Ind. Jn. of Agri. Econ.
Vol.71, No.3, July-Sept. 2016

SUBJECT I
AGRO-INDUSTRY, AGRICULTURAL MARKETING, ENTREPRENEURSHIP, AGRI-BUSINESS, TRADE AND INNOVATIONS

Evolution of Agribusiness Incubation Ecosystem in NARES for Promoting Agri-Entrepreneurship

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ABSTRACT

The processes of technology transfer in research and development of agriculture are in the very early stages in Indian agricultural landscape. Starting 2006 the advocacy and implementation of a national Intellectual Property and Technology Commercialisation policy through the ICAR has gradually led to the evolution of National Agriculture Research and Education System (NARES) from a knowledge generator to a technology or demand-driven and market-led agricultural research and development system. This transition has been supported by funded programmes and projects leading to initialisation of technology commercialisation and agri-incubation processes across the country. These incubation centres are slowly emerging as vibrant hubs for technology transfer to industry and for attracting entrepreneurs into this sector. The study brings forth issues of long term sustainability of these early trajectories. The current mode of project based public funding needs to be put on a continuum endowed with more functional and financial autonomy. Only then, can these technology-transfer processes trigger an ecosystem of more agri-based start-ups, increased agribusiness and enhanced agri-entrepreneurship activities.

Keywords: Agribusiness, Research and development, Technology transfer, Agri entrepreneurship

JEL: Q13, Q16, O32, O34

I

INTRODUCTION

The Government of India has recently announced the "National Intellectual Property Rights (IPR) policy (Government of India, 2016a). The policy advocates promotion of a holistic and conducive ecosystem for catalysing the intellectual property for economic, socio-cultural development and protecting public interest. The policy document put forth seven objectives, namely, (i) IPR awareness: outreach and promotion, (ii) generation of IPRs, (iii) legal and legislative framework, (iv) administrative management, (v) commercialisation of IPR, (vi) enforcement and adjudication and (vii) human capital development. The policy aims at strengthening the national initiatives such as "Make in India" (Government of India, 2016b), "Skill India" (Government of India, 2016c), "Start Up India" (Government of India, 2016d),

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This study was conducted under the ICAR funded Nation Agricultural Innovation Fund project at ICAR-NAARM. The authors would also acknowledge the technical guidance given by Rama Rao, Director, ICAR-NAARM.

"Smart Cities" (Government of India, 2016e), "Digital India" (Government of India, 2016f). The flagship programme of the Government like Start Up India aims at building a strong ecosystem for nurturing innovations and start-ups in the country (Government of India, 2016d). Under this, Atal Innovation Mission (AIM) is the action plan envisaged with the focus on promotion of entrepreneurship and innovation in sectors such as manufacturing, agriculture, health and education (Government of India, 2016d).

India, being an agrarian economy with rich resources of traditional indigenous knowledge, biodiversity and human capital has a huge potential for promoting agri-based innovation. Such innovations promise some solutions to the current challenges facing only to be addressed by stakeholders across the entire agricultural production-consumption system (NAARM, 2014a). These innovations often need to be nurtured in a vibrant agri-business ecosystem. But any development of a competitive indigenous agri-business ecosystem requires sustainable innovation processes and entrepreneurship development plans (ACI and ETG, 2011). It is now well documented that agri-businesses through agri-entrepreneurship have immense potential to improve the livelihoods of stakeholders in agri-production consumption systems in rural regions (UNIDO, 2013).

Agricultural research and development (R&D) in India has mainly been driven by public sector (Pal *et al.,* 2012). The National Agricultural Research and Education System (NARES)[1] is a major stakeholder in agricultural research and education in India with a focus on technology creation and its delivery to other stakeholders such as farmers, producer groups, retailers, corporations, civil societies and private players (ICAR, 2015). The current needs of the stakeholders warrants NARES to transform into a more pluralistic innovation system addressing the needs of the consumers (NAARM, 2014b). It is important that the research outputs from the NARES system should be able to reach as a product to the end users; these include innovative technologies, processes and products which can provide solutions to the some of the many and fast-emerging across the agricultural production-consumption systems. Concurrently, the success of these technologies can also enhance livelihoods of the stakeholders. Recognising this, the NARES has gradually started shifting from '*a producer-driven* to *demand driven and market-led'* agricultural R&D system. This transition process has led to emergence of issues of technology transfers through commercialisation from public research, gaps of knowledge in new product development (NPD) processes for the markets and attracting entrepreneurs[2] to this sector.

II

OBJECTIVES

The objectives of the present study are to (i) review the existing system and practices of commercialisation and incubation of technology NARES; and (ii)

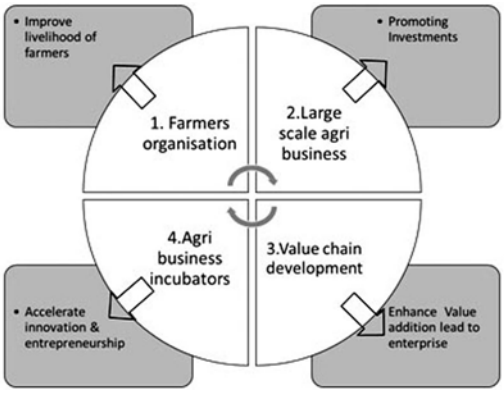
suggest road map for sustainability of incubation system for acceleration of agri-based start-ups and agri-entrepreneurship.

III

EXISTING PRACTICES OF TECHNOLOGY COMMERCIALISATION

3.1 *Approaches for Commercialisation*

A review of the existing literature indicate there are mainly four approaches for commercialisation in agriculture (Figure 1). Strengthening farmers' organisation leads to better livelihoods; involvement of large scale businesses bring more investments; while value chain development bring value addition leading to entrepreneurship (ACI and ETG, 2011). The fourth approach is through building agribusiness incubators[3] which can provide a platform for innovation and entrepreneurship (Sharma *et al.*, n.d.).



Source: Adapted from ACI and ETG (2011).

Figure 1. Approaches for Commercialisation in Agriculture

3.2 *Concept of Incubation*

Incubators are recognised as "technology-led and knowledge- driven enterprises" as they help in speedy commercialisation of innovations and research outputs. Technology business incubators not only help in growth of technology based new enterprises but also improve their survival rate from 30 per cent to 70 per cent (NSTEDB, 2016a). These also help in mustering support services for start-ups, finding funding agents such as venture capitalists, angel investors and better networking opportunities for locating good markets.

Compared to other sectors like engineering, pharmaceuticals, ICT, machinery, consumer goods etc., and this concept is at an early stage in the agriculture and food sector. Even at the global level, there is start of evolution of a variety of agribusiness incubators and many are still at early stage levels. Table 1 enumerates some of the

current models in operation. These include public sector research institutional funded types, viz., ABI, ICRISAT, India; IAA-IPB, Indonesia; CENTEV, Brazil; and private, non-profit funded institutions like Vilgro. The type of focus of these incubators is also variable. While some are focused at sectoral level (Timbali, South Africa) and seek to add value to innovative agri-products with application across the specific value chain, there are few initiatives like MLSF, Malaysia which focus only on high-technology operations and at trans-border levels. Interestingly, there is also an emergence of incubators nurturing low cost technologies with applications impacting rural populations (Vilgro, India; Timpali, South Africa).

TABLE 1. TYPES OF AGRIBUSINESS INCUBATORS

Types (1)	Example (2)	Pros (3)	Cons (4)
I. Agribusiness value chain/ sector development incubators	(i) Fundacion (Chile) (ii) Technoserve (Mozambique) (iii) iundacion Jalisco (Mexico) (iv) Timbali (South Africa)	(i) Strong network and management basis (ii) Abundant and patient capital (iii) Leverage services (iv) Provide linkage of smallholders to niche markets	(i) Costly to start up (ii) Difficult to duplicate (iii) Highly dependent on external funding (iv) Limited sector impact
II. Agricultural research commercialisation incubators	(i) ABI-ICRISAT (India) (ii) IAA-IPB (Indonesia) (iii) CENTEV (Brazil)	(i) Access to pipeline technology (ii)Strong linkage with research community	(i) More production than market oriented (ii) Subordinate to the research organisation to which it is affiliated
III. Technology transfer incubators	(i) High Tech MLSF (Malaysia) (ii) Low Tech Vilgro (India)	(i) Pioneering trans-border high technology transfer (ii) Abundant capital (iii) Works effectively at the bottom of the pyramid launching continuously new programs	(i) Difficult to mix different high-tech culture (ii) Rapid launching if new programs may diminish capability to carry out core incubator task

Source: Infodev, 2013.

IV

TECHNOLOGY COMMERCIALISATION TO INCUBATION IN INDIAN NARES

The processes of technology transfer from academic institutions to industry have emerged during the last two decades following the "Bayh-Dole Act of 1980", an amendment to the patent code of United States (Young, 2005). It paved way to claiming ownership in intellectual property on research funded by U.S. Government. Soon this led to similar initiatives in Europe (Max-Planck, 2016), UK (Lambert Toolkit, 2016), South America (EMBRAPA, 2016), Malaysia (MARDI, 2016), and India (Rao and Sastry, 2004). In the Indian NARES, Indian Council of Agricultural Research (ICAR) had taken the stewardship of technology commercialisation through the promulgation of IP and technology commercialisation policy in 2006 (ICAR,

2006). Since 2007, the institutionalisation of the policy was initiated through development of a set of operational guidelines (ICAR, 2014a,b) and also through establishment of a governance mechanism in a three-tier mode across all the 100 institutes of ICAR (Samuel *et al.*, 2014).

4.1 *Intellectual Property and Technology Management (IP&TM)*

The IP&TM scheme launched during 2008 can be seen as a driver towards implementation of the policy (ICAR, 2014a,b,c). Under this scheme, Institute Technology Management Units (ITMUs) were established across all the 100 institutes in ICAR. Five Zonal Technology Management Units (ZTMUs) were constituted with the mandate to oversee the activities of the ITMUs in the respective zones. The overall supervision of the scheme was by IP&TM unit at ICAR headquarters, guided ably by Agricultural Technology Management Committee (ATMC) comprising recognised experts and the top management of ICAR. Capacity building of the manpower engaged in the scheme formed the primary focus of the initial implementation process leading to series of awareness building and sensitisation programmes. These initiatives resulted in emergence of a pool of about 100 trained IP professionals across the system. Notwithstanding initial apprehensions on IP protection towards stimulate investment in research in agriculture (Kumar and Sinha, 2015), these initial steps of ITMU scheme grants led to the building of vibrant IP ecosystem in the NARES. In terms of visible gains, the number of filings under various IP categories have increased significantly in the recent decade (Table 2). The recent recognition of ICAR as an organisation through grant of the 'Thomson Reuters India Innovation award 2015' is yet another testimony to this fact (Thomson Reuters, 2016).

TABLE 2. IP PORTFOLIO MANAGEMENT IN ICAR

IPR dimensions	Status	Before 2007	2007-2015	Per cent increase
(1)	(2)	(3)	(4)	(5)
Patents	Applied	363	980	270
	Granted	100	170	170
Plant varieties	Applied	0	1024	NA
	Granted	0	700	NA
Trademark	Applied	3	70	2333
	Granted	3	21	700
Designs		0	17	170
Tech. know-how		40	290	725

Source: Saxena, 2016.
Note: Protection of Plant Varieties and Farmers Right Act became functional after 2007.

4.2 *Business Planning and Development (BPD)*

The establishment of BPDs in NARES started with National Agricultural Innovation Project (NAIP) with funding from World Bank. Under this project 10

BPD units were initially established (5 in ICAR institutes and 5 in SAUs) during 2010 for the first time in NARES. Based on the experience and with a view to up-scale across the system, 12 more BPD units were established during 2013-14. The overall objective of the project grants was to initiate this new mode in NARES and internalise into the system after project is completed. Progress and achievements of all the 22 incubators are given in Table 3.

TABLE 3. ACHIEVEMENT OF BPDs IN NAIP

S. No.	Indicator	Phase I (2009-2013)	Phase II (2013-14)
(1)	(2)	(3)	(4)
1.	Number of technologies commercialised	274	57
2.	Number of entrepreneurs incubated/enrolled	1068	150
3.	Number of incubatees graduated	87	4
4.	Number of entrepreneurs supported/ trained	2448	1295
5.	Client servicing (commitment/delivered)	1339	134
6.	Revenue generated for the BPD (Rs. lakhs)	2230.97	202.52
7.	Amount of funding mobilised for incubates (in lakhs)	1711.05	226.68
8.	No. of consultancy assignments undertaken	161	122
9.	Farmers directly benefitted with value addition	39395	1786
10.	Number of local employment generated (direct) through incubatees	219406	567
11.	Number of mergers and acquisitions, joint ventures, tie-ups	57	59
12.	BPD surplus fund (Rs. lakhs)	187.23	39.96
13.	(a) Number of applications filed for patent	265	20
	(b) Number of patents granted	30	7
14.	Number of scientists trained overseas in the frontier areas of science	6	2
15.	Number of scientists trained overseas in consortium-based subject areas	387	2
16.	Number of scientists participated in conference/seminar etc. abroad	21	3
17.	Number of novel tools/protocols/methodologies developed	34	35
18.	Publications	1055	266

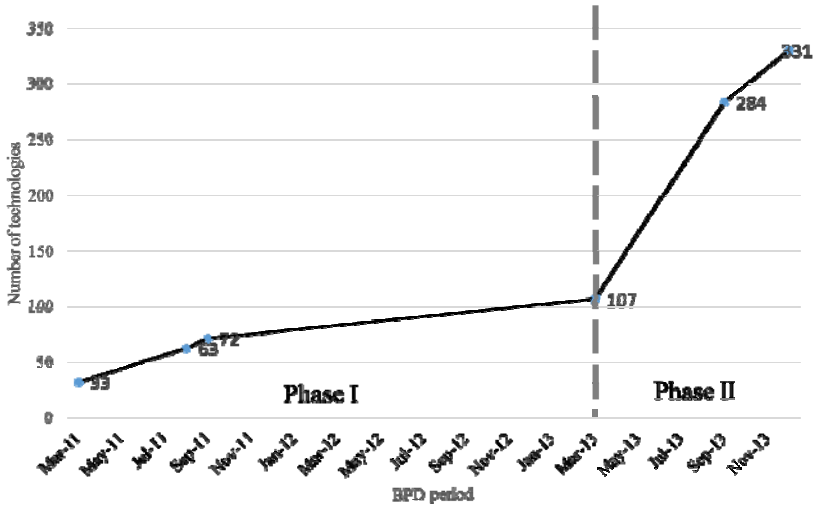
Source: Karuppanchetty *et al*., 2014.

Note: Phase 1 consists of 5 ICAR institutes (CIFT, CIRCOT, IARI, IVRI and NIRJAFT) and 5 SAUs (AAU, BAU, HAU, JNKVV, TNAU), Phase 2 consists of 12 ICAR institutes (CIAE, CIBA, CIFA, CPCRI, CIPHET, CPRI, CRRI, IIHR, IISR, IIVR, NAARM, NDRI). Period of Phase I: 2010-13, phase II: 2013-14.

Units under BPD projects sought to provide a wide range of services ranging from incubation facilities, research support and business services such as office space, access to Information and Communication Technology (ICT) services, advisories on management, and marketing, technical, legal and financial issues (NAIP, 2014). The work in this project also evolved new partnerships between NARES institutes and technology seeking companies through technology validation, technology transfer and enterprise development processes.

The impact of units under the BPD project can also be gauged through concerted efforts of nurturing and skill development of entrepreneurs along with commercialisation of technologies. During the five-year duration (2010-15) capacity enhancement of scientists engaged in the project formed the initial focus of activity. This was done with the primary intent to sensitise and bring a change in the thinking and functioning of core R & D personnel towards technology transfer processes to prospective technology takers. Commercialisation of the technology formed the next

focus. The project successfully demonstrated scaling up of nearly 330 technologies through commercialisation and market intervention. The results indicate a ten-fold increase in the commercialisation of technologies since its initiation of BPD projects (Figure 2).



Source: Karuppanchetty *et al.*, 2014.

Figure 2. Technologies Commercialised by BPD Units (2011-2013)

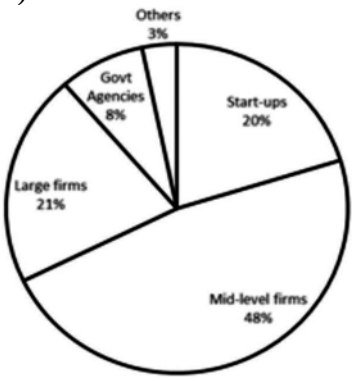
The third focus of BPD project was on conducting training programmes for prospective entrepreneurs in commercialised technologies. This initiative attracted 1,218 entrepreneurs who were part of the incubation centres and many as 91 incubates graduated from these centres during the project period.

The project also helped the entrepreneurs to commercialise their business ideas using research facilities of the institutes and provided pilot level production facilities for the prospective entrepreneurs. Further, BPD units also provided space for incubated innovation ideas and development of prototypes to attract investors.

The type of technology takers ranged across various levels of hierarchy (Figure 3); with 48 per cent from middle-level firms and 21 per cent from large agribusiness. On the other end about 20 per cent of licensees were start-ups and first timers in agribusiness. Additionally, about 8 per cent of transfers were to Government agencies and schemes which is in the tune with mandate of public institutions of direct support to its stakeholders. These initiatives can be viewed as part of enhancing the social capital from R&D outputs of public sector organisations.

A substantial amount of revenue was also generated by the BPD units through different services, viz., consultancy (41 per cent), technology transfer (40 per cent), training (3 per cent), and membership (4 per cent) (Figure 4). A total of Rs. 2468 lakhs was gained through this services in this project (NAIP, 2014). In terms of

broader outcome of the BPD project, data indicates creation of more than 2,00,000 jobs in agribusiness sector with benefits reaching more than 1,40,000 farmers directly or indirectly (ICRISAT, 2015).



Source: Karuppanchetty *et al.*, 2014.

Figure 3. Diversity of Technology Takers through BPD Units.

Source: NAIP, 2014

Figure 4. Revenue Generation Source of BPD Units

As part of networking incubators with prospective technology takers, NAIP-ICAR in collaboration with ICRISAT organised the first agri-investors meet in July 2013. About 400 members representing industry, agri-scientists, investors, prospective entrepreneurs and incubates participated in the meet, where 40 agro technologies based on R & D efforts across NARES were projected. The meet led to 98 B2B (Business-to-Business) meetings among scientist-industrialists and scientist-agri entrepreneurs; and to 43 Letters of Interest (LOIs) signed for commercialisation of technologies by end of the meet. About 53 technologies were commercialised to 80 licensees generating a total revenue of Rs. 3.17 crores to NAIP/ICAR. Thus, units under BPD project have not only emerged as a new source of revenue generation for NARES institutions but also stimulated the creation of a new ecosystem of agri-entrepreneurship and agribusiness particularly in SME sector (NAIP, 2014).

4.3 *Promotion of Innovation and Incubation*

The initial success achieved in the ITMU scheme for initiation of technology transfer process in ICAR and later through the achievements through the BPD units established under the NAIP project funded by World Bank laid the basis for providing a continuum in the NARES for technology commercialisation, incubation and entrepreneurship development. The experience in these two projects led to the new thinking process across policy makers and NARES leading to development of National Agricultural Innovation Fund for implementation with respect from 2015 as part of the XIIth plan activity of ICAR. Currently in operation, this has three components namely, (i) Component I -Innovation Fund; (ii) Component II-Incubation Fund; and (iii) Component III-Attracting and Retaining Youth in Agriculture (ARYA) (Table 4).

TABLE 4. COMPONENTS OF NATIONAL AGRICULTURAL INNOVATION FUND

Name (1)	Innovation fund (2)	Incubation fund (3)	ARYA (4)
Targets	(i) IP & TM (ii) PME, (iii) Grassroots innovation (GRI) fund	50 agri-business incubators in NARES	Encouraging potential rural youth
Objectives	• Best practices and single window system • Strengthen institutional mechanism to protect IP • Promote creativity and innovation in ICAR institution • Supervision of intellectual assets • Capacity building in IPR and technology commercialisation • Manage new knowledge • Nurture grassroot innovation* IP-driven handholding • Sustainable innovation management in ICAR institutes	• Strengthen and expand the agri-business incubators • Promotion of viable enterprises and sustainable employment of entrepreneurs • Scale up of pilots in value chain • Training entrepreneurs • Support technology development • Money support for incubates	• Mentor/handhold rural youth with technical and financial support • Attract youth in rural areas in agriculture and allied sectors for sustainable income and employment • Establish network groups for capital intensive activities • Develop functional linkages between institutions and stakeholders for sustainable development of youth
Project implementation in 2016	(i) Redesigned model of commodity driven ZTMC; (ii) Continuing ITMU scheme (iii) PME guidelines developed and implemented (iv) Developed operating guidelines for GRI (v) Common SOP for valuation and pricing of technologies under process	(i) 27 ABIs in ICAR institutes granted and initiated	First phase grant for ARYA sanctioned to 25 KVKs

Source: ICAR, 2014c.

Note: *A grassroot or rural innovation can be defined as the process(es) that take place in rural areas when knowledge, technology or information is made available and is put to productive use in society.

Under the component I it is clear that IPTM scheme is now into the next phase to provide a continuum of early work. Further, the existing Prioritisation, Monitoring and Evaluation (PME) for the R & D is integrated under a single window of innovation fund. The intent is to streamline the existing mechanism of R & D systems under the single window thus easing the operations. The Grass Root Innovation (GRI) is a new initiative which seeks to promote grassroots innovations to enhance and complement existing R & D efforts in agriculture (Sastry and Tara, 2014). Under the component II of the NAIF, a target of 50 agribusiness incubators has been envisaged. Till date, 27 ABIs have been granted on a competitive basis. It is expected that the second call for applications would be announced soon and reach enhanced to other foci including University R&D centres. The third component (ARYA) has been provided with an aim to develop rural enterprises with youth in villages with the proven technologies. This is being implemented through 25 KVKs selected on competitive basis.

V

TECHNOLOGY BUSINESS INCUBATORS (TBIs)

National Science and Technology Entrepreneurship Development Board (NSTEDB) of Department of Science and Technology, Government of India has been promoting knowledge and technology intensive enterprises through Science and Technology Entrepreneur Parks (STEPs) programme since 1982. Currently 18 are in place and agriculture forms a part of the mandated areas.

Since 2000, NSTEDB initiated Technology Business Incubators (TBI) programme for nurturing technology and knowledge based start-ups. In general, the type of services provided by TBI includes market research, developing business plan, technical assistance, other support assistance such as obtaining approvals, arranging legal and IPR services, using facilities of host institute at minimal charges and proving workspace for initial period with other ICT facilities (NSTEDB, 2016a). There are 68 TBIs established under NSTEDB in India (NSTEDB, 2016b). Interestingly, only three TBIs have been granted with primary focus in agriculture sector; of these two are established in ICAR and one in SAU (Table 5). Another 20 TBIs in other sector shave nurtured technologies with plausible applications in agricultural and food sector (NSTEDB 2016a). An infrastructure support provided by the TBI in agri-business and agri-biotechnology includes wet labs, testing facilities, support equipment areas, discussion rooms, and conference rooms.

In terms of performance, 54 per cent of the incubate companies from 68 TBIs are valued more than INR 2 crores and 23 per cent of them are valued at INR 1-2 crores and other 23 per cent are valued less than INR 1 crores (NSTEDB, 2014), on an average, 62 per cent of the seed investment of these companies equity and 38 per cent from debt. In 2012-13, about 32,000 employment was generated by incubates and graduate companies with an annual turnover of Rs. 1500 crores. As many as 450

patents/copyrights were also filed (NSTEDB, 2016a). All this indicates positive impact of TBI towards acceleration of entrepreneurship in the country.

TABLE 5. LIST OF TBIs IN NARES

S.No. (1)	Name of the TBI (2)	Initiating year (3)	Trust area (4)	Name of the institute (5)	Location (6)
1.	Association for Innovation Development of Entrepreneurship in Agriculture (A-IDEA)	2014	Agri-business	NAARM	Hyderabad, Telangana
2.	Society for Innovation and Entrepreneurship in Dairying (SINED)	2009	Biotechnology (food/agri), agri-business (agri-products)	NDRI	Karnal, Haryana
3.	Agri- Business Development-TBI	2011	Biotechnology (food/agri), agri-business (agri-products)	TNAU	Coimbatore, Tamil Nadu

Source: NSTEDB, 2016b.

VI

THE CANVAS OF AGRIBUSINESS INCUBATION ACROSS INDIA

The canvas of agribusiness incubation initiatives is wide and diverse with players from Government, NGOs, professional bodies and international organisations (Table 6). Most of these efforts span across all sectors with few focused on agriculture and food sector. Focus on agriculture started its footfall formally in 2000. With the recent announcement of start-up India and National IPR policy, a need for more networking across the canvas is emerging. Consolidation of efforts across diverse centers will and encourage cross learning within each sector and across sectors.

ICAR started its journey after 2006, when it announced IP and technology commercialisation policy. In fact, the initial steps undertaken in technology transfer through IP & TM scheme and later through BPD project are in line with National IPR policy announced by Government of India in May 2016. Hence, it is imperative that NARES would develop mechanisms to link with other operators in incubation and entrepreneurship space across the country.

VII

NARES ABIs VIS-À-VIS OTHER INCUBATORS IN INDIA

An attempt was made to synthesise data from NARES ABI system and across incubation system operating through other agencies across the country. The data in Table 7 indicates that the advent of NARES ABIs has been recent and less than decade old. Focus of all ABIs in NARES is essentially on agricultural food PCS only. While several other incubators serve a range of sectors. In terms of governance, the ABIs seem to be more bound by institutional hierarchy and processes as compared to the loose and flexibility models in other TBIs. While most ABIs are still functioning

on R&D models led by R&D professionals, TBIs management teams function with professionals in the field of enterprise building.

TABLE 6. EVOLUTION OF TECHNOLOGY TRANSFER COMMERCILISATION AND INCUBATION IN INDIA

Year (1)	NARES (2)	Government of India (3)	Other initiatives (4)
1980		▪ STEP (DST)	
1990		▪ Honey bee network	
			o SRISTI (NGO)
1997			o GIAN (NGO)
2000		▪ TBI (DST)	o NIF (DST)
2001			o Vilgro (non-profit)
2004			o ISBA (Prof.)
2006	❖ IP policy document	▪ MSME Act	
2007	❖ IP & TM Units		
2008	❖ BPD (Phase I)-NAIP	▪ PMEGP	
	❖ Capacity building		
2010		▪ MSE-CDP	
		▪ MDA scheme	
2012		▪ BIRAC (DBT)	o NIABI (Network)
2013	❖ Phase II of BPD		
	❖ Agri investors meet		
	❖ ICAR guidelines		
2014	❖ NAIF		
2015	❖ ABI announcement		
2016	❖ ABIs- 27 established	▪ Start-up India	
		▪ National IPR policy	

Source: Authors compilation from different sources.

Notes: PMEGP- Prime Ministers Employment Generation, MSE-CDP-Micro and Small Enterprise-Cluster Development Programme, MDA-Market Development Assistance, BIRAC-Biotechnology Industry Research Assistance Council, SRISTI- Society for Research and Initiatives for Sustainable Technologies and Institutions, GIAN-Grassroots Innovation Augmentation Network. Restricted to agriculture sector, NIF-National Innovation Foundation, ISBA-Indian STEP and Business Incubators Association, NIABI-Network of Indian Agribusiness Incubators.

TABLE 7. COMPARISON OF ABIs AND OTHER INCUBATORS IN INDIA

(1)	Parameters (2)	ABIs (3)	Other incubators (4)
I.	General information		
	i. Objective	Strengthen the ABIs created through NAIP, support potential agri technologies of NARES towards enterprise development, capacity building of agri entrepreneurs, providing suitable platform for incubation of GRI	Creating technology based new enterprises, facilitation of transfer of technology, employment generation and economic development
	ii. Nature	Non-profit unit at public sector R&D institute; institutional funding only project	Both profit and non-profit organisations exists. More than two third TBIs are promoted by government; few promoted by banks and private company

(*Contd*.)

TABLE 7. CONTD.

(1)	Parameters (2)	ABIs (3)	Other incubators (4)
	iii. Sources of funding	ICAR supported project	Central government, host institute, financial institute, private sector companies/colleges etc.,
	iv. Year of starting	ABIs started in 2016, Initial experience: BPD (2008-14)	Varying, First started in 1980s (STEPs), 2000(TBI, Vilgro)
	v. Thrust areas	Agriculture and food sector	Diverse - ICT, manufacturing, biotechnology, agriculture, healthcare; rural, electronics etc
	vi. Linkage with start up India	Not yet	Forms part of the start-up India hub
II.	Governance		
	i. Governance Structure	It a project based mode with control by the sponsoring agency. A internal screening Committee at institute level and steering committee at ICAR	Promoted by Central Government and have a loose control on day today activities. There is a Governing/Advisory Board (11 to 15 members) and Executive management team at TBI * Based on TBI (NSTEDB), similar structure exists for others
	ii. Management Team	More R & D personnel	Business management teams, includes Chief executive, professional and technical experts
	iii. Monitoring and Evaluation	Exist	Review mechanism of NSTEDB is through a National Expert Advisory Committee
	iv. Selection	Selection through screening	Prescribed format exists. Selection is through a pre-screening followed by review by selection panel and then an interview with expert panel
	v. Mentoring	Exists	Exists
	vi Graduation of incubates		Based on a formal criteria
	vii. Exit policy for incubates	In place at respective ABIs;	Defined exit policy
	viii. Legal status	No independent legal status; works as a part of the ICAR institute	Not for profit registered societies
	ix. Link with TTO	Strong linkage with R & D & technology within institute or other ICAR institutes	Have linkage with R & D in the institute and with other private agencies
	x. Best practices	Not yet	Exists
III.	Services provided		
	I. Infrastructure	Documented in application but not specified	Specified: Range from 5000 sq.ft. to 25,000 sq.ft depending on th thrust area
	II. Prototype testing	Still in nascent stage	Most incubators have established large facilities and outsource services
	III. Decisions	Top driven; Institute head	Empowered at TBI level, more flexibility and autonomy
	IV. Funding of new ventures	No seed support	Have seed support, have a weak support from, angel investors, VCs but improving over years

(Contd.).

TABLE 7. CONCLD.

(1)	Parameters (2)	ABIs (3)	Other incubators (4)
	V. Partnership	Still in infancy	Partnership with international organisation, Co-funding partnerships
	VI. Networks	Within ICAR	Diversity of industry, academia
IV.	Performance and outcomes		
.	Graduates; type of firms	(i) 91 graduated in 2010-2014 (ii) 20 per cent of them were start ups, 48 per cent (mid-level firms), 21 per cent (Large firms) (iii) More than 2,00,000 employment generated *Base on previous efforts (BPD project)	(i) 500 tenants graduate every year (ii) 60% of them technology based start ups (iii) 32,000 employment estimated *Based on TBI (NSTEDB). Similar trends exits in other TBIs

Note: Data collected by authors.

The nascency of ABIs is further elaborated in range of network and linkages which are limited to NARES and need to be extended. The support for infrastructure for pilot plants and services is more in TBIs attracting more entrepreneurs. There is a significant need for prototype testing in ABIs. All these factors contribute to higher levels of performance in TBIs. For the ABIs, there might be a late entry into this platform but significant gains of reaching the 1,40,000 farmers, the primary stakeholders is positive indicator. The scope of employment generation in this sector also indicates strong need to complement the ongoing efforts in NARES ABIS and bring in lessons learnt in other sectors for more visibility.

VIII

CONCLUSION AND WAY FORWARD

The study clearly indicate enhanced opportunities for nurturing and building new enabling platforms for agri-business and agri-entrepreneurship in the country. Considering the large diversity of players in the entire agricultural production-consumption systems, there are focused areas for improving the system through R & D. The technologies and products need to be transferred through systematised approach and through forging more business partnership between technology developers and the seekers. The journey of NARES into technology transfer process has started only in 2006 as compared to initiatives in other sector. However, it may be pointed out that ICAR initiatives are in synchronisation with recently announced national IPR policy 2016. Hence it is crucial that NARES take forward this initial success in a more objective manner and become part of larger canvas operating in the country. Forging formal links and developing partnership with schemes and projects operating under other agencies of Government of India (DST, DBT), successful NGOs, professional bodies and associations is one way to take forward the early initiatives and success gained. Accelerating technology transfer process can trigger

more agri-based start-ups, and attract more entrepreneurs across the country. The study indicates that most of the successes achieved by the NARES has been through funding from projects. For a long term sustainability, it might be necessary to build in more functional and financial autonomy to accelerate incubation and entrepreneurship in the agribusiness ecosystem.

NOTES

1. NARES (National Agricultural Research and Education System) includes institutes under Indian Council of Agricultural research (ICAR) and State Agricultural Universities (SAUs).

2. Incubator is an organisation that "seeks to give form and substance – that is, structure and credibility- to start-up or emerging ventures. Consequently, a new business incubator is a facility for the maintenance of controlled conditions to assist in the cultivation of new companies." Commonly classified by ownership and capital sourcing, there are three types of incubators: (a) Public (b) Private (c) Academia/University.

3. Entrepreneur is an innovator who introduces new technological process or products. Entrepreneur alters technological possibilities and alters convention through innovative activity, and lifts up production constraints.

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