

Agri-Business Opportunities

through Innovative Technologies, Prospects and the Way Forward

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Innovative technical knowledge, often termed as ‘improved technology’ plays an important role in yield and income enhancement in agriculture and allied sectors. Research institutions, especially the publicly funded ones, often tend to be the primary sources of such technical knowledge in the form of improved varieties, hybrids and other technology-based products. Dissemination of the same for large scale adoption by the end users has often been a limiting factor, given the inadequate infrastructure and/or resources at the disposal of these research and development-based institutions. Hence, as a means of spearheading large-scale dissemination of these innovative processes and products, a novel system of ‘developing and nurturing technology-based businesses’ has been gaining momentum world over, which also formed a part of the UNs millennial sustainable development agenda.

Key words: Agrinnovation, Agricultural Technologies, Technology commercialization

SIMULATING the model of innovation lead entrepreneurial development through commercial licensing and incubation, has widely been practiced in a number of research universities abroad, the ICAR, the apex body for all agriculture and allied sector based research organizations in India has adopted its own policy of Intellectual Property Rights and Technology Management policy(IP&TM) in 2006. This further helped ICAR to institutionalize a robust system of technology commercialization through licensing and incubation across the R&D institutions under its purview.

In a bid to double the farmers’ income within this decade, the GoI has made a number of regulatory reforms to support startups, launched Startup India with 19 Point Action Plan and hosted an Agricultural Grand Challenge to provide the startups with an ecosystem to flourish. As a part of this endeavor, 27 states and 3 UT have made tremendous policy reforms to uplift

the startup ecosystem and improve the entrepreneurial efforts since the last three years.

Huge investments in order of thousands of crores seems to have been ploughed into the Science and technology based entrepreneurial development modules. Besides the Government sponsored programmes like DST, DBT, Atal Incubation, NITI Aayog etc., several industry partners like CII, FICCI, and private entities are also floating investment support for S&T based entrepreneurial ventures. Though the basic tenant of these programmes appears to be encouraging science and technology based smart solutions for the problems and constraints faced by stakeholders along the agricultural value chain, their approach differs widely across the different programmes. Innovative, smart and quick solutions based on AI and IoT have wide ranging applications across the length and breadth of the problem situations. It is reported that an estimated 3000 and more entrepreneurial ventures

have been launched in the last five years trying to make an impact on the S&T based entrepreneurial development across different fields, with specific interest being on AI, IoT, smart farming solutions, market linkages.

However, in cases relating to the science and technology based solutions that also require to pass through stringent regulatory compliances like bioefficacy studies, generation of toxicological data and other specific ecological, social or other forms of compliances, it is seen that often several entrepreneurial ventures that get initiated with high competitive edge lose out soon. In this context, instead of reinventing the wheel, the startups could benefit from obtaining a license from the pool of technologies that have been developed over years of research and experimentation by the publicly funded R&D institutions taking into account the various specific requirements into consideration. The S&T based entrepreneurial options often need to pass through different

TRL levels and need to be de risked prior to being scaled up.

Initiatives by ICAR- Status and progress

After adopting its own IP policy in 2006, ICAR has institutionalized technology transfer office through its three tier system of technology commercialization process effective since 2007 with Intellectual Property & Technology Management (IP&TM) Unit at the HQ as the top tier, Zonal technology Management Centres (ZTMCs) as the middle tier and Institute Technology Management Units (ITMUs) for effective technology transfer at 72 of the research institutions under its purview. The system has been effective in commercializing over 1600 technologies to potential entrepreneurs and help set up several successful agriculture-based enterprises across the country.

In realization of the fact that some of these technology transfers often require scaling up and the licensees require handholding support both for

scale up and to reach the market, ICAR initiated the Incubation activities through financial support from the World Bank funded National Agriculture Innovation Project (NAIP) since 2009. A total of around 22 incubation facilities have been initiated for effectively supporting the licensees through incubation process for a period of 18-24 months.

Subsequent to the NAIP, ICAR has initiated and continued the financial support for incubation facilities through the National Agricultural Innovation Fund (NAIF) since 2016 onwards. A total of 25 institutions under the ICAR have been successfully operating incubation facilities promoting individual entrepreneurs and MSME enterprises license and scale up technologies. Besides, some of these incubation facilities are also encouraging new ideas and help early stage innovations through R&D support for scale up.

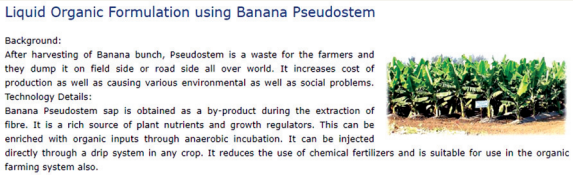
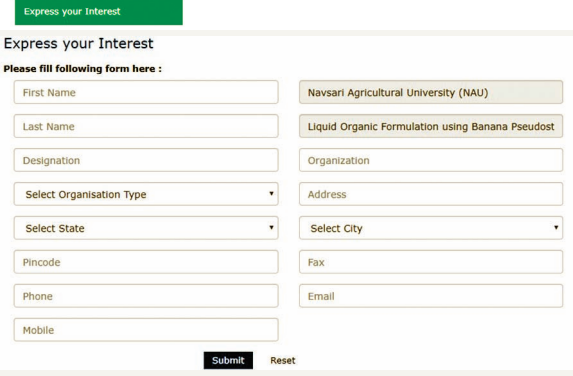
The fact that the technology-based

incubation facility of ICAR promotes market ready technologies that fulfill statutory compliances and regulatory frameworks, makes it easy for budding entrepreneurs to head start their businesses with immediate effect. A total of over 200 incubatees (virtual and real) have benefited from these incubation support activities, few have already broken even and have also obtained national and international recognition and funding support.

Genesis of Agrinnovate

Further, ICAR with an objective of enhancing its visibility and to cater a number of growing needs of different institutions and following the models adopted across the globe, has established a 'corporate face' that could promote technology transfers in a centralized manner- *Agrinnovate India Limited (AgIn)*, a Government of India Enterprise which was incorporated under the Companies Act, 1956 (No.1 of 1956) since October, 2011, under

Table 1. User Journey on the website (www.agrinnovate.co.in) to submit the Expression of Interest

Steps	Screenshots of related section
1: Go to available technology section to see the list of research institutions and technologies available	
2: Understand the technology details by going through the solution description and related pictures.	
3: Express your interest to take up the technology by submitting your contact details	

the direct administrative control of DARE, Ministry of Agriculture & Farmers' Welfare.

AgIn within the capacity of one of its kind public sector institution, besides its primary function of promoting technology commercialization, is envisaged to facilitate the process of large scale sourcing and supply of unique bio based products for mass production with appropriate legal and statutory compliances; facilitate professional service functions of National Agriculture Research and Education System (NARS) and to enhance the pace of commercialization through capacity building for national and international clientele.

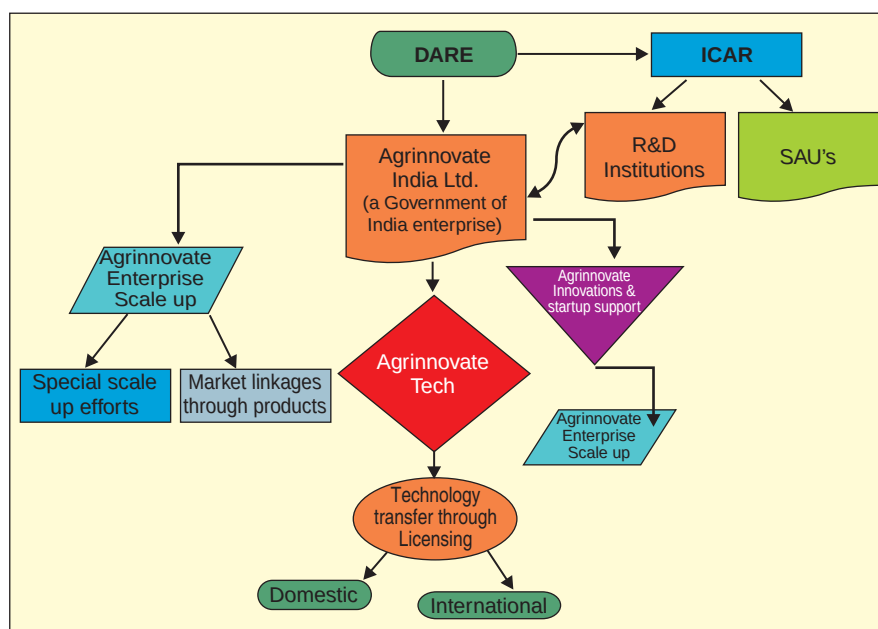
The concept of technology-based entrepreneurship development through effective technology transfer as a one stop shop for various agri based sectors through Agrinnovate has proved to be an efficient one in terms of saving both monetary and physical efforts of reinventing the wheel.

Agrinnovate India limited is promoted as:

- One stop shop for market ready agri technologies with suitable regulatory compliance,
- Facilitate strategic collaborations and turnkey projects (domestic and foreign) as per the client requirement
- Capacity building on IP and technology management and specific technology related programmes (both domestic and international)
- Technology valuation and pricing and Impact assessment for all agriculture and allied sectors including field crops, horticulture, fisheries, animal husbandry, dairy and agricultural engineering.

The technological solutions that could be obtained on a license from Agrinnovate include:

- Seed and Planting material (Field crops, horticulture)
- Bio based agri inputs (bio pesticides, bio fertilizers, Nano inputs with regulatory compliance)
- Animal husbandry, dairy and fisheries (diagnostics, vaccines, feed and nutritional products)



Proposed Integrated Technology Based Entrepreneurial Ecosystem for NARS.

- Post –harvest value added products (horticulture, meat, dairy & fisheries)
- Small and marginal Farmer friendly agricultural tools, implements and machinery
- Biotechnological products (protocols, GMO detection, molecular markers etc)

Based on a sound Intellectual property rights guideline, the company has adopted its own standard operation processes that ensure stringent compliance of processes and formats such as:

- Submission of Technology Disclosure Form along with a Costing Sheet
- Techno-Commercial Assessment Committee Meeting for approval of the Standard Terms of reference between Agrinnovate and the institution in the presence of a technical expert,
- Uploading of Standard Terms
- Advertisement and Business Development
- Expression of Interest received from clients on the web or otherwise,
- Due Diligence of the Client
- Mutual Agreement of the Terms of Trade between the company and the client
- Draft Legal Agreement and Vetting followed by
- Signing of Agreement, once the license fee is received from the client.

With a revamped web site indicating/listing institute wise technologies that are ready for commercial licenses cutting across different disciplines, (www.agrinnovate.co.in) any interested individual or a company can access the technologies and submit his/her expression of interest to Agrinnovate.

Despite its slow start since 2011 to 2018, Agrinnovate India limited today has commercialized more than 30 technologies and has earned more than a crore as license fee. Technology commercialization through Agrinnovate has helped the research and development institutions under NARS in streamlining the processes by having a uniform MoU across institutions, legal vetting of individual MoUs. Further, Agrinnovate has been able to provide a 'platform for technologies available in the system' at one place and has been able to facilitate 'multiple technology transfers' in one MoU. Clients can choose different technologies from different research institutions and have one MoU for the licensing. Agrinnovate is also being able to undertake international transfers and collaborate with organizations like CII, FICCI and several others. Having initiated the process and successfully completed several tech transfers assisting ICAR institutes as well as Stat agricultural universities, Agrinnovate is getting

pepped up to take additional responsibilities of initiating national and international level capacity building programmes and facilitate financial support for innovations and incubation in the future through an integrated system proposed here with.

Proposed integrated system for efficient management

Keeping in view the diversity of technology needs, a centralized model that encompasses an integrated approach to be promoted as a unique Government of India enterprise that integrates existing mechanism of technology transfer, incubation and start up support and at the same time indemnifies the organization at large.

Under this proposed model, effort is being made to bring the existing approaches under a single platform so that multiple duplicating mechanisms would get integrated.

Agrinnovate Tech: The primary function of technology transfer through licensing will be dealt under this programme through a centralized

portal where all the potential technologies from within the NARS (ICAR institutions and SAUs) will be listed and marketed through other digital platforms for large scale domestic and foreign licensing. Such a centralization would also help make the system leaner and more effective by reducing the number of 'active technology transfer offices' in the system.

In addition to the existing 'non-exclusive' licensing process, this would also include new initiatives such as 'limited exclusivity' based on geographic location and time.

Agrinnovate Enterprise Scale up: This arm of the integrated system would identify potential enterprises involving technology back up for specialized scaling up process. Agrinnovate would provide the much-needed financial support and help scale up the commercial production process, thereby, paving way for enhanced income for the organization. This could also include large scale production or sourcing of IP enabled technology products for supply. Such an initiative would help

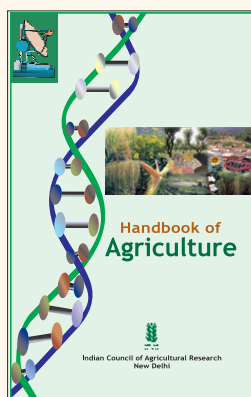
the licensees get validation of their products and also assured market of quality products, at the same time an assured income for the organization.

Agrinnovation and start up support: This arm of the integrated system would help promote startups through technology or business incubation models. The system would involve a specialized selection process and according financial support and also equity-based participation. Other components on need based capacity building, entrepreneurial development support and technology enabling facilities for both domestic and foreign could effortlessly get added to this arm.

Such models are already in existence across the world and have proven to be successful. Converting such a set up into a status of 'federation' would be the way forward for delinking the commercial wing from the existing system and making it a truly corporate arm.

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Handbook of Agriculture



The Handbook of Agriculture is one of the most popular publication of the ICAR with a wider readership. The present edition presents science-led developments in Indian agriculture, the ongoing research efforts at the national level and with some ideas on the shape of future agriculture. While information in some chapters such as Soil and water, Land utilization, field and forage crops has been updated with latest developments, many new topics such as the Environment, agrobiodiversity, Resource conservation technologies, IPM, Pesticides residues, Seed production technologies, Energy in agriculture, informatics, Biotechnology, Intellectual Property Rights, Agricultural marketing and trading and Indigenous Technical Knowledge have been included in the present edition. For those who take intelligent interest in agriculture – and their number is increasing fast – the present edition would serve as a useful book.

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