of milk supplied by each farmer, the fat content, billing information, credit information, and other information are also made available to dairy cooperative members. Daily maintenance and updates are made to this data in the central database.

(2) Sugarcane Information System: To give standards for sugar cane crops to 200–350 shareholders in each community, the Sugarcane Information System maintains information on shareholders. This system preserves information about each shareholder's cultivation schedule, quantity harvested and delivered to the society, deductions made by the Society for credit, and net income owed to the farmers.

Every hamlet has a connection to the Directorate of Marketing in Pune, which helps farmers learn about the prices of their goods, including fruits, vegetables, and other agricultural products.

A Pentium II computer with 64 MB of RAM, a 2 GB hard drive, a printer, and a UPS power backup system are included with the computer booths. The main computer centre has been connected via dial-up connectivity using a modem and telephone line to receive information and submit requests and complaints to the central server station. Dial-up connections typically take 10 seconds to connect and range in speed from 19200 BPS to 28000 BPS. The village-level society covers the about Rs. 350/- telephone fee.

The Information Villages Project:

This project is being carried out by the MS Swaminathan Research Foundation in collaboration with the International Development Research Centre (IDRC), aimed at bringing the benefits of modern information and communication technologies to rural families in Pondicherry.

Objectives

The prime objective of this project is to assess the impact of ICT in the promotion of sustainable agriculture and rural development and document their role in supporting the process of knowledge empowerment of rural families. Whereas specific objectives of the project are

1. To set up six Village Information Shops that enable rural families to access modern information and communication technologies
2. In rural areas to teach educated youth, especially women, how to run information shops
3. To instruct young people in rural areas in the setup and upkeep of a system that produces locally relevant information from generic information.
4. To maintain, update and disseminate information on entitlements to rural families using a blend of modern and existing channels of communication
5. Evaluating the effects of information stores and ICT using surveys, participatory rural appraisal, and other techniques and
6. To build models of information dissemination and exchange in rural areas that use advanced information and communication technologies.

The Project is located in the Pondicherry region in South India. A Value Addition Centre (VAC) has been established at Villianur and is functional since February 1998. It acts as the hub of the communication network in the project. Four Village Information Shops have been set up at Kizhur, Mangalam and Embalam, and Veerampatinam. An office in Villianur serves as a Value Addition Centre. Villianur is a market center for many hamlets that surround it and is also an administrative node and a road junction. Villianur has been selected based on the access of rural families to infrastructure and markets. Project staff at VAC scans the WWW for useful contacts and technology. Data gathering and value addition to data are carried out here and information is transformed to suit local queries or needs. This is also an exchange point for a variety of locale-specific information on health, transport, public events, subsidies, prices, etc. Information on developmental programs (entitlements, credit, inputs, etc.) and markets is maintained here.

The Centre has two PCs, a scanner and a printer; a telephone line for long-distance calling facility. This telephone has dial-up access to the Internet provided by VSNL. A LAN based on VHF radio has been established with the Villianur office serving as a hub handling voice and data. The strategy is to create a wireless network (VHF) in the local area, which connects to a fixed telephone line through which access to the Internet is available. From here emails can be sent online while e-mails to other villages can be received at Villianur and forwarded.

There is a reading room with a small collection of books and documents in Tamil on various aspects of agricultural production. A collection of government notifications is also maintained in the center.

Several locally relevant databases in Tamil have been created to meet the felt needs of the rural families on Families below the poverty line, Public welfare schemes, or entitlements to the rural population.

Indian Space Research Organization's Project:

One-way video and two-way audio teleconferencing interactive networks have been used for education and training by Indian Space Research Organization. The major application of the network in rural development was for training extension staff from various departments of the state governments. In addition, a large number of women, Panchayati Raj elected officials, primary school teachers, and child development workers spread over large distances have been trained.

Satellite Krushi Gosthi:

Like all other State Agricultural Universities, Gujarat Agricultural University also performs triple functions of teaching, research, and extension education. The research generates technologies, which can be utilized by farmers and rural people. The present system of the transfer of technology from Gujarat Agricultural University (GAU) to extension functionaries of the development of the State and in turn to the ultimate users consumes considerable time. Looking at this reality the GAU has prepared a major plan under the name of "GAU Satellite Krushi Gosthi" to apply modern tools like satellite linkage for the agriculture sector. The GAU is the first in all SAUs, where such kind of facility has been installed. The GAU satellite Krushi Gosthi for transfer of technology can reduce the time lag to a considerable extent the system helps for large area coverage as well as noticeably reduces the distortion in message transfer.

Such a facility provides a facility for two-way conversation. It helps farmers to get on-the-spot solutions to their questions and queries regarding the live programs while watching it at the classroom end. This facility makes it possible to keep live contact between the scientists of the university and the farmers of the state.

Features of the System:

A satellite-based distance interactive education system normally consists of three elements, first TV studio from where scientists deliver the talk through the live program, second several remote classrooms or Direct Reception Centres (DRSs), with the facility of the TV set and STD telephone, from where farmers can watch the live program on TV sets and third satellite linkage to transmit live program given by scientists from the TV studio to farmers at DRSs.

The Gujarat SATCOM Network has full capability for one-way video and two-way audio. RESCO has established the SATCOM Network consisting of a TV studio in the capital city of Gujarat. The video and audio from the TV studio are digitally transmitted to the classroom ends (DRSs). The return audio at the classroom (DRSs) is available through STD lines. This facility is used to keep live contact with the scientists of the university delivering a talk from the studio with those farmers who are watching the live program at the classroom ends. At present more than a hundred Direct Reception Stations (DRSs) to receive transmission are already established throughout the state with the collaboration of different departments of Government and NGOs. GAUSATKRU has a vital linkage with them. This system helps farmers to receive information regarding inputs as well as markets. This latest satellite-based communication facility is also useful to the students of the university to interact with dignitaries or experts in the agriculture field. To reduce time lag to a considerable extent, such type facility can be also installed in other State Agricultural Universities. Such a facility needs to be strengthened at the village level with the collaboration of NGOs, schools, co-operatives, and Government organizations.

Government of Andhra Pradesh's effort:

The Government of Andhra Pradesh is making significant efforts to increase the effectiveness of its administrative offices, and satellite-based information and communication technology are a key component of those efforts. The state of Andhra Pradesh (AP) is the first in India to create a statewide computerization initiative that will be employed in rural areas, at the administrative level above the village-level panchayat. In the state, there are 1124 mandals. The first software application is the issuance of certificates pertaining to land holdings, caste, nativity, and income across a common counter, without the current delay of 15 to 20 days. The AP State Wide Area Network (APSWAN), aims to link the state government's Secretariat with 23 District Headquarters, serving as the backbone for "multi-services" (voice, video, and data) that would be used for improved coordination between state headquarters and district offices in managing various regulatory, developmental, and hazard mitigation programs of the state government. Mandals will be served by this two-way communication, and electronic commerce applications will be developed. The AP Value Added Network Services project hopes to deliver a variety of public services through a large network of information kiosks. The Computer-aided

Administration of Registration Department (CARD), a project of A.P. aims to introduce a transparent system of property valuation, which is easily accessible to citizens.

MANAGE's efforts:

The National Institute of Agricultural Extension Management, MANAGE, Hyderabad, has taken up several "Cyber Extension" initiatives, across the country. District-level Web Sites are being hosted, Information Kiosks are being established at block/ Mandal and village levels, and technical and other need-based information is being collected, digitized, and hosted on the Internet.

Conclusion:

The role of Information Technology to develop agriculture and quality of life in a rural area is well established. IT can help an average Indian farmer to get relevant information regarding agro-inputs, crop production technologies, agro-processing, market support, agro-finance, and management of farm agri-business. Agriculturists and government representatives working for agricultural improvement should be able to use information and communications technology (ICT) effectively to handle new scenarios that may arise due to the full or partial deregulation of the agricultural market, the waning of government protections, the opening of the market for agriproducts, changes in the agricultural environment, and the use of export opportunities. The quality of rural life may be improved by better decision-making made possible by high-quality information. Making rural areas technologically efficient helps reduce the disparity or inequality between urban and rural life. Fast ICT development ensures the growth and adoption of digital services in agriculture. It is important to develop a national strategy for the use of ICT in agriculture. National coordinating organizations that play a consultative role might act as a catalyst for the strategy creation process. ICT cannot be successfully implemented in agriculture and rural areas by a single entity. As a result, industries like fertilizer and food, which have a significant impact on agriculture, should collaborate to initiate and encourage the use of ICT in agriculture.

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e-EXTENSION

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Introduction:

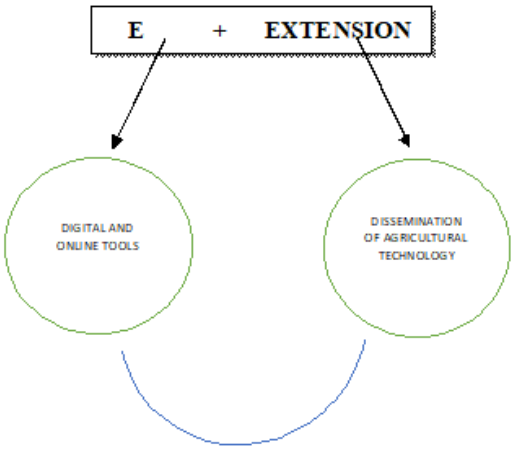
e-Extension and cyber-Extension are synonyms. The term "extension over cyber space"is used to describe it.

In the context of agriculture, "e-Extension" typically refers to the use of digital and online tools and platforms to provide extension services to farmers and other stakeholders in the agriculture sector. Extension services refer to the transfer of knowledge, skills, and information from agricultural experts to farmers and other stakeholders. E-Extension involves the use of digital technologies such as websites, mobile apps, online forums, and social media platforms to provide this information and support. The goal of E-Extension is to improve access to agricultural information and services, particularly in rural areas where traditional extension services may not be easily accessible.

e-Extension can also provide farmers with real-time information on market prices, weather conditions, and best practices in agriculture, helping them to make more informed decisions and improve their livelihoods. However, in the context of agriculture, the term "cyber extension" refers to the process of "disseminating agricultural technology through the use of computer communications, online networks, and digital interactive multi-media." To expand information availability to the farmers, extension officers, and researchers, it facilitates significant use of ICT, regional and multinational information networks, web, knowledge - based systems, multi-media learning systems, and machine training systems.

Concept of e-Extension or cyber extension:

Cyberspace is the imagined realm in which computers are interconnected globally via networks. These computers can retrieve data stored in audio, video, animation, text, and graphic formats. Networking software packages offer the ability to interact with the data from connected servers.



What makes it important?

About the Agricultural Community's Information Requirements

1. One of the main problems the farming industry is currently dealing with is maintaining the standard of their produce.
2. The farmer's search for adequate technology solutions is a further problem, but both the research system and the extension machinery are addressing it.
3. Controlling the technology One of the key concerns facing the farming sector is technology management.
4. Making the best use of inputs. Notwithstanding the fact that farmers are employing inputs, one crucial question is whether they are doing so in the intended, appropriate, or suggested ways.
5. Looking into your possibilities. since a farmer has several possibilities. Because he traditionally grows a variety of crops, the research system is offering new techniques to them. He must consider all of his possibilities, including mixed farming, agricultural diversification, animal husbandry, fisheries, and any other diversification strategies he can think of. He is currently torn between using conventional ways and new methods.
6. Finding suitable input sources. So, in the context of agriculture and related sciences, this is one of the major issues. We can claim so because there are currently significantly fewer service suppliers. Another crucial challenge is how to guarantee the provision of timely and high-quality inputs.
7. Joint action with other farmers. The main issue facing Indian farmers is. Just about 80% of areunimportant and unprofitable. For around 80% of farming groups in India, the marketable surplus for marketing purposes is very low in such circumstances. In light of these facts, if they are**.**
8. It is getting increasingly difficult for people to sell their goods and make money if they are not distributing the produce, uniting them into multiple organizations, or using group tactics. The receivers have a large number of needs, but the farmers are unable to provide them because of a gap, so it is important to identify and satisfy both consumer and marketing wants.
9. Farmers also need information about diversifying their sources of revenue. Also, governments nowplace a strong emphasis on tripling farmers' incomes. Agriculture needs to be more diverse if we are to consider income generation.

10. Seeing how altering policies will affect things. Because of this, the government is releasing a number of policy changes along with information on how farmers might profit from them. Before, a farmer was not permitted to exchange his goods,, but thanks to an amendment made to the Companies Act in 2005, a farmer is now permitted to engage in trading in order to increase his earnings. How is the farmer finding out about these things in such circumstances? Hence, the government offers a variety of platforms, such as Producers Net's seed resource, the AGMARKNET, and maybe the e-NAM mediated platform. The farmers have access to numeroussuch choices. Yet, one of the crucial details is how to provide these items to the farmers.
11. Producers still required data about diversifying their revenue streams. Furthermore, administrations currently place a strong emphasis upon tripling producers' incomes. Farm needs to bemore diverse in order to revenue generating.
12. The wise use of agricultural financing. There was a time when finding agricultural financing was abig problem. But, the funding is now accessible. Financial institutions are stepping up to offer agricultural financing, but the challenge is figuring out how to use it effectively.
13. The coordinated effort. Until the farmers band together. It is incredibly challenging to increasetheir profits.
14. Developing coping mechanisms pertaining towards the extreme weather events, which no one can stop. Nonetheless, the researchers' extension methods and the farmers collectively can develop specific tactics; how they can adapt to the changing environment.

Need or benefits of e-Extension

- To quicken agricultural expansion. If you consider how agriculture has developed. Almost 30 crore people lived there, and 50 million tons of agricultural products were produced whilein early days of autonomy. Yet, with time, these 50 million tons have grown over 280 million tonnes. That indicates that there has been an almost 6.5 to 7-fold increase there. Hence, that would not be achievable without the use of technology and numerous concerns in between. So, the question of how to improve this growth right now is one in which e-Extension will play a part.
- Make it easier to access information of information, the majority of farmers are still reliant on them. While examining the established sources But,there is another component that relies on global sources of knowledge. How do we now increase these numbers? That is the goal prior to e-Extension, and it is for this reason that e-Extension interventions are required.
- To better connect research, extension, and client systems. These three systems already exist, but it's unclear whether they are connected in an organic way, thus the e-Extension method will aid them in forging these connections. Just as a simple illustration, let's say you communicate electronically using social media. You use WhatsApp groups as an example. if the farmer participates in a certain WhatsApp group. Therefore, he is always connected to scientists, extension service providers, and He is capable of being multiple things at once. connected to input suppliers, allowing for the establishment of organic partnerships in this way.
- Create effective feedback mechanisms. The scientists were having a lot of trouble using the conventional method of getting feedback because they were required to go to the field. But,

today's portals, websites, and mobile-based extension services are assisting them in obtaining effective feedback from the farmers.

- The extension delivery that is economical. Hence, with e-mediation. Because the mobility support that had to be given to the extension professionals was the main issue with the extension system. So, we can lessen that mobility help with e-mediation. This indicates that by supplying the extension mechanism, we are saving a significant amount of money. Moreover, one extension agent can assist numerous farmers at once

To help knowledge managers develop by providing them with e-Extension tools and strategies. In the near future, knowledge managers will be the effective e-Extension workers, helping to close the gap between extension agents and farmers.

- To guarantee gender balance in the technology transfer process, since the means for extension are gendered. Thus, because it requires a great deal of travel and engagement with farming communities and farmers. As a result, the man is still in charge. ICTs because they are age and gender neutral. So, by implementing ICT or e-Extension procedures, we can also close the gender gap.
- To support marginal and small farmers. By giving the right knowledge when it's needed, empowerment is achieved, information that is appropriate and timely empowering marginal and small farmers, these two essential inputs are crucial, and e-Extension is how we can reach our goals.
- To provide the farm stakeholders with services that go beyond technology transfer, instead of just giving them production-related technologies. By giving them processing, marketing, and other alternatives, as well as the requirement for e- Extension

Needs of cyber extension:

In order to:

- Accelerate the expansion of agriculture;
- Increase knowledge resources;
- Facilitate Better Information Access;
- Add Enough Technical Manpower;
- For Stronger Research-Extension-Client System Linkage;
- Develop Effective Feedback Mechanism
- empowering small and marginal farmers,
- ensuring gender equity in the technology transfer process,
- ensuring cost-effective extension delivery,
- developing knowledge managers,
- serving farms beyond the technology transfer function, and going beyond.

Components/ tools of e- extension:

- E-Mail
- World wide web
- Telnet
- Interactive Expert Systems
- Video Conferencing

- looking up extension-related information online
- File Transfer Protocol FTP etc

Figure 1: Components used in ICT programmes in India

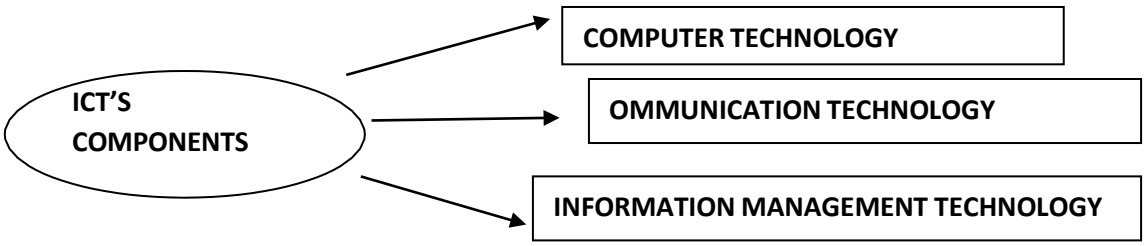
Information Communication Technology

Information and communications technology (ICT) is often used as a next ended synonym for information technology (IT).

The integration of telephone, audiovisual, and computer networks through a variety of linking systems is commonly referred to as information and communication technology (ICT). ICT refers to any device that can retain, access, alter, deliver, or acquire digitally stored data.

Concept:

There are three primary areas that make up information and communication technology (ICT). Computing, communication, and information management technology are the three. Applications among these systems include maintaining, interpreting, and transmitting facts, data, and knowledge.



ICT comprises of information technology (IT) and communication technology (CT). It is the study and use of electronic equipment's and their interconnected system for storing, retrieving, manipulating and evaluating data and information.

Communication technology is a combination of +analogue media like transparency, slides, tapes, radio, Television and digital media like computer and interest-based services.

Meaning

Information and communication technologies, sometimes known as ICTs, are growing inimportance as a tool for societal advancement and are major economic drivers globally. ICTs are no longer only used to support high-end R&D; the emerging innovations have significantly improved lifestyles and productivity levels across all economic sectors.

Definitions

There is no one definition of ICT.

The topic of electronic communication is explicitly included in the term ICT, whichis a larger word for information technology (IT), according to Wikipedia (2008).

The analysis, planning, creation, execution, assistance, or supervision of computer-based information systems, notably software applications and computer hardware, is what is referred to as information technology (IT). IT deals with the safe conversion, storing, processing, transmission, and retrieval of information using Computer systems and technological devices.

The agricultural industry is preparing to employ modern information and communication technologies to their fullest potential. A number of significant steps have been taken at the level of the Government of India to offer For all groups involved in agriculture education, investigation, growth, and distribution, IT infrastructure and connection are required. In addition, the Ministry of Agriculture has made steps to generateagricultural content in partnership with the National Informatics Centre (NIC) in order to inform farmers about the selling of various agricultural commodities. The National Agricultural Innovations Project (NAIP) and the International Crop Research Institute for Semi-Arid Tropics (ICRISAT) have been enlisted to assist the National Agricultural Research System in the design, development, and implementation of Knowledge Management Systems (KMS) in Agriculture. This initiative is being supported by the IndianCouncil of Agricultural Research.

As a result, ICTs are becoming crucial instruments for the expansion of agriculture, and it is today required that all graduates in agriculture should have a functional understanding of telecommunications and computing, the internet, and the world wide web.

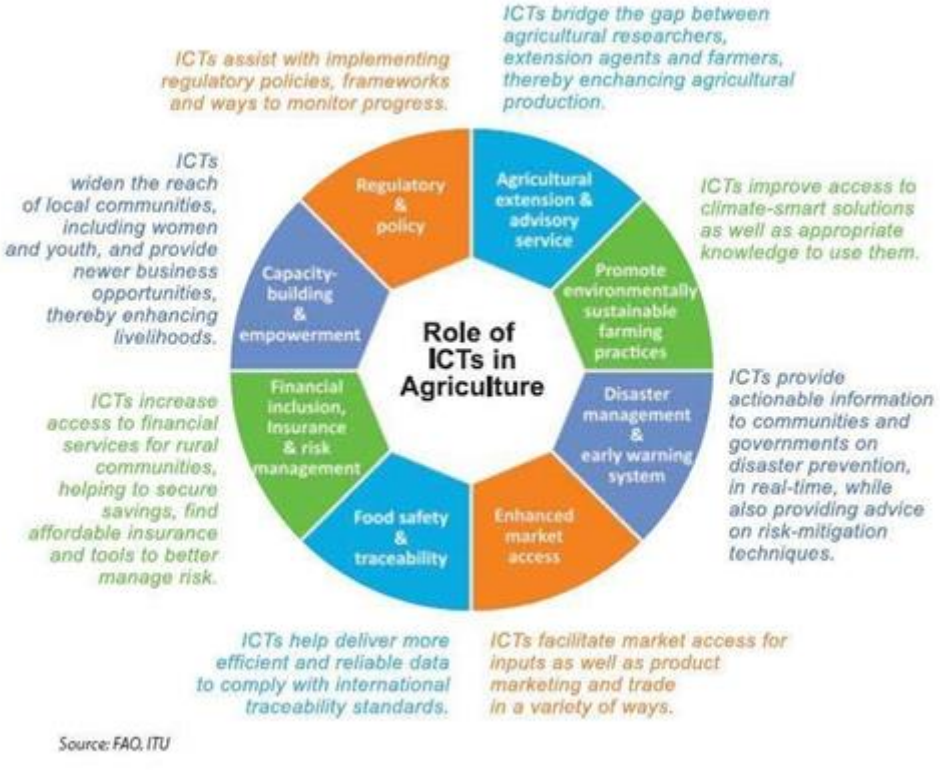
Unique Features of ICT

- The incredible repository of information is free to access,
- instantly available around the clock, 365 days a year, and allows for interactive communication.
- It is also accessible from anywhere in the world.
- The exchange of information is dynamic and expanding.

ICT uses for continuing education

- From general-purpose use to mission-critical applications, there are a variety of ICT tools or applications accessible to streamline the operation.
- The organization's daily activities can be made simpler by using general-purpose software.
- For general usage, the following selection of ICT equipment (software) offered.
- Word processing programmes, which are used to create text documents.
- Presentation software, which is utilized to create presentations.
- Spreadsheets - used to prepare tabular data with computations and for calculation.

- Databases, which are used to store information as records and retrieve it using query mechanisms.
- Multimedia -utilised to arrange information in a more comprehensible way using text, graphics, animation, music, and videos
- Web browsers and email - accustomed to using the Internet to send or receive mail and conduct informational searches



Information needs of farmers

- The primary goal agricultural ICT is to satisfy farmers' informational needs. The following are some essential requirements for farmers that appear essential for the expansion and improvement of agriculture.
- Daily price updates of agricultural goods in the neighbouring districts, together with market information. Farmers prioritise price notifications from markets outside of their communities so they can compare prices and decide where to sell their goods.
- Knowledge of the newest methods and technology Agricultural equipment and methods are upgraded as a result of ongoing technological improvement. Current knowledge of cutting-edge techniques in animal husbandry and agriculture is crucial for development.
- Detailed information on government efforts.
- Information about programmes and subsidies for rural development;
- For rural development of people to whom the programmes are directed. Localities that experience natural disasters frequently receive government grants and subsidies. For small and marginal farmers, knowledge about these initiatives is especially crucial.
- General news and information on a variety of farming activities in local communities.
- weather prediction updated data on factors including temperature, humidity, and rain

forecasts. newest (best) practise packages Farmers have a critical need for information on "best practises" in agriculture. Farmers may need information on drought-resistant cultivars of specific crops in order to survive prolonged droughts in some regions. general news about agriculture

- Provide costs and availability details about the agricultural inputs, etc.
- Forewarning Details on processing insurance claims Comprehensive information on crop insurance plans, the types of damages covered, the amount of compensation granted, premium payments due, etc. and treatment of diseases and pests In areas with persistent droughts, pests and diseases typically do not constitute a serious concern. However in other contexts, this knowledge is useful. Moreover, earlier notice in the regard to particular crops, such as sugarcane, is crucial.
- Knowledge on screening and sample of the soil is crucial for farmers since the quality and composition of the soil directly affects the productivity of crops. If farmers have easy access to this information, it equips them to generate their best yields given the available resources.
- Post-harvest technology. Post-harvest technology and storage education are just as important as pre-harvest education. Farmers are becoming more aware of how processing food adds value.

Word processing

Written reports, such resumes and reports, can be edited using word processing software.

- Developing, modifying, conserving, and publishing documents.
- Text within a document can be copied, pasted, moved, and deleted.
- Word styling, including character choice, bolding, underlining, or italicising.
- Making and altering tables.
- Adding components, like images or drawings, from other applications**.**

Spreadsheet

Microsoft excel is a powerful spreadsheet that is easy to use and allows you to store, manipulate, analyses and visualize data. It also supports data bases features for graphics and presentations. It is a suitable research technique that requires little training. It's not just what makes statistics interesting, but it also gives quantitative labour life.

Databases

Databases are collections of information, each entry detailing an object in a machine-readable format, such as a book, journal, article, or any other document or object. These can be found on a variety of storage devices, including CD-ROMs, video discs, computer hard drives, tape recorders, and floppy disks.

CD-ROMs

As the data in CD-ROMs has been condense or packed and is able to only read, they are unique laser-based digital storage devices. It is actually a blessing for impoverished nations like India where access to online facilities is highly limited because you may find the data that is included in it but can't add any new data.

Interactive computer video technology

One of the most widely utilised multimedia elements in ICVT, it connects the computer to audio-video responses in a manner that enables the learner to get personalised, genuinely interactive training. The ICVT can help solve the issue of pertinent farm information and raise the standard of extension agents.

Interactive video disc

One of the most well-liked media and technology is called a "IVD," and it consists of a visual disc player that can access the visual pictures kept on a two-channel sound disc. Texts, images, motion, and digitised audio constitute additional informational elements that support the audio just on video disc. The most important topic that will likely be discussed is the price of multimedia.Yet, as the customer base grows, the cost decreases proportionally.

Interactive Multimedia Compact Disc (IMCD)

One of the most adaptable audio-visual ways to interact is IMCD. When it comes to getting agricultural technology from scientific developments to farmers, it is incredibly effective, precise, swift, and considerably less expensive.

The formulation, storing, access, and transmission of computer information conveyed in multimodal, like text, speech, image, audio, and video, is known as communication networks.

Computer Assisted Instruction (CAI)

CAI is an organic result of using the principle of programmed learning. A vast quantity of organised knowledge can be stored on a computer and madeaccessible for tailored training to suit the needs of the specific learner. CAI may be set up to instruct as many as 40,000 students at once.

Advantages of ICT tools

- With the help of ICT, pictures may be employed to teach and help children' memory recall.
- Teachers can readily clarify specific routing and guarantee learners' understanding using ICT.
- ICT allows instructors to create engaging lessons and make learning more fun, which may increase student focus and attendance.

Limitations of ICT tools

- Configuring the gadgets might be very difficult.
- Too expensive to afford.
- Teachers have trouble using them because they lacking ICT tool knowledge

A Few Cyber Extension Experiments

- Information Village Centre 1998
- Gyandoot
- AGMARK NET-
- AGRISNET
- A-Aqua
- E-krishi
- E-sagu
- ITC–e choupal

- Kisan call centre
- Soochana se samadhan
- Tara haat
- Gyan sanchar
- KMA 2008

Conclusion:

The "Heart of Soul" of the Ministry of Agriculture's knowledge base is agricultural extension. That is the means via which the agriculture industry will change. The above-mentioned agricultural extension changes are meant to rehabilitate and energise the national agricultural extension system as well as to encourage efficiency in agricultural production and productivity. As a result, they help realise the vision for 2040.

The agriculture sector's declining growth will be stimulated and reversed if this reform is fully implemented with the backing of all stakeholders; but, this growth won't happen unless the budget allocation to the sector, which is currently at roughly 3.4 percentage points, is increased.

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PARTICIPATORY RURAL APPRAISAL

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Introduction:

The last few decades have witnessed shifts in the understanding of rural development from moving from top-down to bottom-up approaches, from centralised standardization to local diversity, and from blueprint to learning process. These moves have directed social appraisals away from extractive survey questionnaires and towards participatory appraisal and analysis in which the activities previously appropriated by outsiders are instead carried out by local rural or urban people themselves. In these changes, a part has been played by two closely related families of approaches and of methods, often referred to as Rapid Rural Appraisal (RRA) which spread in the 1980s, and its further evolution into Participatory Rural Appraisal (PRA) which had come about fast and began to spread in the 1990s. The term PRA was used early on in Kenya and India around 1988 and 1989. In India and Nepal from 1989 onwards there was an accelerated development and spread of PRA with many innovations and applications. Parallel developments took place in other countries around the world, with lateral sharing and an explosion in creativity and diversity (Chambers, 2004).

PRA has been known as an approach and method for learning about rural life and conditions from, with and by rural people. PRA as a term is also used to describe a variety of approaches. Thus also described as, a family of approaches and methods to enable rural people to share, enhance and analyse their knowledge of life and conditions, to plan and to act. A very rough review of commonly used participatory methodologies suggest that the shift from conventional surveys onto rapid rural appraisals (RRA) was based on the realization that RRAs were not very participatory, ("windshield survey"), and the accuracy of the information was low. This led to a shift towards participatory rural appraisals (PRA) with the aim of increasing the involvement of the respondents. PRA therefore made much emphasis on "handing over the stick" (as participants drew maps or transects) to symbolize the shift in the control over the process (Chambers, 1997).

Origin:

The philosophy approaches and methods known as rapid rural appraisal (RRA) began to emerge in the late 1970s. Workshops held at the IDS on rural development tourism (1977), indigenous technical knowledge (1978), and RRA itself (1978, 1979) were only some among the parallel moves in different parts of the world in search of better ways for outsiders to learn about rural life and conditions. In the mid 1980s, the words 'participation' and 'participatory' entered the RRA vocabulary. They already had a long history in rural development. For some years in the 1970s and early 1980s, under the leadership of Norman Uphoff and others, Cornell University published the Rural Development Participation Review until USAID terminated its support, and participation was a recurrent theme in the contributions to Michael Cerner's book, edited for the World Bank, Putting People First (1985) which drew on experiences from earlier years. It was at

the 1985 Khon Kaen International Conference that participation began, albeit modestly, to be used in connection with RRA. Discussions at the Conference generated a typology of seven types of RRA (KKU 1987: 17) of which 'participatory RRA' was one.

For this, the dominant purpose was seen as stimulating community awareness, with the outsider's role as catalyst. Later, in 1988, participatory RRAs were listed by the IIED team as one of four classes of RRA methodologies - the others being exploratory RRAs, topical RRAs, and monitoring RRAs (McCracken *et al.* 1988). In 1988, there were parallel developments in Kenya and India. In Kenya, the National Environment Secretariat, in association with Clark University, conducted an RRA in Mbusanyi, a community in Machakos District which led to the adoption in September of a Village Resource Management Plan. This was subsequently described as a Participatory Rural Appraisal, and the method outlined in two Handbooks (PID and NES 1989).

Around the same time in 1988, the Aga Khan Rural Support Programme (India) was interested in developing participatory RRA, and invited IIED to help. Jennifer McCracken carried out a four week consultancy with AKRSP in Gujarat in September and October 1988 during which participatory rapid rural appraisals were conducted by and with villagers and AKRSP staff in two villages (McCracken *et al.* 1988). In different ways, both the Kenya and Indian experiences were seminal for understanding and for the development of PRA. Subsequently, there was an explosion of innovation in India especially but not only in the NGO sector. The small group of the Sustainable Agriculture Programme at IIED, with support from the Ford Foundation and SIDA, was decisively influential through its activities in Africa and Asia, and spread PRA and its methods through 30 substantial field-based training workshops in 15 countries and through publications and papers.

Definition of PRA

Participatory rural appraisal (PRA) is the fieldworkers' use of participatory approach. PRA is defined and updated several times by Prof. Robert Chambers. PRA has been described as

- A family of approaches, methods and behaviour to enable poor people to express and analyse the realities of their lives and condition, and themselves to plan, monitor and evaluate their actions (Chambers, 1994).
- A growing family of approaches, methods, attitudes and behaviours to enable and empower people to share, analyse and enhance their knowledge of life and conditions, and to plan, act, monitor, evaluate and reflect (Chambers, 2004).

PRA is a flexible, low cost and time saving set of approaches and methods used to enable workers to collect and analyze information in terms of past, present and future situations to understand the rural societies and the condition that exists in rural areas which would provide a thorough and comprehensive idea regarding problems, potentials, resources and solutions to formulate realistic development practitioners to achieve the desired goals within specific time (Chambers,1992). The use of the PRA also brought forth the adaptability of PRA tools and their use in the research process (Szymanski, *et.al* 1997). Locally, participatory processes create the possibility for creating linkages between survival strategies, knowledge systems, knowledge network and sustainable livelihoods (Gupta, 1997).

Paradigm of PRA

The behavior, attitudes and roles of PRA differentiate it from traditional research and RRA. In case of traditional research data gathering is dominated by outsiders. They determine the objectives, collect and take possession of information, scrutinize it, compile and process it, and prepare papers and reports. Outsiders manage and own the information. Whereas, in PRA, outsiders encourage local people to dominate the process. The locals direct much of the objectives, gather, express and analyze information, and plan the output. Outsiders work only as facilitators, learners and consultants not taking much dominating roles in process. They help in establishing rapport, catalyze, maintain the flow, proper use of methods, and to encourage local people in choosing and improvising methods for themselves. Outsiders just watch, listen and learn. Metaphorically, and sometimes actually, they "hand over the stick" of authority. Local people prepare maps and models; they do transect walks and observe; they investigate and interview; they make diagram and analyze; they present information; they plan. As a result, they are having more control of the investigation, they own and retain majority of the information, and strongly identify their priorities for action, and then determine and control that action. When considering the participatory innovation, four significant features explain the uniqueness of PRA as compared to traditional participatory researches as follows;

a) PRA explores **local people's capabilities** to map, model, observe, quantify, estimate, compare, rank, score and diagram their local environment in their surroundings. They have better awareness of their situations than outsiders. The facilitators provide local people with the occasion and methods to think upon and rank their problems and opportunities the way they perceive them. The locals analyze and present their priorities - for improving their farming systems, for managing and efficiently utilizing their common property resources, for better living standards, for development actions in their communities and so on.

b) **Rapport** building is a key to facilitate the participation. A comfortable and good rapport between facilitator and local people and some measure of trust are minimum prerequisite conditions for effective PRA. If the prior attitude of facilitators is relaxed and right, the method of PRA itself fosters further rapport. Initial actions by facilitator can include being transparent and honest about who they are and what they are doing; and participation in local activities. Personal demeanor matters in creating first impression, showing humbleness, respect, patience and interest in what people have to say and show: slowly exploring surroundings and not being in hurry; attentively listening, watching and not making judgments. Then local people voluntarily lose themselves and significantly contribute in activities such as participatory mapping and modeling and matrix scoring. Thus by reinforcing rapport, we can sustain and strengthen the participatory process.

c) **Diagramming and visual sharing** are common elements in most of PRA. The visual sharing in form of a map, model, diagram, or units is used for ranking, scoring, counting or quantification. It helps all who are present to see, point to, discuss, manipulate and alter physical objects or representations. Triangulation can also be carried out with people crosschecking and correcting each other. This learning is progressive. The information thus obtained is visible, semi-permanent, and public, and is checked, verified, amended, added to, and owned, by the participants.

d) Some participatory methods were known and have been used from a long time while, some were introduced recently. Perhaps most striking is the power which has been revealed of **combinations and sequences**. To take an examples: - with participatory mapping, villagers draw not one, but several maps, which become successively more precise and accurate. The map is then used as a reference for other planning, and is kept with villagers for their own monitoring and evaluation. These sequences give advantages such as it increases the commitment of participants, making further action more likely, more spontaneous, and more sustainable. The sequences help in triangulation and reveal errors or omissions in earlier stages. Through it the different activities can interact cumulatively, each activity adds a dimension and details which qualify and enrich others. The all concerned learn is through the process, through local people sharing what they know, through observation and through analysis.

Principles of PRA

The principles of PRA have evolved over time. Interestingly, new principles are still keeps on being added to the list. An effective PRA require practitioners and facilitators to follow some basic principles. The principles of PRA have been induced rather than deduced *i.e.* they have been formed by trying out practices, finding what works and what does not, and then asking why. Chambers (1997) has listed the following principles.

Listening and Learning

PRA is based on the principle of listening and learning through participatory interactions and learning progressively. PRA signifies the knowledge, experience, history and culture, views and ideas and priorities and preferences of local people. Listening to local people helps in portraying their outlook, which otherwise would remain hidden and lose its relevancy. The greater the interaction with the greater is the learning achieved. The extent of interactions is influenced by the capacity of a listener more than a speaker. Such learning increases progressively. Proper learning is encouraged through appropriate mental and physical status of a learner. If a learner wishes to learn, then, he/she need to be mentally prepared to listen, learn and show gratitude towards those from whom they can learn.

Offsetting Biases

PRA aims at offsetting biases, which generally include a "hurried" appraisal by professionals for quick results. Professionals generally tend to appraise samples at times conveniently when the situation is favorable for them; consult would-be-beneficiaries who are generally more accessible and better off; and professionally prioritize those aspects which they think are more relevant. In order to offset such biases, PRA, encourages relaxed listening and learning, seeking participation from people who are relatively not that better off but requires the benefit most, visiting more remote locations and covering local communities. This process must try to have involvement-of those who would otherwise can't be reached, initially local people might have some initial hesitation, but later they will start enjoying it. It will discover new facts about the poorest people, women, disadvantaged groups in remote areas etc.

Utilization of precious Community Time

In context to learning from local people, PRA is based on the principle of utilizing precious community time in the best possible way. Local peoples are busy in pursing their livelihood activities and it is vital to keep note of their time and learn as much as time permits.

This also reveals that community members are requested to spare their time for interaction at their convenient time. Thus the learning should be focused to make proper utilization of their time.

Seeking Diversity

PRA consider diverse conditions and different actors for learning. It prefers more of difference rather than looking for representativeness of results or data collected. It looks for diverse events, different processes and forces, which help in understanding of issues from different perspectives. For any analysis, greater the diversity, betters is the understanding of "reality".

Triangulation /Cross checking

The principle of triangulation is improves trust worthiness of data. It will be done by changing the team composition, the sources of information and the techniques applied. It shows the importance of considering each activity or phenomenon from different viewpoints and using different techniques to study them. The process of crosschecking is an important principle of PRA for minimizing errors and doing mid-way corrections. Since there are different sources from which information can flow it is important to cross-check the reliability and validity of the data in PRA by putting it to different tests such as changing methods, locations, timing, groups, teams, etc.,

Optimal ignorance and appropriate imprecision

In order to efficiently utilize available resources such as money and time, the principle of optimal ignorance is kept in mind of PRA facilitators. It means knowing what is worth knowing and knowing enough to serve the purpose and not knowing the rest or not trying to find out more. It focuses on avoiding information that is not necessary. These principles of PRA help in making learning iterative, in facilitating participatory sessions, in making such processes interactive, innovative and informational and in making effective use of time.

Multi-disciplinary Team

The scientific team conducting PRA must have broader base, meaning thereby including scientists of all important disciplines related to the area of study. It is also important to have representation of female scientists in the team so that rural women could be effectively involved in the appraisal exercise. The team should discover among themselves one member who could work as Team Leader/Facilitator. Another member should be identified to work as Process Recorder or Content Recorder. While interacting with the villagers he/she should first form rapport and not directly jump to the objective of the study. The responsibility of rapport building may be assigned to one member of the team who could work as Environment Controller.

Tools and techniques of PRA

Spatial PRA Techniques

Social Map

Social mapping is the most popular method in PRA. It focuses on the depiction of habitation patterns and the nature of housing and social infrastructure: roads, drainage systems, schools, drinking-water facilities, etc. it is made by local people and not by experts and is not drawn to scale. It depicts what the local people believe to be relevant and important for them. Thus it reflects their perceptions of the social dimensions of their reality with a high degree of authenticity. The key feature of a social map is that it is a big help in developing a broad

understanding of the various facets of social reality, viz., social stratification, demographics, settlement patterns, social infrastructure, etc.

Steps:

- Fix the location and time for the exercise in consultation with the local people. Invite them for it.
- Explain the purpose of the exercise to the participants. Request them to start off with drawing the prominent physical features of their locality.
- Watch the process alertly. Listen to the discussions carefully. Take notes in as much detail as possible.
- Encourage greater involvement of participants.
- Keep track of who is actively involved, which sections of the society they belong to, and who is being left out.
- Denote the household wise details you are particularly interested in, like caste composition, school age children, etc. This will, of course, depend on the purpose of the exercise.
- Triangulate the information with others in the locality.

Resource map

While the social map is based on habitation, community facilities, roads, temples, etc., the resource map focuses on the natural resources in the locality and documents land, hills, rivers, fields, vegetation, etc. A resource map in PRA is not drawn to scale. It is done by the local people not experts as the local people have more knowledge of their surroundings where they have lived for a long time. It shows how people see their own locality in terms of natural resources.

Steps:

- Selection of a proper place to prepare a resource map of the area in by consulting with the local people. Fix a definite time and invite people from varied sections of the society. Make sure of the participation of the marginalized groups and women.
- Explain the participants what is the purpose of the exercise and ask them to show the major resources in the area preferably using locally available material in a creative way and to make the map as representative as possible.
- Do not interrupt or interfere. Let them do it on their own. Just in case they get stuck, do the needed to help them out.
- Carefully listen to the discussions they have, while preparing the map. Note down the relevant points.
- After the map is completed, ask participants to explain the map including the used various symbols, visuals and colours.
- Keeping the objectives of the process in mind, discuss the varied problems and opportunities in resource map.
- At the end, ask them if they would like to make any modifications or additions in the map.
- Observe keenly who is actively taking part and who is not. Try to increase the participation of the marginalized groups and women in the process.

Transect

Transect walk has been mostly used for natural resource management. It gives a cross-sectional representation of the different agro-ecological zones of the region. It then do their comparison against certain parameters including topography, land type, land usage, ownership, access, soil-type, soil fertility, vegetation, crops, problems, opportunities and solutions. Beside natural resources, it also considers various social features such as, the caste and ethnic determinants of a settlement access and control and gender-related dimensions in detail, depending upon the objectives of the process. It is generally made after a resource map and therefore helps in triangulation. Various kinds of transect are used like historical transect that focuses on geographical features while time transect is generally like a snapshot of the same transect at different points of time.

Steps:

- Identify a group of local people having some sort of knowledge of the area and are willing to walk with you for the exercise.
- Explain the purpose of transect to the participants and let them actively involved in the process of decision making related to the transect path you should take to effectively cover details of the locality.
- Discuss and conclude the parameters to consider for collection of data during the walk.
- After fixing a definite time, be on decided starting point at prefixed time and accompany local people on the already decided transect path. As per the situation on the field, do required modifications. Also carry along the list of parameters and preferably the resource map for the walk as it can be used as a reference during observation and discussions during the walk in the route.
- Observe the surroundings. Try to take detailed notes of everything using local terms as it is not advisable to rely on your memory too much.
- Clarify things by asking questions for the things you are not clear about to the local people accompanying you. Carefully listen them while they are answering the discussions amongst themselves. Motivate them to keep on explain as you move.
- At certain locations if necessary can stop and have detailed discussions on the emerging points.
- Utilize this opportunity to clarify if any issues emerged from the social map, resource map and other methods.
- Something which you may find new and interesting in the route can be collected and brought along like some leaves, grass, etc. It helps as a reference for further discussions and also in documentation.

Mobility Map

Mobility map explores the movement pattern of an individual, a group, or the community. It focuses on where people go and for what. It also denotes the aspects, like the frequency of visits, distance, and the reason of the visit. It shows the perception of involved people regarding movement patterns and its importance.

Steps:

- Select the person, group or community whose mobility pattern you are interested in understanding.
- Explain them the purpose of the exercise and discuss with them about the places they visit.
- Ask them to name the places of their visit and denote these places using symbols or visuals, specifically if the participants are not literate
- Draw a circle in the middle of a paper or ground to represent the village/locality and ask them to locate the pieces of paper with the names of the places they visit around the circle in such a way that they are properly represented.
- Ask them to link the cards representing the places visited with the circle depicting their locality by lines. The thickness of the lines could represent a particular feature, such as, the frequency of the visits.
- Ask them to repeat the procedure to denote for all other places that they visit, sequentially.
- Encourage them to represent other aspects in the form of visuals, symbols or in writing. Brainstorm to conclude aspects which could be represented including. - Purpose of visiting the places - Importance of the places visited - Distance of the places - Mode of transport - Frequency of visits - Whether alone or with someone
- Ask them to make necessary alterations if required once the diagram is ready.
- Request the participants to illustrate the map and their learning from it.
- Ask them to give an in depth explanation of the diagram. Clarify doubts by asking possible questions regarding diagram.
- Copy the diagram onto paper with all the details.
- Triangulate the diagram and other details generated during discussions with others in the locality.

Time Related PRA Methods

Time Line

Time line is a pivotal PRA method commonly used to understand the temporal dimension from a historical perspective. It captures the chronology of events as recalled by local people. It is denoted as a sequential aggregate of past events. It thus gives details about the historical landmarks of a community, individual or institution. The important point to note here is that it is not history as much the events of the past as perceived and recalled by the people themselves.

Steps:

- Find some elderly persons in the village who are willing to talk about the history of the village. Illustrate them the purpose of the exercise. And discuss with them the history of the village.
- Request one of the participants to note down the major events in brief on cards in bold letters. If the participants are unable to do so, ensure that one of the facilitators takes this role.

- Continue the discussion for collecting information about more such events that they would like to add. Once you feel that the list of events is more or less complete, ask them to keep the cards in a chronological order.
- Add years to the left side of the list of events. Sometimes failure of memory, use of different time frames and calendar systems may present a problem for the participants in arriving at the exact years. In such situation, you may have to use your own understanding to arrive at the years.
- Start a discussion on the time line to help the participants analyze and reflect on it. It can be done using some important questions like:- What was the situation in the past? - What were the major events? - What changes have taken place? - What were the reasons for change?
- Ask questions regarding the time line to clarify your doubts or to get a detailed understanding.
- Copy the details onto paper. Note down the names of participants, facilitators, location details, dates, legends, etc.
- Triangulate with other elderly persons in the village to see the accuracy of the information given in the time line. Secondary sources of information can also referred for triangulation.

Trend Analysis

Trend analysis is also a popular PRA method having focus on change. It documents trends related to certain variables over different spans of time. It is, thus, people's recall of the past and of how things have changed over time. Trend analysis also gives a good idea of the quantitative changes that occurred over time related to different aspects of village life, such as yields, population, livestock population, the number of trees, area under cultivation, rainfall, etc., it helps to find the increases and decreases in the variable under study over a period of time. It generally denotes broad movements in different aspects of the local peoples' lives rather than precise shifts. The discussion that follows a trend analysis may also look into the causes of changes and thus provide an understanding of the dynamics of change

Steps:

- Select a group of local people who are interested in the exercise. Let them know the purpose of the exercise and start a discussion on the present situation moving towards the aspects you are interested in pursuing. This sets the environment for trend analysis.
- Directs the discussion further to reach at the aspects of trend analysis. Inform them the objectives and make the group of participants for performing brainstorming and come out with a list of aspects related to the features they would like to study and then select the most significant ones.
- Need to facilitate the selection of time landmarks and encourage the participants to denote the selected landmark years on cards using symbols of visuals. Similarly various other aspects can be represented.
- Participants are then asked to make the matrix on the ground, using chalk and to represent from top to bottom the landmark years and from left to right various aspects.

- After the diagram is ready, ask participants if they are satisfied with it or need any modifications. Also ask if they would like to add new aspects in it.
- This is the time to enquire them about certain aspects in which you are interested but not already mentioned. Ask the participants to describe the diagram and discuss their findings and rethink on them
- Copy the diagram onto a sheet of paper with details of the legend, the scoring system, the participants and facilitators, and the location and date.
- Thank the participants for their time and active participation in the process. Triangulate the diagram and findings revealed during the discussion with those having knowledge about the topic.

Seasonal Diagram

Season diagram is also called seasonal calendar, seasonal activity, profile and seasonal analysis. Seasonal diagram is made across annual cycles, with months or seasons as the basic unit of analysis. It shows the perceptions of the local people with regards to seasonal variations. Seasonal diagram are not based on statistics but can utilize secondary or primary data to triangulate the information generated. The major benefit of seasonal analysis is that it denotes a range of items and their magnitude, which supports the understanding how these items are related to and influence one another.

Steps:

- Inform the participants about the objective of the method and initiate the discussion on the present month and then the work they performed during the season.
- Ask them to recognize a unique characteristic of each month that would remind them of the month. It can be anything like a symbol or drawing.
- Draw a grid with chalk on the floor. In the grid have a least 13 columns and a many rows as the items you want to study. Keep the cards with names of the months and visuals or symbols in the top boxes in order, horizontally.
- Now on the vertical axis, take the aspects whose seasonal variations you are interested in to represent the magnitude of the activity using different number of seeds or stick of different can be used to indicate the number of days. Similarly, sticks of different size can be used to indicate the quantity of rainfall during the month. After completing one aspect or activity move to another, until all of them are similarly covered.
- After the diagram is ready, ask participants if they are satisfied with it or need any modifications. Also ask if they would like to add new aspects in it or ask any questions if you have any doubts in diagram.
- Discuss with the participants about the major findings and learning, implication of the finding and recommendations and action points
- Please simultaneously note down the points arising out of discussion among the participants from the beginning of process.
- Copy the diagram on a piece of paper with legends and details of the participants, facilitator’s locality and date.
- Thank the participants for their valuable time and active participation.

- Later triangulate the findings with other sources to ensure that the information generated are correct.

Relation Related PRA Methods

Cause Effect Diagram (Problem Tree)

Cause effect diagram is also known as fishbone or Ishikawa diagram. It falls under the family of flow and linkage diagram method and focuses on the causal factors of a phenomenon, activity, or problem, and their effects. The cause effect diagram depicts visually the causes, effects and their interlinkage, which gives a detailed understanding of a particular topic, and provides scope for analysis and subsequent action by the local people.

Well-being ranking methods

Well-being ranking, also known as wealth ranking and well-being analysis is used for ranking and grouping household and communities on the basis of income, wealth, and other perceivable well-being criteria. It shows a materialistic focus on income and assets. Well-being is generally culture-specific and is therefore difficult to measure. Well-being ranking however gives a unique method to explore local people's thinking on well-being. Therefore well being ranking method has become popular. However, well-being ranking is subjective and not an absolute assessment of people's wealth or well-being.

Venn Diagram

Venn diagram is commonly used to study institutional relationship and thus sometimes also referred to as institutional diagram. It is however, popularly known as Chapati diagram as the method uses circles of various sizes to represent institutions or individuals. The larger the circle, the more important is the institution or individual considered. The distance between these circles represents the degree of influence or contact between institutions or individuals. Overlapping circles indicate strong interactions among institute

Other Methods

01. Team contracts: Team contracts are developed by the help of all the team members to ensure good group dynamics. It may include agreements to hold evening discussions and morning brainstorming sessions. In these contracts, one elected person may monitor team interactions to provide feedback.

02. The night halt: This method helps in building rapport between outsiders and villagers ias outsiders stay in the village. It s considered significant prior to PRA as it promotes change in outsiders' attitudes. The outsiders sleep and eat as villagers do and get chances of having informal discussions when people are less busy.

03. Work sharing: in this method, outsiders learn from local people to understand the skills and turmoil involved in carrying out basic activities on farm. This helps in bringing positive attitudinal changes and building rapport.

04. Rapid report writing, with self-correcting notes: Report are written including a brief summary of how diagrams were constructed and of the vital findings. Individuals can also keep a private diary or make a series of notes to mentionon things they would like to improve the next time.

05. Shared presentations: The vital findings should be shared to villagers and outsiders. This helps in cross-checking and feedback. Professionals present these findings and invite comment and criticism.

Potentials and challenges

(a) Beyond farming systems research (FSR)

We need to further develop and disseminate such participatory approaches and methods that can help farmers to analyze their own situation and make their own needs and priorities known to scientists.

(b) Participatory alternatives to questionnaire surveys

Despite of the repeated criticism of the high costs, errors and of large-scale questionnaire surveys, remain one of the most widespread method to collect information. The participatory methods now present better alternatives to it. PRA has more depth and realism of information. PRA methods also generate valid and reliable quantitative as well as qualitative data at the village level. PRA methods are thus more cost-effective and less time consuming than questionnaire surveys. Participatory methods have improved accuracy through cumulative presentation, crosschecking and analysis. Issues of PRA include the feasibility and cost of training fieldworkers in PRA methods as it require skills and experience to carry these.

(c) Empowerment and equity

PRA has been found to empower as through a PRA process people express and share what they already know and learn from others. Preferably the participant are selected including the poor and disadvantaged. Through PRA, we can identify the weaker and empowered and equity can be served. By using appropriate techniques the priorities and interest of underpowered can be identified and included in the policies. Differentiating by groups, interests and gender can empower the poorer and women in several ways. It can give them self confidence to argue their case.

(d) Local people as facilitators and trainers

A uniqueness of PRA is that it accepts the capabilities of rural people as they have done the analysis of their situation better than outsiders. Thus the development and spread of participatory approaches and methods by local people themselves can make them self sustain in identifying and solving their problems. The challenge is to understand that through such role reversals there arise new relative competences and roles, and that outsiders along with facilitators also becomes learners and trainees.

(e) Policy research and change

Policy insights have been gained through PRA as these methods were used to investigate the effects on agriculture of structural adjustment policies. Policy makers could now, through improved RRA and PRA approaches and methods, receive information and insights which were more up-to-date, reliable and credible, than those through official channels (Chambers, 1992).

(f) Personal behavior, attitudes and learning

PRA approaches and methods have paved the ways for officials, scientists and academics through which they have come face-to-face with local people in an informal mode which both sides have found beneficial. It provides opportunities to facilitate changes in outsiders' behavior and attitudes. The further scope here is to see how to scale up, how to enable many more policy

makers personally to gain direct learning experience in the field from and with rural people, enabling them to fit policy and action more to local conditions and priorities and to the needs of the poor.

Conclusion:

Participatory Rural Appraisal (PRA) approaches s cumulatively based on the behavior and attitudes of outsider facilitators and extent of participation of local people. The importance and popularity of PRA is influenced by the analytical abilities of local people when catalyzed by relaxed rapport towards faciliators, and expressed through sequences of participatory and especially visual methods. Principles of PRA help in guiding the execution of the methods in effective manner. The different tools and techniques available for following the Participatory Rural Appraisal are chosen as per the objectives and resources available. All methods have definite procedure to be followed with correctness. Promising potentials of PRA include farmers' own farming systems research, alternatives to questionnaire surveys, monitoring, evaluation and lateral spread by local people, empowerment of the poorer and weaker, and policy review. Thus PRA has proved its acceptance over the years, still there is much untapped dimensions of modifications for the new researchers to utilize the techniques with more effectiveness.

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UNCERTAINTY AND RISK IN AGRICULTURE

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Introduction:

Agriculture is a sector that is exposed to a wide range of risks and uncertainties, which can affect the profitability and sustainability of farming operations. These risks and uncertainties arise from a variety of sources, including weather conditions, pests and diseases, market volatility, input costs, government policies, and environmental factors. Risk and uncertainty are inherent in agriculture, and farmers face a constant challenge in managing these risks and uncertainties. The impact of these risks can be particularly severe for small-scale farmers, who may lack the resources and infrastructure to manage risk effectively. The risks and uncertainties faced by farmers can also have broader implications for food security, rural development, and environmental sustainability.

Effective risk management strategies can help farmers mitigate the impacts of these risks and uncertainties and ensure the long-term viability of their businesses. These strategies may include diversification, crop insurance, financial planning, improved technology, and knowledge sharing. Governments and other organizations can also play a role in supporting farmers by providing access to credit, knowledge and information, and infrastructure.

Managing risk and uncertainty in agriculture is an ongoing challenge that requires a combination of strategies and approaches. By working together to address these challenges, farmers, governments, and other stakeholders can help to ensure the sustainability and resilience of agricultural systems, while also contributing to food security, rural development, and environmental sustainability.

UNCERTAINTY: A situation in which a person does not know for sure what will happen.

Uncertainty in agriculture refers to the unpredictability of future events or outcomes related to farming operations. Uncertainty can arise from a variety of sources, including weather conditions, market volatility, input costs, government policies, and environmental factors.

Uncertainty can have a significant impact on the decision-making processes of farmers, making it difficult for them to plan for the future and make informed decisions. Uncertainty can also create risk, as farmers may be forced to make decisions based on incomplete or uncertain information.

For example, uncertainty about weather conditions can make it difficult for farmers to decide when to plant or harvest their crops. Uncertainty about market prices can make it difficult for farmers to decide which crops to grow and how much to produce. Uncertainty about input costs can make it difficult for farmers to decide how much to invest in their farms and what technologies to adopt.

Effective management of uncertainty in agriculture requires strategies that can help farmers to reduce their exposure to risk and make more informed decisions. This may include diversification of crops and markets, adoption of new technologies, use of climate-smart farming practices, and participation in government support programs.

Overall, uncertainty in agriculture is a constant challenge that requires ongoing attention and adaptation. By developing effective strategies for managing uncertainty, farmers can help to ensure the long-term viability and sustainability of their businesses

Types of uncertainty: In agriculture, there are several types of uncertainty that farmers and other stakeholders may face. Some of these include:

Uncertainty connected to pricing: Farmers' profitability may be impacted by the prices they will obtain for their crops or livestock. Trade policies, supply chain interruptions, and market demand are a few examples of the variables that might contribute to this unpredictability.

Weather-related uncertainty: A variety of weather factors, including temperature, wind, and rainfall, can significantly affect crop yields and quality. For farmers, weather pattern uncertainty and its impact on crops may be quite difficult.

Price-related uncertainty: Farmers' profitability may be impacted by the prices they will obtain for their crops or livestock. Trade policies, supply chain interruptions, and market demand are a few examples of the variables that might contribute to this unpredictability.

Input-related uncertainty: Farmers may also experience unpredictability in the pricing and availability of inputs like seeds, fertilizer, and pesticides, which can have an impact on their crop yields and profitability.

Regulatory uncertainty: Changes in government policies, regulations, and subsidies can have a significant impact on the agricultural sector. Uncertainty in these areas can make it difficult for farmers to plan and make long-term decisions.

Technological uncertainty: The development of new technologies such as precision agriculture, genetic engineering, and robotics can provide opportunities for farmers to improve their productivity and sustainability. However, uncertainty about the effectiveness and reliability of these technologies can make it challenging for farmers to decide whether to adopt them.

Environmental uncertainty: Climate change and other environmental factors such as soil quality and water availability can also pose uncertainty for farmers. These factors can impact crop yields and the long-term viability of agricultural practices.

Risk:

Risk in agriculture refers to the potential for loss or negative outcomes associated with farming operations. Risk can arise from a variety of sources, including weather conditions, pests and diseases, market volatility, input costs, government policies, and environmental factors.

The impact of risk on farming operations can be significant, as that may have an impact on profitability and sustainability of the business. For example, a farmer may experience a loss of crops due to weather conditions or pests, which can result in reduced income and financial strain. Market volatility can also affect the prices farmers receive for their crops, which can affect their profitability and ability to invest in their farms.

The risk exists universally, and different persons have different understanding about risk. Even today still we cannot find a unique concept. Regarding the word significance of the risk.

In the agricultural economic management, the risk refers to that farmers make a variety of judgments and probabilities which will happen in the future production dependent to their former's experiences and related knowledge (Knight, 1921).

In insurance, the risk means, "disaster or possible loss." It is usually used to as the insurance sign, the loss reason and the loss opportunity in the risk management research. Thus, usually the risk is defined as the relative change between anticipated result and the actual result (Skipper, 1999).

Risk is the possibility of adversity or loss, and refers to "uncertainty that matters." Consequently, in order to lessen the impacts of risk, risk management entails making decisions amongst options. Normally, tradeoffs between increases in risk, projected rewards, entrepreneurial flexibility, and other factors must be assessed. Understanding risk is a starting point to help producers make good management choices in situations where adversity and loss are possibilities.

Types of risk in agriculture:

Some risks are unique to agriculture, such as the risk of bad weather significantly reducing yields within a given year. Other risks, such as the price or institutional risks discussed below, while common to all businesses, reflect an added economic cost to the producer. If the farmer's benefit-cost tradeoff favors mitigation, then he or she will attempt to lower the possibility of adverse effects.

Weather and climate risks: Farmers are highly dependent on weather patterns, and natural disasters such as droughts, floods, storms, or extreme temperatures can cause significant crop losses and production problems.

Market and price risks: Agricultural producers are vulnerable to fluctuations in commodity prices, which can be influenced by global supply and demand, trade policies, or currency exchange rates. Market uncertainties can affect farm profitability and financial sustainability.

Biological risks: The presence of pests, diseases, or weeds can cause significant yield losses, reduce crop quality, and increase production costs. Livestock farmers also face animal health risks and diseases that can spread rapidly and affect entire herds.

Technology and innovation risks: Adoption of new technologies or production methods can entail investment risks, including equipment costs, training expenses, and the risk of unexpected problems or lower-than-expected benefits.

Policy and regulatory risks: Agricultural producers can face regulatory and policy changes that affect their operations, including environmental regulations, trade policies, or government subsidies.

Financial risks: Agricultural producers may face financial risks, including fluctuations in interest rates, exchange rates, and inflation, as well as changes in the availability of credit or insurance coverage.

Human and social risks: Labor shortages, immigration policies, and social factors such as changing consumer preferences or population growth can also affect agricultural production and profitability.

Production or yield risk: occurs because agriculture is affected by many uncontrollable events that are often related to weather, including excessive or insufficient rainfall, extreme temperatures, hail, insects, and diseases. Technology plays a key role in production risk in farming. The rapid introduction of new crop varieties and production techniques often offers the potential for improved efficiency, but may at times yield poor results, particularly in the short term. In contrast, the threat of obsolescence exists with certain practices (for example, using machinery for which parts are no longer available), which creates another, and different, kind of risk. Price or market risk reflects risks associated with changes in the price of output or of inputs that may occur after the commitment to production has begun.

Institutional risk: results from changes in policies and regulations that affect agriculture. This type of risk is generally manifested as unanticipated production constraints or price changes for inputs or for output. For example, changes in government rules regarding the use of pesticides (for crops) or drugs (for livestock) may alter the cost of production or a foreign country's decision to limit imports of a certain crop may reduce that crop's price.

Other institutional risks: may result from modifications to laws governing how animal waste is disposed of, limitations on how land is used for conservation, or adjustments to income tax or credit laws.

Farmers are also subject to the human or personal risks that are common to all business operators Events like death, divorce, accident, or the ill health of a business principal can cause disruptive upheavals. Also, the shifting goals of those participating in the agricultural business might have a big impact on how well it performs over the long term. Asset risk, which includes theft, fire, and other losses or damages to tools, structures, and animals, is another issue that affects all firms.

Marketing risk: prices and costs Changes in prices are beyond the control of any individual farmer. The price of farm products is affected by the supply of a product, demand for the product, and the cost of production.

- Supply of a product is affected by a combination of production decisions made by farmers as a group and by the weather and other factors that influence yields.
- Demand for a product is affected by consumer preference, consumers' level of income, the strength of the general economy, and the supply and price of competing products.
- Cost of production of a unit of product depends on both input costs and yield. This makes it highly variable.

Financial risk: Financial risk occurs when money is borrowed to finance the farm business. Uncertainty over future interest rates, a lender's willingness and capacity to continue providing cash when required, and the farmer's capacity to produce the revenue required for loan payback can all contribute to this risk. Smallholder farmers may experience special difficulties repaying debt if they borrow money at exorbitant interest rates. Poor yields and lower-than-anticipated prices might make debt repayment challenging and perhaps necessitate selling the farm.

Weather and natural disasters: Farmers are heavily dependent on weather conditions, and changes in temperature, rainfall, or other natural factors can have a significant impact on crop yields. Natural disasters such as floods, droughts, and wildfires can also cause damage to crops and livestock.

Production in agriculture is typically a time-consuming activity. For example, livestock production often necessitates continuing expenditures in feed and equipment that may not provide profits for several months or years. Since markets are often complicated and contain both domestic and international factors, occurrences in distant parts of the world can have a significant impact on producer returns.

Factors of risk in agriculture:

There are several factors of risk in agriculture, including:

1. **Weather conditions:** Changes in temperature, rainfall, and other weather patterns can affect crop yields and quality, which can have a significant influence on the profitability of farming operations.
2. **Pest and disease outbreaks:** Pests and diseases can destroy crops, reduce yields, and increase production costs, making it difficult for farmers to earn a profit.
3. **Market volatility:** Changes in demand, supply, and prices of agricultural products can have a significant influence on the profitability of farming operations.
4. **Input costs:** The cost of inputs such as seeds, fertilizers, pesticides, and labor can be volatile and unpredictable, which can affect the profitability of farming operations.
5. **Access to credit:** Farmers often rely on credit to finance their operations, but the availability and cost of credit can be unpredictable, which can affect their ability to invest in their farms.
6. **Government policies:** Changes in government policies related to subsidies, tariffs, and trade agreements can affect the profitability of farming operations.
7. **Environmental factors:** Environmental factors such as soil quality, water availability, and biodiversity can affect crop yields and quality, which can have a significant influence on the profitability of farming operations.
8. **Social and cultural factors:** Social and cultural factors such as gender, ethnicity, and land tenure can affect access to resources, opportunities, and markets, which can affect the profitability of farming operations.

There are several factors of risk in agriculture dicussed in detail:

Unviable Agriculture: Unviable agriculture refers to agricultural practices or systems that are no longer economically, socially, or environmentally sustainable. This can occur for various reasons, including:

a) **Poor soil quality:** Overuse of land, improper use of chemicals, and soil erosion can lead to poor soil quality, reducing crop yields and making agriculture unviable.
b) **Lack of access to markets:** Farmers may have limited access to markets to sell their crops, resulting in low prices and low returns on investment.
c) **Climate change and weather-related events:** Changes in weather patterns, extreme weather events, and drought can affect crop yields and reduce the viability of agricultural practices.
d) **High input costs:** The cost of inputs such as seeds, fertilizers, and pesticides can be high, making it difficult for farmers to earn a profit.

e) **Low returns on investment:** In some cases, the cost of producing crops may be higher than the market value of those crops, resulting in low returns on investment and making agriculture unviable.
f) **Inadequate infrastructure:** Inadequate infrastructure, such as roads and transportation, can make it difficult for farmers to transport their crops to market, reducing their profitability.
g) **Limited access to credit:** Farmers may have limited access to credit, making it difficult for them to invest in their farms and improve their practices.
h) **Lack of support from government:** Lack of government support for agriculture, such as subsidies, infrastructure investment, and research and development, can make it difficult for farmers to remain competitive and viable.

Ineffective minimum support price

Minimum support price (MSP) is a form of agricultural price support mechanism used in India, where the government sets a floor price for certain agricultural commodities to ensure that farmers receive a minimum price for their crops. An ineffective minimum support price can occur in several ways, including:

a) **Setting the MSP too low:** If the MSP is set too low, it may not provide adequate price support to farmers, resulting in lower profits and making agriculture an unviable option for them.
b) **Limited coverage:** The MSP may only cover a limited number of crops, leaving farmers of other crops without price support.
c) **Implementation challenges:** Implementation challenges, such as lack of awareness among farmers about the MSP, inadequate procurement infrastructure, and corruption in procurement processes, can also make the MSP ineffective.
d) **Lack of indexation:** The MSP may not be indexed to inflation or the cost of production, making it ineffective in providing adequate price support to farmers.
e) **Market distortions:** The MSP can also create market distortions by incentivizing farmers to produce crops that are covered by the MSP, regardless of their demand or profitability.
f) **Political considerations:** The MSP may be influenced by political considerations, rather than economic or agricultural considerations, leading to an ineffective MSP policy.

Falling prices of agricultural commodities:

The falling prices of agricultural commodities can have several causes, including:

a) **Oversupply:** When there is a surplus of a particular agricultural commodity, it can lead to falling prices as the market becomes saturated with the product.
b) **Changes in demand:** Changes in consumer preferences, global economic conditions, and government policies can all affect demand for agricultural commodities. If demand decreases, prices may fall.
c) **Trade policies:** International trade policies, such as tariffs or subsidies, can also impact the prices of agricultural commodities. For example, if a country imposes tariffs on imports of a particular crop, it may lead to lower prices for domestic producers.

d) **Climate and weather patterns:** Extreme weather events such as droughts, floods, or freezes can damage crops and decrease yields, leading to a reduction in supply and potentially higher prices. Conversely, ideal weather conditions can lead to bumper crops and lower prices.
e) **Technological advancements:** Advancements in agricultural technology can increase yields, which can lead to oversupply and falling prices.

Rural Indebtedness:

In the post-independence era, there have been massive market interventions to provide adequate credit to agriculture in general and to farmers in particular. Mention may be made about cooperative movement, nationalization of banks, setting up of National Bank for Agriculture and Rural Development (NABARD), Regional Rural Banks (RRBs), priority sector lending, Kisan Credit Cards, interest are subvention by the government in farm lending, micro finance etc. According to NSSO statistics, the percentage of institutional credit has fallen from 69.4% in 1991 to 56% in 2012. Farmers' reliance on non-institutional loans has increased dramatically, from 30.6 percent in 1991 to 44 percent in 2012. According to the 70th round of the National Sample Survey, commercial banks had the biggest percentage of institutional agencies at 25.1% in 2012, closely followed by cooperatives at 24.8%. Just 2.2 percent of total institutional lending to agriculture was given by self-help groups, 1.2 percent by the government, and 1.1 percent by financial institutions.

Inefficient Value Chain in Agriculture: Inefficient value chains in agriculture can lead to several problems that can affect farmers, processors, and consumers. Here are some of the key issues that can arise from an inefficient agricultural value chain:

a) **Limited access to markets:** Inefficient value chains can limit farmers' access to markets and prevent them from reaching buyers willing to pay higher prices for their products.
b) **Quality issues:** Poor infrastructure and handling practices can lead to damage and spoilage of crops during transportation and storage, resulting in lower-quality products and lower prices.
c) **Lack of transparency:** Inefficient value chains can lack transparency in pricing, quality, and other factors, which can lead to market distortions and lower profitability for farmers.
d) **Limited investment:** Inefficient value chains can discourage investment in agriculture and related infrastructure, which can limit the sector's growth potential and impact on economic development.
e) **Limited innovation:** Inefficient value chains can discourage innovation in agricultural practices and technologies, which can limit productivity gains and sustainability improvements. between stakeholders along the value chain to promote collaboration and shared goals.

Possible solutions: The issue must be addressed immediately of agricultural risk on a war footing. There are several solutions that can help farmers manage the risk and uncertainty in agriculture:

1. **Crop diversification:** Farmers can diversify their crops to reduce the risk of crop failure and market volatility. By growing a variety of crops, farmers can spread their risks across different markets and seasons, reducing their exposure to weather and market risks.

2. **Crop insurance:** Crop insurance can protect farmers against the risk of crop failure due to natural disasters, pests, and diseases. It can provide a safety measure for farmers, ensuring that they have the resources to recover from crop losses and continue farming.
3. **Financial planning:** Farmers can use financial planning tools such as cash flow projections, budgeting, and risk analysis to better manage their finances and reduce their exposure to By tracking their expenses and revenues, farmers can make informed decisions about when to invest in their farms and when to reduce their costs.
4. **Contract farming:** Contract farming can provide farmers with a guaranteed market for their products, reducing their exposure to market volatility. By entering into contracts with buyers, farmers can secure a price for their crops and reduce their risks of price fluctuations.
5. **Improved technology:** Improved technology such as precision agriculture, soil sensors, and weather forecasting can help farmers make better decisions about planting, irrigation, and fertilization, reducing their exposure to weather and environmental risks.
6. **Knowledge and information sharing:** Farmers can benefit from access to knowledge and information about new farming practices, technologies, and markets. By sharing information and learning from each other, Farmers can increase their output and reduce their exposure to risk.
7. **Government support:** Government policies and programs such as subsidies, research and development, and rural infrastructure development can help farmers manage their risks and uncertainties by providing them with the resources and support they need to invest in their farms and grow their businesses.
8. **Strengthen Forward Markets :** Forward markets play an important role in managing price risk in agriculture by allowing farmers to sell their products at a fixed price before they are harvested. However, in many developing countries, the forward market is not well-developed or accessible to small farmers, which limits their ability to manage price risk effectively. Here are some ways to strengthen forward markets in agriculture:
    a) **Increase access:** Governments and other stakeholders can work to increase access to forward markets by improving infrastructure, reducing transaction costs, and promoting transparency in market operations. This can include measures such as building marketplaces, improving market information systems, and providing training and support to farmers and traders.
    b) **Reduce barriers to entry:** Governments can work to reduce barriers to entry for small farmers by providing access to credit, improving access to market information, and promoting market competition. This can help to level the playing field for small farmers and increase their bargaining power in the market.
    c) **Encourage innovation:** Innovations such as mobile phone-based platforms and digital marketplaces can help to increase access to forward markets and reduce transaction costs for farmers. Governments and other stakeholders can support these innovations by providing regulatory frameworks that enable their development and adoption.

d) **Improve risk management:** Effective risk management tools, such as weather insurance and crop insurance, can help to reduce the risks associated with forward markets and encourage greater participation. Governments and other stakeholders can work to improve access to these tools and provide education and support to farmers on how to use them effectively.

By implementing these and other measures, it is possible to strengthen forward markets in agriculture and improve the ability of farmers to manage price risk effectively. This can help to build more sustainable and resilient farming systems and support the economic well-being of farmers and their communities.

9. **Widening Crop Insurance :** Crop insurance is an important risk management tool that can help farmers to protect against losses due to weather events, pests, and other production risks. However, in many developing countries, crop insurance is not widely available or accessible to small farmers, which limits their ability to manage risk effectively. Here are some ways to widen crop insurance in agriculture:
    a) **Government support:** Governments can provide subsidies and other forms of support to help make crop insurance more affordable and accessible for small farmers. This can include premium subsidies, funding for insurance programs, and support for outreach and education efforts to increase awareness of the benefits of crop insurance.
    b) **Private sector involvement:** Private sector insurance companies can play an important role in widening crop insurance by offering innovative products and expanding coverage to new regions and crops. Governments can encourage private sector involvement by providing regulatory frameworks that support the development of insurance markets and incentivizing private sector investment.
    c) **Index-based insurance:** Index-based insurance uses satellite data and other sources of information to measure losses at the regional or national level, rather than requiring individual assessments of crop damage. This can help to reduce the costs of administering insurance programs and make them more accessible to small farmers.
    d) **Collaborative approaches:** Collaborative approaches, such as partnerships between governments, private sector insurers, and farmers' organizations, can help to widen crop insurance by pooling resources and expertise. This can help to increase access to insurance programs and reduce the costs of administering them.
    e) **Innovation:** Innovations in technology, such as mobile phone-based platforms and digital insurance products, can help to widen crop insurance and make it more accessible to small farmers. Governments and other stakeholders can support the development of these innovations by providing regulatory frameworks that enable their development and adoption.

By widening crop insurance and making it more accessible to small farmers, it is possible to increase the resilience and sustainability of agricultural systems and support the economic well-being of farmers and their communities.

10. **Integrating Agricultural Markets:** Integrating agricultural markets involves connecting farmers, traders, and other stakeholders across different regions or countries to create more efficient and effective market systems. By integrating agricultural markets, it is possible to increase market access, reduce transaction costs, and improve price discovery for farmers and traders. Here are some ways to integrate agricultural markets:
    a) **Infrastructure development:** Governments can invest in infrastructure such as roads, bridges, and storage facilities to improve connectivity between different regions and countries. This can help to reduce transportation costs and improve the flow of goods and information between different markets.
    b) **Harmonization of regulations:** Harmonizing regulations and standards across different regions or countries can help to reduce trade barriers and increase market access. Governments can work together to create common standards for quality, packaging, and labeling, which can help to reduce the costs of complying with different regulations.
    c) **Information and communication technology (ICT):** The use of ICT, such as mobile phone-based platforms and digital marketplaces, can help to connect farmers and traders across different regions or countries. This can improve market transparency, reduce transaction costs, and increase access to market information.
    d) **Trade agreements:** Governments can negotiate trade agreements that facilitate the free flow of goods and services between different regions or countries. This can help to reduce trade barriers, increase market access, and create more efficient market systems.
    e) **Collaborative approaches:** Collaborative approaches, such as partnerships between farmers' organizations, traders, and other stakeholders, can help to integrate agricultural markets by pooling resources and expertise. This can help to improve market efficiency, increase access to markets, and reduce transaction costs.

    By integrating agricultural markets, it is possible to create more efficient and effective market systems that benefit farmers, traders, and consumers. However, the process of market integration can be complex and requires coordination and cooperation between different stakeholders. Governments, private sector actors, and farmers' organizations all have a role to play in supporting the integration of agricultural markets.

11. **Promoting Smart farming :** promoting Smart farming, also known as precision agriculture, involves the use of technology and data analytics to optimize agricultural production and increase yields while reducing inputs such as water and fertilizers. Here are some ways to promote smart farming:
    a) **Education and training:** Education and training programs can help farmers to understand the benefits of smart farming and learn how to use technology and data analytics to optimize their production. This can include training on the use of sensors, drones, and other precision agriculture technologies.
    b) **Access to finance:** Access to finance can help farmers to invest in smart farming technologies and equipment. Governments and other stakeholders can provide

support for farmers to access credit and other forms of finance to help them adopt smart farming practices.

c) **Innovation:** Research and innovation can help to develop new and improved technologies for smart farming. Governments, universities, and the private sector can collaborate to invest in research and development to create new technologies and improve existing ones.

d) **Data sharing:** Sharing of data and information between farmers, researchers, and other stakeholders can help to improve decision-making and optimize production. Governments and other stakeholders can create platforms for data sharing and promote collaboration between different actors in the agricultural value chain.

e) **Policy support:** Governments can provide policy support to promote smart farming, including the development of regulatory frameworks to support the use of precision agriculture technologies and incentives such as tax credits or subsidies for investments in smart farming.

By promoting smart farming, it is possible to increase agricultural productivity and efficiency, while also reducing environmental impact. However, the adoption of smart farming practices can require significant investment and changes to traditional farming practices, so it is important to provide support and incentives for farmers to adopt these technologies

Conclusions:

In conclusion, risk and uncertainty are inherent features of agriculture and can significantly impact the livelihoods of farmers and the overall food security of a region or country. The types of risks faced by farmers are diverse, including weather-related risks, market risks, and production risks. Uncertainty, on the other hand, arises from unpredictable events or situations such as disease outbreaks or political instability. The consequences of these risks and uncertainties can be severe, including crop failures, income losses, and food insecurity.

However, there are various strategies that can be adopted to manage and mitigate the risks and uncertainties faced by farmers. These strategies include diversification of crops and income sources, adoption of new technologies such as precision agriculture, strengthening of forward markets, widening of crop insurance, and integration of agricultural markets. By adopting these strategies, farmers can better manage risks, improve their income stability, and enhance their resilience to shocks.

It is also important for governments, private sector actors, and other stakeholders to collaborate in supporting farmers in managing risks and uncertainties. Policies and programs that support research and innovation, education and training, and access to finance can also play a critical role in promoting risk management and mitigation in agriculture.

Overall, while it may not be possible to eliminate all risks and uncertainties in agriculture, it is possible to adopt strategies that can help farmers to better manage and mitigate these risks, leading to more sustainable and resilient agricultural systems.

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