

INVITED ARTICLE

Empowerment of Rural Youth with Novel Agricultural Technologies

India is a young country

Global population is expected to increase to 9 billion by 2050, with youth (aged 15-24) accounting for about 14% of this total. Rural population in India, accounts for 68% (90.22 Crores) and the total youth population is 28% (35.6 Crores) ranging between the ages of 10-24 years. India is emerging as future young nation in the globe and adding 2 million young people to the ranks of unemployed every year. Which is likely to entail tremendous cost, including social unrest and dislocation.

New generation is going to take up Agriculture

Agriculture is contributing to 15.35% of national GDP and covers 68% of total population. Increasing literacy rate in rural areas (71%) is the ray of hope for bringing change in all areas in villages including agriculture. Thus, the mantle of agriculture rests in the hands of educated rural youth in the country in future.

Realities on ground

India is struggling with the grim challenge of rural-urban migration. Large number of rural youth migrate to cities in search of better livelihood and lifestyle. If the trend and pace continue, the Indian urban population is likely to reach 600 million by 2030. Out of total migrants from rural to urban areas, youth account for nearly 30 per cent. Education and Mass Media exposure is inducing high aspirations among rural youth resulting in migration from agriculture to non-agriculture sectors. Education system does not involve agriculture in initial years due to which interest is not being created in the young minds. Urban



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attraction leads rural youth to opt non-agriculture education so that they get jobs in urban areas. Even the majority of the farmers are not in favour of their younger generation taking up agriculture and settling in villages. Agriculture is ridden with uncertainties of monsoon and markets; making it one of the risky professions. Hence, for agriculture, there are limited takers among rural youth by choice.

Our youths are underutilizing their time, energy and enthusiasm in various other activities leading themselves and India nowhere. The right thing to do at the moment is to attract and retain youth in Agriculture and allied activities as this sector will be future to feed billions. Urbanization and migration to other countries has made agriculture an unwanted sector for youth to enter in India. Urbanization is attracting youth with various income generating prospects and leading youth get attracted to various other unrest in the society. This unrest of urbanization is developing lot of importance for agriculture, which needs a societal change in mindsets of parents and children about adoption of agriculture and allied activities. It is also, evident that, agricultural skill is not genetically inherited. So, it has to be adopted and cultivated in rural youth or farmers. There is a need to develop agriculture in such a way that it attracts youth towards profitable and constant income generating activities. The waning interest of rural youth has led to the ageing of the Indian farming community which is a bad omen for the future of agriculture and food security. While the average age of the Indian population is only 29 years, the average age of farmers is 55 years

Challenges

Rural youth experience following challenges while opting agriculture as profession-

- “ Insufficient access to knowledge, information and education.

- “ Limited access to land.
- “ Inadequate access to financial services.
- “ Difficulties accessing green jobs.
- “ Limited access to markets.
- “ Limited involvement in Policy dialogue.
- “ Lack of agricultural content in education.
- “ High risk in agriculture profession.

Opportunities

In spite of challenges, agriculture emerges as promising sector due to-

- “ India is a big country with 1.3 Billion population / consumer base.
- “ All season activities in Agriculture and Allied sectors.
- “ Ample opportunities for commercial Agriculture, processing, marketing and export.
- “ Increased focus on skill training, programmes providing financial support, incubation, entrepreneurship facilities.

What is entrepreneurship? Entrepreneurship is a key factor for the survival of small scale farming in an ever-changing and increasingly complex global economy. But what is entrepreneurship in agriculture? How does it relate to small-scale farmers who operate on the edges of the economy?

Farmer-entrepreneurs see their farms as a business. They see their farms as a means of earning profits. They are passionate about their farm business and are willing to take calculated risks to make their farms profitable and their businesses grow. Farmer-entrepreneurs operate in a complex and dynamic environment. They are part of a larger collection of people including other farmers, suppliers, traders, transporters, processors and many others. Each of these has a role to play in producing products and moving them through to the market – through the value

chain. Each one needs to be an entrepreneur. They also need to respect each other and work together to make the whole system work better and be more profitable.

Entrepreneurship dynamics

But beyond this, successful entrepreneurs are technically competent, innovative and plan ahead so they can steer their farm businesses through the stages of enterprise development – from establishment and survival to rapid growth and maturity. However, there are many challenges that these entrepreneurs face: social barriers, economic barriers, regulations, access to finance and information, and their own managerial capacity to cope with risks and changes and to seize opportunities.

Public sector technology generation often fails to take into account farmers' needs, perceptions and location-specific conditions for agricultural extension, leading to significant gaps between the public sector institutions and farmers. They face some challenges as-

- “ Research- farmer linkages are weak.
- “ Duplications of efforts among a multiplicity of agents attending to extension work without adequate coordination.
- “ Difficulty in attributing impact.
- “ High transaction costs and weak accountability to farmers.
- “ In India extension workers to farmers ratio (1:5000)
- “ Multiple role of extension agency, no motivation for promotion

Changing economic scenario calls for appropriate agricultural technologies & agro-management practices to respond to –

- “ Food and nutritional security,
- “ Poverty alleviation,

Diversifying market demands,
Export opportunities
Environmental concerns

These conditions pose new challenges to the technology dissemination systems. The best approach for a concrete situation depends on:

- “ wider context in which extension is taking place & the value concepts & principles which are common; - the objectives of extension activity;
- “ extension institutes with its own value concepts, principles & form of organization- the target population with their value concepts & principles & their forms of organization;
- “ The functions and procedures of extension based on the objectives & principles of the extension institution and the target group.

Importance of Entrepreneurship Development among rural youth

Entrepreneurs organize the production process. The absence of which, all other resources, namely land, labour and capital would remain idle.

Contribution to GDP and capital formation

Increase in the Gross Domestic Product (GDP) is the most common definition of economic development. Income is generated in the process of production. So, entrepreneurs generate income *via* organization of production be it agriculture, manufacturing or services. Income generated is distributed among the factors of production where land gets rent, labour gets wages and salaries, capital gets interest and the residual income accrues to the entrepreneur in the form of profits.

Generation of employment

Every new business is a source of employment to people with different abilities, skills and qualifications. A large portion of our society gets

employment in industrial sectors which solve the problem of unemployment.

Generation of business opportunities for others

Every new business creates opportunities for the suppliers of inputs which is referred to as backward linkages and the marketers of the output what is referred to as forward linkages. Eg: As a printer manufacturer they would create opportunities for paper, cartridge and refill manufacturers as well as wholesalers and retailers of stationery products.

Remarkable role in economic and industrial development of a country

Entrepreneurs establish new ventures and produce variety of goods and services. Hence modern needs of a society are satisfied and lead to a country to rapid economic and industrial development.

Increasing the scope of economic activities

Development does not merely mean 'more' and 'better' of the existing, it also and more crucially means diversification of economic activities—across the geographic, sectoral and technological scope. Economic development is also constrained by the supply-side pressures resulting into absence of capacity to meet the demand. Entrepreneurs mobilize local and even overseas resources to augment the productive capacity of a country.

Impact on local communities

Entrepreneurship, in its natural habitat is small business at great leveler. That small-scale entrepreneurship enables such marginalized groups as women, SC, ST and OBC to pursue their economic dreams. As there are no entry barriers in terms of educational qualifications, entrepreneurship is an even more attractive career option for such marginalized groups.

Gives benefit of innovation to the society

Entrepreneurship and innovations are directly related. Entrepreneur continuously search innovation and gives its maximum benefits to our society and nation

Establishes stability in the society

Entrepreneurs establish enterprises not only in urban areas, but also in semi-urban and rural areas. In rural areas, generally tiny, cottage and small scale industries are established, which leads to stability in our society.

Plays important role in balanced regional development

Entrepreneurs establish industries in all areas of the nation which decentralize economic power and leads to balanced regional development.

Earning of foreign exchange by export promotion

Entrepreneurs search opportunities in international market, produce goods and services as per international demand and export their products in foreign market.

Optimum utilization of natural resources

Entrepreneurship is a process of shifting natural resources of lower productivity and yield into an area of higher productivity and yield. Hence natural resources can be optimally utilized.

Pays taxes to government

Entrepreneurs earn profit by establishing and managing industrial units. This profit increases periodically and pays a large amount of taxes to government.

Development of subsidiary industries

Due to development of entrepreneurship banking, communication, transportation, insurance, services *etc* develop rapidly. So opportunities for development of subsidiary industries also increase.

Raise the living standards of society

An entrepreneur always searches for new changes, responds to them and exploits them as opportunities. In this way they produce modern and luxurious products for our society and helps to increase the living standards of the society.

Income Generating Activities /Enterprise in Agriculture & Allied fields

Agriculture

As said by Sardar Vallabhai Patel “Agriculture is locomotive of our economy and a prosperous rural economy based on agriculture will ultimately make the nation prosperous.” Some of the income generating agribusiness activities, youth / farmer can take up are, Mobile Soil/water testing kits/laboratories; Land preparation consultancy/customized land preparation techniques for farmers; Compost preparation out of rural waste and marketing; Vermi-composting; Micro-irrigation lay out consultancy by educated rural youth as professional graduates charge more; Hybrid Seed production skills/ hybridization techniques for rural youth; Weed control through customized implements manually operated/petrol operated by letting these small & low cost implements; Plant protection techniques such as extracting neem oil, production of NPV at labs and preparation and marketing of Trichoderma cards; Price forecasting consultancy and charging for the service and Agriculture Journalism as a source of income in foreign exchange activity. Few policy recommendations were also proposed to be adopted immediately to bring youth/farmer in agriculture like

Agri- information kiosk at every village/ panchayat level and training by the corporate, NGOs, KVK and SHGs as a role of CSR.

To change the fate of the farmers and youth in Indian agriculture, it is recommended to reduce the supply chain and, if possible farmers should directly sell the produce to the consumers by avoiding the middle men; to provide quality to the product by adopting “Good Agriculture Practices-(GAP)” in producing organic produces at the production stage and good post-harvest management practices like, packing according to the consumers need and at the marketing stage to use the product to reach at time . Profit making businesses and provide employment to the rural youth in agribusiness and marketing of the agricultural produces and to develop the best relationship between urban & rural people are the main criteria.

Animal Husbandry

Dr. Verghese Kurien has said “We must build on the resources represented by our young professionals and by our nation’s farmers. Without their involvement, we cannot succeed. With their involvement we cannot fail”. Therefore, youth in rural areas / villages have to concentrate on the available advantages in animal husbandry and reap benefit in income generation as Indian Livestock is huge in population but poor in productivity. The livestock sector is a sustainable secondary source of income and can generate gainful employment in school dropouts in rural areas. Due to reluctance of rural youth in this sector livestock in rural area is declining. Digitalisation has been efficiently transforming the milk retail market. It is further making inroads into processing activities. A strategic infusion of technology for value addition could diversify our milk from a raw material to scores of products, from the elementary

curd, paneer, khoya etc. to a variety of cheese, chocolates etc.

To develop livestock, youth should take up interest and enter into value addition and small scale industries in the enterprises such as Dairy farming, Meat production and processing technologies. Livestock can be a largest source of employment and income generating activity by commercializing it with all the natural resources available in India.

Poultry/*Kadakhnath* rearing

Poultry farming is basically raising of birds domestically or commercially, primarily for meat and eggs for food. In order to meet the quantity and quality requirements, a variety of breeds are raised. These improved breeds include layers which produce eggs and broilers that provide meat. Since poultry farming is a profit-making business, its primary focus is on maximum production with less expenditure. The rural youth can earn a good living by involving in this profitable venture. The poultry industry, with its production in the form of eggs and meat, is of particular significance in providing a balanced diet for the human population. Proper management of poultry involves enhanced methods of rearing, hatching, housing, sanitation, prevention from diseases and a sound marketing arrangement.

Kadakhnath, also called *Kali Masi* is an Indian breed of chicken, originated from Dhar and Jhabua, Madhya Pradesh. Its flesh, beak, tongue, legs, nails, skin etc. are black which is due to the abundance of melanin pigment, which is a good diet for heart and diabetic patients. Its meat is tasty and easily digestible; due to this characteristic it has lot of demand in the market and is sold in high rates. These birds are mostly bred by the rural poor and tribal people. There is scope for successful entrepreneurial opportunities in *Kadakhnath* rearing. RVSKVV take up measures to save the bird. The

model developed by RVSKVV scientists is very successful and providing jobs to hundreds of tribal youths presently. Rural youths can learn this business model developed by RVSKVV, Gwalior.

Fisheries

A farmer/youth/women can take up fisheries as a profitable business and create employment to both coastal and Inland rural people as fish / shrimp farm managers; shrimp / fish hatchery managers; shrimp hatchery technicians; Aqua lab technicians; Aqua lab Managers; Fish Retail outlets; Mobile Fish retail outlets for Fish Value added products; Ornamental fish rearing and breeding units; Ornamental fish fabricating units; Ornamental retail fish marketing shops *etc.*

Bee Keeping (Apiculture)

Beekeeping is a significant sustainable, and environmental sound activity involving integration of forestry, social forestry and Agricultural supporting activity since it provides nutritional, economic, and ecological balance, while providing employment and income. India has a good potential for beekeeping and to become a major honey exporting nation. Beekeeping is a low investment and skill Industry having the potential to offer direct employment to lakhs of people especially hill dwellers, tribal and unemployed youth and farmers. Sustainability of this industry is therefore vital to the country's economic wellbeing and development.

Beekeeping involves simple technology which rural youths can learn easily. It is the maintenance of bee colonies, commonly in wooden-made hives. A beekeeper keeps bees in order to collect their honey and other products that the hive produce (including beeswax, propolis, flower pollen, bee pollen, and royal jelly), to pollinate crops, or to produce bees for sale to other beekeepers.

Most of the Indian beekeepers engaged in beekeeping activity are primarily doing the extraction of raw honey from the bee colonies maintained by them. Very few beekeepers are extracting wax & pollen. The Raw honey extracted by beekeepers are procured by Beekeeper Cooperative Society/ Beekeeping NGO/Honey Traders/ Pharmaceutical Companies etc. and in turn sent for processing through Honey Processing Plant and finally the processed honey gets packaged with suitable brand name for its sale to customers. The youth can make a good supplementary income for sustainable livelihood.

Lac cultivation

Lac resin is extensively used for preparing a range of products, from cosmetics to ammunition. It is cultivated on a variety of trees, mostly fruit-bearing and shady trees like berry, kusum palash and sal. etc. Lac is the resinous secretion of a number of species of lac insects. The government is working on Non Timber Forest Products-based livelihood opportunities, under which, women/youth living in villages surrounded by forests are being given training in scientific lac cultivation to improve their income. The traditional practice is being revived through intensive training programmes in scientific cultivation for procuring the produce.

Sericulture

Sericulture is a comprehensive agro-based cottage industry, which aims at uplifting the socio-economic standards of people who are engaged. As a dynamic small-scale industry the employment potentiality of the silk industry is extensive. The major activities of sericulture comprises of establishment of Mulberry, Cocoon production, Raw silk production and Fabric production. The broad-based development of the agro-based industry will improve both the social and physical infrastructure of India.

Sericulture industry with a broad agricultural base is an excellent avenue for providing employment with various entrepreneurial opportunities for the rural development. The cultivation of mulberry plants and rearing of silkworm are agro based, while the post cocoon activities are industrial. The various entrepreneurial opportunities in sericulture industry are Raising of Mulberry Nurseries, Preparation and supply of Silkworm eggs (DFLs), *Chawki* Rearing units (Young Age Silkworm Rearing), Cocoon production, Silk reeling, Silk twisting, Silk yarn and fabric dyeing, printing, Silk weaving, Silk fabric finishing and Cocoon and silk based handicrafts etc., The sericulture and silk industry has great potential to contribute towards rural income, poverty alleviation and women empowerment.

India's silk industry provides gainful employment to over 9.43 million persons of which a sizable number belong to the economically weaker sections of society. The Indian silk products have high demand in international market. Therefore small technology intervention in silk production can employ rural youths in a big way.

Mushroom Cultivation

In India mushroom production was earlier limited to the winter season, but with technology development, these are produced almost throughout the year in small, medium, and large farms, adopting different levels of technology. Mushroom farming can be apt for business. It can be profitable with low capital investment. Mushroom farming business will be the perfect option for a person who has little knowledge in the science and technology of mushroom growing and who owns a building for having the farm. Mushroom cultivation is an art which requires both study and experience. Mushroom cultivation does not require much space and investment. It can be taken in a room size space.

Commercial Mushrooms cultivation can become a tool of self-employment and can ensure the enhancement of family income at the cost of less investment.

Quality Seed Production

In India there is a big gap between demand and supply of quality seed in India. To fulfill the seed requirement of the country, rural youth engagement at village level needs to be strengthened. There is huge demand of quality seed of newly released varieties of field crops in the country. Rural youths can be encouraged to produce and sell quality seed as per local demand. Quality seeds will be the main drivers of crop production in future. There are several business opportunities in each stage of the seed value chain.

Rural youths are unaware of technological developments in farm sector. Seed production can be source of income and can generate gainful employment in school dropouts in rural areas. Seed production enterprise involves the major activities like seed production, seed testing, seed processing, seed storage and seed marketing etc. Training with technological intervention in seed production, seed testing, seed processing, seed storage and seed marketing etc. will empower rural youth to earn their livelihood.

Organic Farming and organic food products

Organic seeds of food crops are a new thrust area for agriculture. Learning new organic production technologies through one week or 15 days programme will attract rural youth. Consumers have become more diverse and there is now increasing demand for 'fresh foods, and 'organic' foods, 'safer and healthier' foods and foods with adequate shelf life. There are opportunities for rural youths but there is lack of knowledge of technological advances in

organic sector in rural areas. Organic startups need to be promoted for involving rural youths to generate employment.

Vermicompost production

At village level raw material and land for vermicompost production is available easily. Vermicompost production technology is easy to learn.

Nursery raising

Rural youth who are unable to pursue higher education, school and college drop outs, women in agriculture who have no facilities of higher education can easily be provided skill- oriented vocation training for raising fruit plants saplings, nursery raising, flower cultivation for their livelihood. There is a huge demand of skilled professionals for grafting, budding, potting, repotting and other nursery operations. Raising fruit plant nurseries, vegetable nurseries, ornamental plant nurseries, medicinal and aromatic plant nurseries, forest plant nursery and their marketing in demanding area are many options available for rural youths to raise income. Small polyhouse and net house technology will generate income round the year.

Service provider

Service providers are needed to provide a common platform to villagers for their needs like linking farmers to markets, finding a suitable market for their produce, input ventures, ancillary ventures such as soil testing, meteorology services, cold-storage services, transportation, trading and credit agencies run by farmer groups, processing and marketing ventures, transportation to cities, logistics services.

” **Marketing of Farm produce:** Diversify farm produce into higher value agriculture product requires strengthening of the market linkages. These linkages at village levels are not strong

enough today. Smallholder farmers and Small and Medium Enterprises (SMEs) in the rural developing world typically face access to market barriers, due to infrastructural deficits, limits to knowledge and technology access, and asymmetric market information. Educated rural youths can be the providers of such services.

- ” **Marketing of fresh fruits & vegetable:** Fresh fruits and vegetables are in big demand in urban areas. Rural youth can make it a business to earn household income.

Hydroponics

Hydroponics is a type of horticulture and a subset of hydroculture which involves growing plants (usually crops) without soil, by using mineral nutrient solutions in an aqueous solvent. Hydroponics offers many advantages, notably a decrease in water usage in agriculture.

Goat farming

Involves the raising and breeding of domestic goats (*Capra aegagrus hircus*) as a branch of animal husbandry. People farm goats principally for their meat, milk, fibre and skins. Goat farming can be suited to production along with other livestock (such as sheep and cattle) on low-quality grazing land. Goats efficiently convert sub-quality grazing matter that is less desirable for other livestock into quality lean meat. Furthermore, goats can be farmed with a relatively small area of pasture and limited resources.

Custom hiring services

Custom hiring centres at village level can also be job providers. These service centres can provide farm equipment like tractor, cultivators, seed drills, tractor driven sprayers and other farm machinery to small and marginal farmers.

Pisciculture

The fisheries sector is also an important source of income and employment generation in India. The country has rich and diverse fisheries resources due to its vast coastline and varied inland resources in the form of rivers, canals, lakes, ponds, tanks, reservoirs, etc.

Commercial Horticulture

There is vast scope in the fruits & vegetable processing to make it a home business. In rural areas where local fruits like guava and mango are easily available, they can be used to make gel and other products. Only proper training and awareness is lacking. Agricultural universities can come forward to train rural women with provision of technology.

There are technological developments in the area of fruits keeping, processing, grading, packing, transportation and marketing. But our rural youth are unaware of all these technologies. They need to be trained. Only value addition can bring dramatic improvements in the commercial horticulture sector and result in higher incomes.

Post-harvest losses are also a major concern. About 30-40 per cent of total horticultural production gets wasted before consumption due to various reasons like lack of high-tech storage facilities, easy transportation facilities to cities, lack of marketing network etc. From farm gate to a consumer, a horticulture product passes through seven intermediaries. Village youths can take up these jobs. The country ranks first in the production of banana, papaya, mango, lemon, ginger and okra. The horticulture sector offers tremendous opportunities for their exports. Despite the huge production of horticultural crops, India's share in world exports amounts to less than 1.5 per cent. The horticulture

sector is recognized to have the potential to augment rural income, enhance employment opportunities.

Floriculture

Floriculture is the area where employment is available for youths in rural area round the year. The diverse agro-climatic conditions enable the growth of all types of flowers in one or the other part of the country round-the-year. Floriculture has immense potential for generating gainful self-employment to youths in flower production, packing, transportation and marketing.

Agro-Processing

Rural areas provide abundant raw materials from agricultural, horticultural and animal produce to start entrepreneurship in the field of agro-processing. With the availability of fresh, abundant & affordable raw material, rising consumer affordability, rapid urbanization and change in lifestyle, the preference for processed agro-products has been increasing rapidly. These factors would provide an impetus to the food processing sector.

Youths can develop entrepreneurship in making daily household items like pickles, *murabbas* and *papads*, which are the good examples of preserved products used in Indian household and are in big demand. Agro-processing not only enables to reduce the post-harvest wastages but also helps to fetch fair and remunerative prices to the producers through value addition in their agricultural produce. Presently, the processing of fruits and vegetables is only two per cent in India.

Logistics support avenues to youths

Transportation

Transportation of farm fresh produce to market place is a big problem in rural areas. Farmers of remote villages often depend on

public transport system. Youths of such remote villages can provide logistics support for timely market deliveries.

Storage

Storage of perishable food items like fresh fruits and vegetables is another problem to most of the small producer. Creating storage facilities at small level in villages or village clusters with affordable technology support will bring employment to rural youths.

E- marketing of Agriculture and Market linkages

Rural people face market barriers, due to infrastructural deficits like storage logistics, water management systems, distribution systems, limits to knowledge and technology access, and lack of market information. Educated rural youth using computer networks and the internet can develop and strengthen market linkages to sell in mandies, city malls, retail shops in urban areas and make it as profession. These linkages at village levels are not strong enough today.

Jaggery Production by Sugarcane

Jaggery making is a simple process comprising crushing of sugarcane for juice extraction, filtration and boiling of juice for concentration and then cooling and solidifying to make jaggery blocks.

Rural youths can make it a home business. The juice is extracted in conventional crusher; this is then filtered and boiled in shallow iron pans. During boiling chemical bleaching agents or natural vegetable items like Bhindi (Lady finger) are added to clean the juice and the extraneous matter is constantly removed to give a bright golden colour. The boiled juice is then left to cool in iron/ Aluminum pots to form the jaggery blocks

IT application sector

Digital entrepreneurship involves the transformation of existing businesses through novel digital technologies and the creation of new innovative enterprises characterized by the use of digital technologies to improve business operations, the invention of new (digital) business models and engaging with customers and stakeholders through new (digital) channels. Despite the rapid growth of digital agricultural technologies, most ICT-enabled solutions have yet to be demonstrated at scale. To encourage digital agripreneurship, companies need to create pools of digitally-skilled employees. This involves finding potential employees with relevant skills and identifying how they can be attracted and retained.

The emphasis be given on empowering the farmers through application of information technology for adopting innovative technologies required to increase the profitability in the farming. In future all the activities will be implemented and maintained through application of Internet of Things (IoT) by integrating the state and central Govt. schemes benefiting the farmers. IT application will help attracting, retaining farmers and rural youth towards modern ways of farming as commercial activity in the rural areas. Educated rural youths can start advisory services, information centre services, attracting, retaining farmers and rural youth towards modern ways of farming as commercial activity in the rural areas.

Smart agriculture supply chain

Surprisingly the majority of farmers we spoke to, had access to a smart phone but did not use it to access technical information. The need of the hour is technologies which are effective, user-friendly and can create a smart agriculture supply chain to benefit rural development and income generation of rural youth.

IT based services in villages

Active internet users are presently around 500 million. The number is expected to grow to 1 billion by 2025-27. Advanced digital technologies for extension can be big game changers. Educated rural youth will be the future ambassador for real transformation in agriculture that requires revamping the agriculture extension system that is market-oriented and demand driven. Effective extension technologies are crucial to bring right information to farmer doorstep.

Customised solutions to diverse needs of the farming community

Educated Rural youth can be trained to provide real time solutions to farmers for their needs and agriculture inputs.

Programmes for Promotion of Youth Involvement in Agriculture

Attracting and Retaining Youth in Agriculture (ARYA)-

Realizing the importance of rural youth in agricultural development especially from the point of view of food security of the country, ICAR has initiated this programme. The EFC of IP&TM has recommended the XII plan scheme, National Agricultural Innovation Fund with three components namely (I) Innovation Fund, (II) Incubation Fund and (III) Attracting and Retaining Youth in Agriculture (ARYA). Thus ARYA is one of the components of the scheme.

“ARYA” a pilot project launched by ICAR, to find out ways to attract and retain youth in agriculture, by identifying their reasons for drawback such as giving no part in policy formation, Land & credit accessibility and mainly support from the parents and the society. Reasons for the success of youth, if considered for involving in policy making by taking

their collective feedbacks and facilitating them with good Communication reach, Advocacy and Networks.

The Project states that Indian youth constituting to 28% of the Indian population are with huge drawback in accepting agriculture as their profession because of less Knowledge, awareness, interest in adoption and middlemen role in marketing of agricultural products leading to less profit. Pointing out the differences other nations have made to bring their youth into agriculture such as, Philippines - institutionalizing, promoting and protecting the youth rights; Vietnam – prioritizing the great respect for farmers of their country; Taiwan - by supporting the young and professional to take up agriculture; Korea – reducing its interest in all agriculture related finances to support youth to take up agriculture in their countries; ARYA has projected that the key role of India is to support youth in agriculture by bringing real changes at village level will help youth to take up agriculture. ARYA project then comes into the picture engaging rural youth by guiding them on entrepreneurial processing techniques, its practical utility and making their own product graded /marketable/ saleable. This project aims at improving the livelihood of youths through capacity building and skill development in selected enterprises of selected districts. The major population depends on agriculture and subsidiary occupation *i.e.* crop production, poultry, goatry and processing etc. for increasing employment and income generation.

National Agricultural Higher Education Project (NAHEP)

NAHEP has been formulated by ICAR with a total cost of US\$ 165 million (Rupees 1100 crores at the exchange rate of Rs. 66.75 = 1US\$) for five years starting from 2017-18. The project is proposed on 50:50 cost sharing basis between the World Bank

and the Government of India, implemented at the Education Division, ICAR- New Delhi. Overall, the project aims to develop resources and mechanism for supporting infrastructure, faculty and student advancement, and providing means for better governance and management of agricultural universities, so that a holistic model can be developed to raise the standard of current agricultural education system that provides more jobs and entrepreneurship oriented which are on par with the global agriculture education standards.

The mandate of ICAR/DARE includes promotion and coordination of education in agriculture, agro-forestry, animal husbandry, fisheries, home science and allied sciences in the country. ICAR is now embarking upon an ambitious step in further strengthening the National Agricultural Education system in the country through National Agricultural Higher Education Project (NAHEP) with financial assistance of the World Bank by investing on infrastructure, competency and commitment of faculty, and attracting talented students to agriculture.

The project would benefit all the Agricultural Universities (AUs), *i.e.* 63 State Agricultural Universities modeled on the US Land Grant University pattern, 5 Deemed to be Universities (DUs), 3 Central Agricultural University (CAUs) and 4 Central Universities (CUs) with Agriculture Faculty.

Student READY (Rural Entrepreneurship Awareness Development Yojana)

Student READY (Rural Entrepreneurship Awareness Development Yojana) programme is a new initiative of Indian Council of Agricultural Research to reorient graduates of Agriculture and allied subjects for ensuring and assuring employability and develop entrepreneurs for emerging knowledge intensive agriculture. This envisages the introduction of the programme in all the Agricultural Universities as an

essential prerequisite for the award of degree to ensure hands on experience and practical training depending on the requirements of respective discipline and local demands. This programme includes five components *i.e.* Experiential Learning, Rural Awareness Works Experience, In-Plant Training / Industrial attachment, Hands-on training (HOT) / Skill development training and Students Projects. All these components are interactive and are conceptualized for building skills in project development and execution, decision-making, individual and team coordination, approach to problem solving, accounting, quality control, marketing and resolving conflicts, etc. with end to end approach.

Experiential Learning (EL) helps the student to develop competence, capability, capacity building, acquiring skills, expertise and confidence to start their own enterprise and turn “Job Creators instead of Job Seekers”. This is a step towards “Earn while Learn” concept. The Rural Awareness Works Experience (RAWE) helps the students primarily to understand the rural situations, status of technologies adopted by farmers, prioritize the farmers’ problems and to develop skills and attitude of working with farm families for overall development in rural area.

Technology and globalization are ushering an era of unprecedented change. The need and pressure for change and innovation is immense. To enrich the practical knowledge of the students, in-plant training shall be mandatory. Hands-on training aims to make conditions as realistic as possible. The biggest benefit of hands-on training is the opportunity for repeated practice. Student project work provides several opportunities to students to learn several aspects that cannot be taught in a class room or laboratory. In order to provide such opportunities to the graduates of agricultural science, student’s project is proposed as one of the components of the Student READY. This programme will be very useful and beneficial to the

students/ graduates in gaining the competence for entrepreneurship, in building confidence, skill and acquire Indigenous Technical Knowledge (ITK) of the locality and thereby, preparing the pass-out graduates for self-employment and will play the key role in overall personality development. Efforts will help in improvement of the Agriculture Education System and sustainable development in the country.

Agriculture Incubation by NAARM

NAARM is successful in running an agriculture incubation centre for agriculturists. Incubation Vs Acceleration- doing the best to cater the needs through innovation. Many incubatory models Tech generators (CSIR labs, NDRI, TNAU etc.); Business development model (CIIE, a-IDEA, IIM-C, other management institution; PPP mode; Private incubators; Technology Parks; Startup India Scheme), technology generators and initiatives in India and entrepreneurs incubated by a-IDEA - Neelima Horticulture, Inner being, Agrobook, Saro Organic and Millet bowl can be adopted. Important aspect of incubation in NAARM such as business mentoring, networking and investors connecting can also be seen and replicated.

Involvement of Youth – Initiatives and Experiences of IIMR

IIMR incubation centre is sharing technology related to millet farming and marketing such as Market-driven crop production; Development of products and up scaling; Assessing consumer acceptability, price and market strategies, policy imperatives; Promotion and Commercialization of millet produces to the people interested in agribusiness.

Initiatives by MANAGE

a. AC&ABC Scheme for Agri-preneurship Development

MANAGE has been supporting rural youth to develop Agri-preneurship in rural areas by establishing Agri-Clinics & Agri-Business Centers at rural level by agriculture graduate. It is advised that all agricultural Universities should promote Agri-preneurship by adding it as a course; help bankable project preparation for self-employment and conducting visits to interact with successful entrepreneurs.

b. Skill Training for Rural Youth- (STRY)

MANAGE has initiated a pilot project called “Skill Training for Rural Youth-(STRY) to provide the different modular skill programmes to the rural youth in about 10 states of India. MANAGE is providing financial and technical support to the state Nodal agency SAMETI and ATMA/ BTT in implementation and running of the STRY in training rural youth of the age 18 years and above with minimum qualification of primary school education. This programme will be an opportunity for rural youth to take part in agriculture and allied activities development.

c. Farmers Capacity Assessment and Certification (FCAC)

The programme “Farmers Capacity Assessment & Certification- (FCAC)” works to create a pool of skilled work force of farmers in Agriculture & allied sectors and to provide recognition to the high degree of farm skills possessed by farmers & farm women. MANAGE directly functions in carrying out the programme by Release of funds to SAMETIs; Preparation of Skill Set standards for selected job for skill recognition; Review the implementation of the activities & monitor expenditure incurred by implementing agencies through SAEMTIs & ATMAs and preparation

of competency base assessment module / skill standards on various subject matter areas on location specific criteria.

SBI Programmes for Agriculture

Available opportunities provided by the SBI to the rural youth to take agriculture and in its development are in promoting integrated farming and produce marketing schemes; Nurturing SHGs and encouraging; Promotion on Skill development for rural youth; Kisan Credit Card facilities with subsidized rate of interest; encouraging farmers clubs; creating bondage between stakeholders; Value chain and Food Processing industry finance; Customized Farm mechanizations and Combined harvesters; Finances for Irrigation, dig well, bore wells, sprinkler, drip etc.; Cold storages and rural warehouses finance, export of processed medicinal and aromatic crop finance; Dairy value chain (scheme Dairy plus) and Chilling centre finance; Poultry finance and Contract farming finance and Quick gold loans for farmers to invest in their agribusiness.

Skill India Program by ASCI

Currently, Agri-startups are suffering with the inadequate talent in the job market, due to which the creation and growth of agriculture startups are facing challenges. But these constraints can be removed with the help of Agricultural Skill Council of India (ASCI) which is providing ample opportunities for the individuals with agriculture background to develop their skills as per the competency standards and qualifications. So, it is necessary to link them to the Skill India programme.

Arise – Launch Pad for Agri Startups by IARI

Arise is the Agribusiness Incubation program of ZTM- BPD UNIT, IARI in association with ICAR Institutes & State Agricultural Universities of North

India. After the success of first edition Agri Biz Idol Camp cum incubation Workshop in 2014, the Second edition of Arise was also organized as an initiative in sync with the Govt. of India policy of “Start-Up India” and “Skill India”. It aimed to provide a platform for budding Agripreneurs to provide innovative solutions to today’s market needs. 22 Business Planning and Development units (or Agribusiness Incubators) have already been established in the ICAR & SAU institutions. NAIP, Final Report 2014 stated that Business Planning & Development units all over India are currently providing incubation support to 1,218 entrepreneurs/Agri based startups, out of which 91 ventures have successfully graduated from the incubator.

Agri-Startup

Start up in the field of Agriculture is called as Agri Startup. Some of the earlier successful Agri Startups include Mitra, Agri Bazaar, Khedut, ecoZen, stellapps, skymet etc. Now the present day focus is on establishing more of enterprises to support the motto “Produce Job Providers instead of Job-Seekers.”

Some Case

a. Farming-as-a-Service

It offers services through the entire value chain in farming- from land preparation to crop harvesting. They can also play an important role in financial inclusion of farmers. They collect comprehensive information of the farm and on the basis of that provide correct information to banks which provide credit/loans to farmers

b. EM3 Agri Services

EM3 provides farm machinery vehicles on demand. Because most farmers cannot afford farm

machinery, therefore, EM3 provides these services on Pay-per-use mode

c. Other Agri-Startups in the fields of-

” Input

Manish Agri Biotech, Richcrore, Sri biotech, Super Agree Seeds, Barrix Agro Services, MITRA, Global Easy Water Project etc.

” IT Services

Reuters Market Light (RML), Basix Krishi, Mobile in Mud, Skymet, Uniphore, Eurvaka Tech etc.

Honey Mission

Hon’ble Prime Minister has given a clarion call “SWEET KRANTI” after which Honey Mission was launched by KVIC from May 2017. After implementation of the Beekeeping program by KVIC for 3 years, it was practically realized that Processing and Quality control parameters, Branding, Marketing tie-up etc., are lacking in the existing system of distribution of bee boxes to individual beneficiaries. Further, in the light of the geographical strength of abundant flora & fauna and keeping in view the population of the beekeepers across the country, it was felt necessary to expand the existing Beekeeping and Honey Mission activities by framing a composite program in ‘Cluster Mode’ to ensure assured income generation to farmers/Bee keepers as well as continuous production of Honey & other bee hive products. Consequently, Ministry of MSME deliberated upon the matter with Ministry of Agriculture & Farmers’ Welfare, Ministry of Social Justice & Empowerment and Ministry of Tribal Affairs, and decided to go ahead in cluster mode & adopt the model of the existing Scheme of SFURTI of Ministry of MSME and customize the same for establishing beekeeping clusters. The proposed cluster can be given a maximum grant of Rs.5.00 crore for more than 500 beekeepers, and a proportionate grant for lesser number of beekeepers, which, however,

shall not be less than 350 beekeepers in view of the viability of the cluster. This directly helped the young beekeepers to expand their work in cluster mode.

Value Addition and Technology Incubation Centre in Agriculture (VATICA)

ICAR has started this project in 100 KVKs to provide technical backstopping for capacity building of farmers, youth and FPOs through establishment of VATICA centre at KVK level with the following objectives-

- “ Extend post- harvest technology to reduce the losses in agriculture production.
- “ Provide the skill training on post- harvest management.
- “ Provide the technical knowledge for establishing the units.

Recommendations

Changing the image of Agriculture in India

Parents and educational institutes should work together to change image of agriculture as a small occupational activity to earn a living and support their family and inculcate get going attitude in the youth to use their opportunities in agriculture timely.

Technology support to Youth

Information kiosk at every village *panchayats* and Helpline Number or guidance portal should be established in each district for rural youth who seek information on agriculture and allied activities. Counseling sessions / awareness camps should be organized for supporting the youth in enterprise establishment.

Skill development programmes

Institutes should promote farmers and youth in rural areas with a model to train and provide

identified skills to make them take up entrepreneurship boldly and widely.

Public Private Partnership (PPP)

Need collaboration of institutes with companies to transfer technologies from lab to land which leads to development of Agribusinesses in the country and CSR skill development trainings and placements, which creates more employment opportunities to the rural youth.

Youth Involvement

There is a great need of youth involvement in constituting changes in Indian agriculture, taking their collective feedback and by providing good communication reach, advocacy and networks so that their mindset to entrepreneurial opportunities in agriculture is boosted.

Direct Marketing

To form Farmer's Producer Organizations (FPO) at rural areas to increase the profit through Agribusiness activities. Marketing of customized agricultural products to connect urban and rural consumers is their needs. Reducing the supply chain and attracting rural youth by opportunities of employment.

Linking Agri-clinic to every bank

To promote Agri-clinic and Agribusiness centers each bank has to be linked with development of Agri-clinic center in their area of operation, which creates effective awareness about entrepreneurship in India.

Target based Agri-finance

Banks need to set targets, incentives and credit guarantee facilities to avoid bankers from risk

in the promotion of Agri-finance by the bankers to farmers and rural youth. This will induce attraction of rural youth towards agriculture.

Income generation activities

If youth show special interest in value addition and small scale industries. Many opportunities listed out can be profitable for livelihood are such as Dairy farming; Meat production; Scheme based Inland and marine fisheries and Indigenous production of processing technologies.

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