Agricultural Extension in South Asia

FACE-TO-FACE

"Innovation is not just about technology—it is about building an ecosystem. Our experience taught us that inclusivity and science-backed validation are critical. Startups need more than ideas; they need market linkages, mentorship, and funding access.

Rural agri-food entrepreneurship is still nascent, and new models are needed to evolve for seeding this. I feel that a "Scale-deep" strategy may be more appropriate than the conventional "scale up/scale down models" as we build rural the new age agri-food entrepreneurs.

Kalpana Sastry R
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INSIGHTS INTO AGRIBUSINESS INCUBATION: In Conversation with Dr Kalpana Sastry

Dr. R. Kalpana Sastry is a distinguished agricultural scientist with more than three decades of expertise in agricultural research, technology, and innovation management. She played a key role in developing the agribusiness incubation system in the Indian National Agricultural Research, Education, and Extension System (NAREES).

In a freewheeling chat with Rasheed Sulaiman V, Kalpana discussed her professional journey spanning over three decades and what she has learned about the agribusiness incubation ecosystem in India.

From an agricultural scientist trained in plant pathology to the Managing Director of an Agribusiness Incubator—with several diverse responsibilities in between—you had a very dynamic career spread over three decades. When you look back, how do you feel?

In one word, I feel *fulfilled*. Looking back, I have a deep sense of accomplishment and pride in navigating a dynamic career that has evolved across multiple roles—from science-based research to assuming leadership roles in agribusiness incubation. More importantly, this journey has reinforced my belief that there is always more to do: more to contribute, more to shape, and more to give back to stakeholders. I now realize that true impact comes not just from knowledge creation, but from decoding those science-based technologies into actionable solutions at the ground level.

A pivotal lesson learnt is the importance of human connection in building successful innovation pathways. Too often, technology developers focus solely on lab-based solutions, overlooking the perspectives of end-users—farmers, entrepreneurs, youth, and grassroots practitioners or agri-

enterprises. Ideation has no boundaries; it thrives across value chains. The translation of an idea to innovation is more successful when it is collaborative, inclusive, and grounded in real-world needs.

I believe this is the opportune moment for India's NAREES to foster an enabling ecosystem that not only catalyses real-time innovations but also bridges scientific rigour with entrepreneurial agility. By aligning scientific insight with grassroots ingenuity, we can drive meaningful impact and build profitable agribusinesses. Now is the time to transform agri-innovations into scalable, livelihood-generating enterprises.

Do you think your selection as Senior Scientist/Faculty at ICAR-NAARM in 1996 helped you better understand the nuances of research management, including the importance of technology commercialization and intellectual property rights (IPR)? How did you learn many of these new topics?

Absolutely. Joining ICAR-NAARM in 1996 marked a defining shift for me—transitioning from a "wet lab" scientist trained in plant pathology to exploring the broader landscape of agri-research management. It was a challenging yet transformative transition, reinforcing the adage: *"Change brings opportunity."* This was also a period when global agriculture was grappling with new scenarios, necessitating integration into global trade. My job's mandate was Intellectual Property (IP) management—a nascent but critical area for NARS. To navigate this, I immersed myself in rigorous training, undertook research projects, and studied global best practices.

The ICAR-National Academy of Agricultural Research Management

This phase taught me that innovation is not just about discovery—it is also about governance, strategy, and commercialization. It shaped my ability to view challenges through multiple lenses: scientific, institutional, and policy-driven. I must admit, the mentorship and support system I received—both within my institute and across the broader ecosystem—were critical in formalizing my transition and accelerating my growth.

It was beyond technical learning; it was about expanding my understanding of the intersection between science, technology, and law, and infusing policy engagement, institutional frameworks, and strategic advocacy. Shaping public policy for agricultural innovation became an integral aspect of my career, and I was fortunate to be part of national policy teams on IP and technology transfer. This participation helped me learn and sharpen a diverse set of competencies.

This foundation continues to benefit me even today.

As your career progressed, who all influenced and inspired you to experiment with, learn, and implement new tasks?

Many mentors shaped my journey at NAARM. Institute Directors like Drs. J.C. Katyal, P.K. Joshi, S.L. Goswami, N.H. Rao, and D. Rama Rao instilled in me the trait of balancing assertiveness and empathy—a leadership quality that later proved invaluable.

Beyond institutional leaders, I was fortunate to learn from specialists like Dr. Victoria Henson-Apollonio (formerly with CGIAR), who deepened my understanding and helped me navigate the complexities of global IP jurisdictions and donor-led project management. Her guidance propelled me to become an early advocate of IP management in agricultural research.

Legal luminaries like Prof. Vivekanandan from NALSAR-Hyderabad—currently the Vice Chancellor of Hidayatullah National Law University (HNLU)—provided me the platform to engage with legal academia and policy advocacy forums, broadening my perspective beyond scientific research into governance and institutional frameworks.

Of course, there are many more names to acknowledge. But one key realization from my journey is that effective mentorship and strong leadership are pivotal in shaping early-stage careers. Early guidance can transform professionals into recognized experts—something I strive to pay forward and continue as a legacy through mentoring young, upcoming professionals.

My key takeaway? Great mentorship accelerates professional growth and shapes value-based professionals.

You were a recipient of the Fulbright Research Scholarship. On what topic did you work during that time, and how useful was it to broaden your understanding of technology management?

My tenure at Cornell University as a Senior Fulbright Fellowship awardee (2007–08) focused on a research project titled *"Policy and Strategy Options for Nanotechnology in Agricultural and Food Systems"*—a forward-looking study at a time when the science of nanotechnology was still emerging. While collaborating with experts like Prof. Terry Tucker (Cornell International Programs) and Dr. Richard Cahoon (Cornell Technology Transfer Office), I explored policy frameworks to assess nanotechnology's potential as a platform tool for enhancing global food security and productivity.

Given the post-GM research landscape at that time, science-based foresight studies were being advocated to objectively evaluate nanotechnology's application across the value chain and guide R&D programmes. This experience sharpened my technical expertise in tools for IP informatics and technology transfer, and also made me more sensitive to the societal implications of innovation.

It connected me with global platforms—such as the National Science Foundation, the National Nanotechnology Mission (through federally funded programmes), the International Food Policy Research Institute, global think tanks, and various policy advocacy platforms (through collaborative projects). These experiences highlighted the power of international collaboration in shaping argic-tech advancements.

Indeed, my Fulbright Fellowship laid the foundation for my continued participation in high-level international and national discussions, with invitations and opportunities across several prestigious platforms—as a speaker, discussant, or panellist.

Participating in a cross-sectional panel on Developing Green Energy models through emerging technologies like Agri-Photovoltaic innovation on farms

How was your experience as part of the Founding Team of a-IDEA technology business incubator at NAARM, where you served for 3 years from 2014? As I understand, they were the early days of technology incubation in the Indian NARS system. So how was it? Was it challenging?

Initiating a-IDEA was both exhilarating and demanding. Transforming a traditional training institute as a practitioner in the emerging agri-innovation eco system required convincing stakeholders of its value and the neccessity. a-IDEA at NAARM was undoubtedly a path-breaking effort in the Indian National Agricultural Research System (NARS), and as with any new initiative, it came with its fair share of challenges.

The key was demonstrating that innovation is not just about technology—it is about ecosystem building. Our experience taught us that inclusivity and science-backed validation are critical. Startups need more than ideas; they need market linkages, mentorship, and funding access. Overcoming these early challenges laid the groundwork for today's thriving incubation landscape.

Have you been successful in overcoming those challenges?

Yes, to a large extent. We were able to seed the idea of building strong incubation across NARS. Starting in 2007, a series of sensitization and awareness workshops were designed and organized. The launch started at NAARM, with the then Director General and Secretary of ICAR flagging the first event. The aim was to build a team of 100 trained middle-level ICAR scientists in IP and tech commercialization.

Efforts to mainstream IP into agricultural education were initiated to formalize these new areas into the agricultural curriculum. The primary objective was to create trained human capital and then move into building an incubation ecosystem across NARS.

In 2015, drawing from the experience of Business Planning and Development (BPD) units under NAIP, agribusiness management units were set up in 100+ institutes. I recall documenting these efforts in one of my publications on the evolution of the agribusiness incubation ecosystem in NARES for promoting agri-entrepreneurship in 2016. I am fortunate to have been part of these foundational steps in this journey.

Let's accept that building a sustainable agri-innovation ecosystem remains a 'work in progress'. Challenges continue to evolve, and adapting to them requires a mindset of continuous learning and recalibration. It is encouraging to see that India's agri-food incubation space has been steadily expanding, more significantly in recent years, through multiple incubators and diverse funding opportunities emerging across the public sector, industry, and banking institutions.

While numbers matter, the focus must now shift towards enhancing quality—both in incubation services and in supporting startups beyond their initial stages.

Scaling-up and manufacturing remain critical pain points for several agri-food startups. Regulatory frameworks in agriculture are still evolving, creating time-lags and compliance uncertainties that may not align with models tested in other industries. The journey of building an innovation ecosystem in agri-food value chains demands patience, agility, and sector-specific strategies, rather than simply replicating frameworks from other domains.

The lesson? Numbers matter, but *depth* matters more. We need sector-specific strategies—not just replicas of IT or biotech models—to address agriculture's unique complexities.

At a Startup -Farmer Conclave to develop Soft Landing Platform of Agri-technologies in Farms

How has the agribusiness incubation system evolved in the past decade?

Significant shifts continue to infuse dynamism into the ecosystem. There have been attempts to build incubators based on commodity focus, geographical location, and agri-technology domains. I strongly feel that the era of "one startup–one incubator" is over. Innovators now engage with multiple incubators, creating a competitive yet collaborative environment.

This development is a positive step. Healthy competition in incubation offerings can foster improvements in services, ensuring greater objectivity and inclusiveness in the support provided to startups.

As investment opportunities mature, there is a growing need to establish *well-laid, ethical processes for venture investments*, ensuring they are both efficient and sustainable. Going forward, the focus should be on refining incubation methodologies, strengthening regulatory frameworks, and ensuring startups receive not just funding but strategic guidance to navigate growth challenges.

The agri-business incubation ecosystem is on the right track, but sustaining its momentum requires structured evolution of processes—rather than resorting to ad hoc measures in response to challenges, unprecedented or otherwise.

Can you tell us about your experiences at AgHub—The Agri Innovation Hub of PJTSAU (2020–2025)?

My tenure at AgHub Innovation Hub was marked by the development of a pioneering incubation model in a *Hub-and-Spoke* format. While the Hub focused on agri-tech and student-led innovations, the three rural innovation spokes in two/three-tier towns like Jagtap, Warangal, and Tandur—spread across Telangana's diverse agro-climatic zones—introduced a new dimension to fostering rural entrepreneurship.

These innovation spokes are fast becoming platforms for rural youth innovators, grassroots entrepreneurs, and local agri-enterprises, helping them build solutions tailored for local markets.
This initiative represents India's first formal institutional framework for supporting idea-driven innovation in Tier 2 and Tier 3 cities—a step toward democratizing agribusiness incubation. With NABARD as the funding partner, the experience reinforced a key lesson: along with the typical "scale-up/scale-down" approach, a *"scale-deep"* strategy may be more effective in seeding rural agri-food entrepreneurship.

Inauguration of Rural Innovation Spoke, AgHub at Tandur, Vikarabad District, Telangana

A major takeaway was the need for convergence among key stakeholders—including banks, MSMEs, funding agencies, and policymakers—to build a strong enabling ecosystem for agribusiness innovation at the local level. I was especially heartened to read about this model being referred to in the 2025 FAO book titled *'Rural Transformation through Agribusiness Incubation: The Asian Experience'.*

It may be early days, but I believe we are now turning *thinking into practice*, and I envision that several new approaches will soon emerge.

Has the Hub-and-Spoke model attracted more rural talent?

My answer is most certainly yes, but with a word of caution. While the unvoiced needs of rural innovators surfaced through this initiative, it is important to distinguish between subsidy-based programs and innovation-driven incubation models.

Innovation is not a social security program; it is about building opportunities to catalyse ideas into reality.

One significant insight was the importance of skill-building and competency development—especially in vernacular languages—to effectively engage rural entrepreneurs. Providing innovation support in a locally accepted mode is essential for ensuring long-term impact and genuine transformation at the grassroots level.

Has agribusiness incubation helped Indian farmers access more services than before?

Without a doubt. As agri-tech innovations mature, farmers benefit significantly. Consider the impact of digital tools like UPI and mobile-based services in rural areas—these have been game-changers for financial inclusion and access to services. Similarly, agribusiness incubation is helping farmers connect with better technological solutions, improved market access, and enhanced financial support.

However, a critical aspect that remains is ensuring that farmers are at the *centre* of these developments. True impact occurs when innovation and entrepreneurship align with the actual needs of those working at the grassroots, rather than pushing technology-driven offerings solely for commercialization.

It is encouraging to see that today's Gen Z farmers are tech-savvy and increasingly view agriculture as a professional enterprise—alongside being a traditional livelihood source. This shift creates opportunities for deeper innovation, structured policy support, and targeted incubation initiatives that can meaningfully transform the agricultural sector.

It seems every organization related to agriculture is keen to establish an agribusiness incubation centre currently. Do you think Indian agricultural institutions have the infrastructure, understanding about incubation, financial support, and other needed capacities to promote argic-entrepreneurship?

While the rapid establishment of agribusiness incubators is promising, it presents a key challenge: the availability of skilled human resources to effectively manage these centres. Funding is certainly critical, but without trained innovation specialists, the effectiveness of these initiatives remains limited.

If India is to build a robust, sustainable agripreneurship ecosystem, addressing this knowledge and skill deficit is essential. Incubation, technology commercialization, and entrepreneurship development must be institutionalized within NARS through structured training, clear policy frameworks, and cross-sector collaboration.

Policymakers must view capacity building as an integral part of the agribusiness incubation strategy—ensuring we invest not just in physical infrastructure but also in expertise, mentorship, and institutional knowledge.

Do you think Knowledge Management and Capacity Development are important for agri-incubation? Should some of these topics be part of the Foundation Course for Agricultural Scientists recruited by the ICAR?

Absolutely. Institutions like NAARM are continuously revising their academic offerings, and I'm fortunate to have been involved in restructuring the FOCARS course to incorporate innovation, entrepreneurship, and agribusiness management.

Integrating these topics into ICAR's foundational training would equip future agricultural scientists with a broader skill set—preparing them to navigate technology transfer, commercialization, and ecosystem development effectively.

Not only training or capacity building, but the country also needs to design and develop new academic courses that formalize emerging knowledge domains and build a human resource base suited to the innovation ecosystem.

We have B-schools that focus on business management, but it's equally important to build competencies in young students for ideation, technology development, and innovation. Only then can we build a broader canvas for innovation-led enterprise in the agri-food domain.

For instance, at NAARM, we designed and offered a one-year *Postgraduate Diploma in Technology Management in Agriculture (PGD-TMA)* starting in 2008–09. This was the first course of its kind in the country, offering an excellent opportunity to systematically study Intellectual Property (IP) and Technology Management in Agriculture. I'm proud that several graduates of this course are now working in top positions—as innovation experts in key businesses, law firms, and public sector organizations.

How was your experience with the Tata Institute of Social Sciences (TISS) during 2017–2020? What roles did you play, and what did you learn about rural development/management during that period?

I truly cherish my two years at TISS—it was an eye-opening experience. One of my biggest realizations was how disconnected agricultural scientists can be from grassroots and rural development. This perspective later became instrumental in shaping the Hub-and-Spoke Model at AgHub.

Understanding social impact, participatory rural development, and governance added a new dimension to my approach to agribusiness incubation.

This experience, coupled with my professional background, also helped me immensely when I served as Chairperson of *Task Force 6 for Think 20 (T20)*, the official G20 engagement group under India's G20 presidency in 2023.

This prestigious assignment gave me the unique opportunity to work with leaders from fifteen countries on developing policy perspectives using science, technology, and innovation as key levers for *"Accelerating SDGs: Exploring Pathways to the 2030 Agenda."* I am happy that our recommendations have become part of the ongoing work plans under Brazil's and now South Africa's G20 presidencies.

Do you think extension and advisory services could play a more important role in promoting agripreneurship?

Absolutely. Agripreneurship requires long-term engagement, not just week-long training modules. Extension services must evolve into mentorship-driven platforms that offer continuous support, business advisory services, market linkages, and financial literacy to agripreneurs.

Strengthening institutional mechanisms for extension and advisory services is key to transforming agribusiness incubation into an impactful, scalable ecosystem.

But do you think they have the capacities to do this? If not, how can their capacities be enhanced?

There is tremendous scope to plan and design new approaches to build a pool of skilled human resources in the specific domain of innovation and entrepreneurship. Since 2016, with initiatives like *Start-up India* and others shaping across the country, it is essential to develop competent professionals to support the maturation of this ecosystem.

It is time for formal academic programmes to be designed and aligned with the objectives of the New Education Policy (NEP). One of the biggest challenges I faced as a team lead of an incubator was sourcing competent professionals to manage the full cycle—ideation, incubation, acceleration, investment, and business development.

Your future plans?

My journey has only strengthened my commitment to driving meaningful change in the agri-innovation landscape. I view each day as a new opportunity to learn, contribute, and create lasting impact for stakeholders in this sector.

The work is far from over. My goal remains to build sustainable frameworks that empower agripreneurs, strengthen incubation ecosystems, and ensure innovation reaches the grassroots level.

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