



CASE STUDY

Digital agripreneurship for Indian agriculture

Bundling digital solutions and services offers valuable opportunities to help agri-tech enterprises sustain their business models and work effectively with small-scale producers

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Insights

1. India has a growing agri-tech industry disrupting the agriculture, accounting for just 400 of a total 9,000 ICT-based start-ups.
2. Small-scale producers make up the majority of the country's farming population (87 per cent), but the majority are still not integrated in the current D4Ag market infrastructure.
3. Some 80 per cent of rural households in India have access to mobile phones, providing a sound base from which to connect small-scale producers with agri-enterprises via digital platforms, creating digital-based job opportunities in the process.
4. Digital agripreneurship in India has uneven distribution. For example, the southern state of Karnataka currently has 39 start-ups, compared with 1 in the northern state of Punjab.
5. There is strong scope for Indian agri-tech enterprises to scale up by bundling their digital solutions to offer advisory, market linkage, supply chain and financial inclusion services. Bundled services have the potential to reach more small-scale producers and increase farm revenue by 10–15 per cent.

Introduction

Developing the digitalisation for agriculture (D4Ag) sector in India, for the benefit of agri-enterprises and small-scale producers alike, faces a two-pronged challenge. Digital agripreneurship holds promise for enabling the transformation of existing businesses through the introduction of digital technologies and innovative enterprises (Trendov *et al.*, 2019). But despite the potential for job and income generation – especially for youth – young agripreneurs in India encounter difficulties due to lack of information, investment, innovation and market exposure (Trendov *et al.*, 2019).

For their part, small-scale farmers often miss out on the potential benefits of accessing D4Ag services, such as improved productivity and market access. The majority of India's farming population is made up of small-scale producers (SSPs),¹ with 86.21 per cent of SSPs accounting for 47.3 per cent of land under cultivation (Squires *et al.*, 2020). However, due to such farmers' lack of resources and low incomes, agri-enterprises face challenges in working effectively with this market sector (Boettiger and Sunil, 2019).

Some 80 per cent of rural households in India have access to mobile phones,

providing a sound base from which to connect SSPs with agri-enterprises via digital platforms, creating digital-based job opportunities in the process. At present, India's agri-tech sector is still evolving in a lucrative market, accounting for just 400 of a total 9,000 ICT-based start-ups (Vijayan and Sivakumar, 2020).

In order to examine the feasibility and relevance of digital agripreneurship in India, a case study was conducted to analyse the diversified portfolio of Smart Farming Innovations (SFIs) developed by the Bill & Melinda Gates Foundation (BMGF) for SSPs (see Figure 1). Smart Farming Innovations create interventions for sustainable business models by allowing agri-enterprises to offer digital innovations, scalable platforms and bundled services (BMGF, 2021). For the operationalisation of data sources and data validation, desk research was performed, together with eight interviews as primary data sources.

The following sections present the key findings of mobile-phone-based multi-stakeholder management² in the areas of advisory services, market linkages, supply chains and financial inclusion.

¹ By definition, a small-scale farmer holds less than 2 hectares of land.

² To bundle D4Ag services, agri-enterprises need to establish partnerships with different stakeholders such as advisory, market linkage, supply chain and financial inclusion services. This is known as multi-stakeholder management.

Key findings

In India, the global market intelligence, innovation management and commercialization organization SkyQuest Technology³ is working with BMGF to support Smart Farming Innovations. The focus is on coordinating policy advisors and value chain platforms via its digital platform.

According to SkyQuest, "On its database, SkyQuest Technology collected 124 agri-tech initiatives in India, which are using digital solutions and services offering Smart Farming Innovations to small-scale farmers." The geographical representation of the 124 start-ups is displayed in Figure 2. The landscape analysis based on target users, primary use case, technology stage and type of D4Ag offered is presented in Table 1.

Advisory and knowledge institutes

"Advisory services should not be the main value proposition of any business model for Indian agriculture, as everyone gives free advice here, but the quality of the advice is what we need." A global leader in digital agribusiness.

"It is challenging to develop a commercial Business to Consumer (B2C) business model as small-scale producers in India are not used to paying for advisory services. Therefore, by using our smartphone application, we do networking with value supply chain actors and financial institutes to bundle our advisory services with market linkages and financial services." SmartFarming BV⁴.

Small-scale producers (SSPs) are both potential D4Ag clients and data providers, so reach is a critical issue. The greatest challenge for advisory and knowledge institutes is reaching SSPs as customers and collecting ground data through them, such as cropland, crops under cultivation, and fertilizer use. As part of the process of providing tailor-made weather and climate information for SSPs, farmers are expected to use smartphones, access smartphone application features

and register field data, such as size, soil type, location, crop under cultivation, water type. By collecting such agronomic data, as well as surveillance data, and data from land registries, data can also be shared with banks and insurance firms for risk monitoring and finance. Crop yield and harvest data collected by farmers can be shared with retailers or wholesalers to create direct market linkages. Therefore, it is clear that most advisory and knowledge institutes need to work in collaboration with other service providers to be able to have a sustainable business model, as farmers are less interested in paid advisory services (FAO, 2021). Bundling services is an innovative way to effectively work with SSFs and generate revenue via multi-stakeholder management.

Market linkages

In India, the Small Farmers Agribusiness Consortium (SFAC) and the National Agriculture Bank for Rural Development (NABARD) are working together to register farmer producing organisations (FPOs) as a legal entity, to ensure better incomes for producers through an organisation of their own (NABARD, 2015). An FPO is a type of producer organisation, established by farmers.

NABARD is funding FPOs working with digitalisation, as digital FPOs⁵ have strong potential to create digital market linkages and allow agri-enterprises to work effectively with small-scale farmers, while scaling up innovative solutions for them.

"For most agri-enterprises, it is challenging to work directly with SSPs due to reach. FPOs are the key linkages to reach a large number of farmers. We are currently working with >360 FPOs in India to provide agri-input access via major agri-input companies and 65,000+ retailers who are enrolled on 'Grow Online', and 6,000 agri-commodity buyers registered on the 'Grow Mandi' platform." Grow Indigo⁶.

3 A market intelligence, innovation management and commercialization organization that connects innovation to new markets, networks and collaborators to help achieve the Sustainable Development Goals. <https://skyquestt.com>.
 4 This social enterprise seeks to empower farmers in the Global South by supplying them with validated, up-to-date, easily understandable and easily accessible information about their crops. www.smartfarmingtech.com.
 5 A digital FPO is an extension of the traditional/conventional co-operative and producer organisation.
 6 An India-based company that offers biological and digital solutions to provide farmers with relevant information and help them to improve soil health. www.growindigo.co.in.

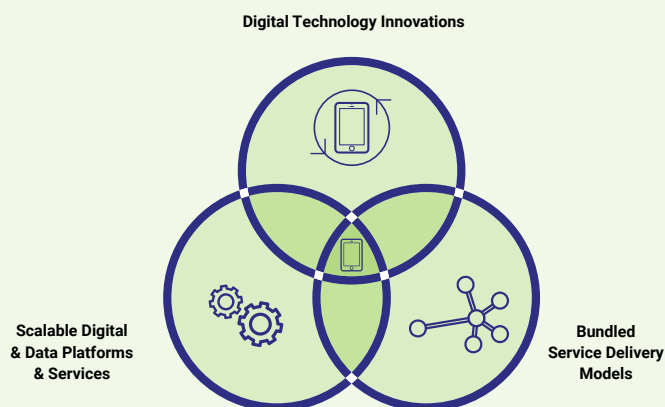


Figure 1: Smart Farming Innovations (SFIs) for Small-scale producers. Source: BMGF, 2021.

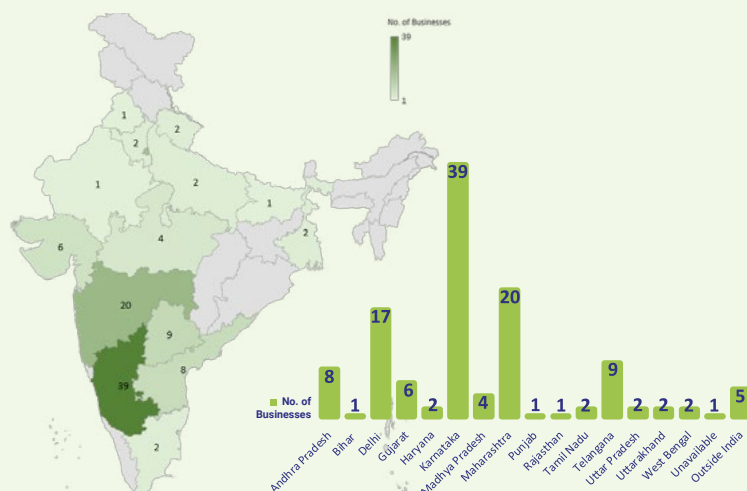


Figure 2: Geographical presentation of agri start-ups working with SFIs in India. The density graph visualizes the number of start-ups in India (left). The bar chart shows the number of start-ups per state.

Table 1: Landscape analysis of Indian start-up ecosystem working with SFIs for small-scale producers.

Target users		Primary use case		Technology stage		Type of D4Ag Offered	
Farmers	69	Advisory	31	Idea	4	Digital service	50
Farmer producing organisations	22	Market linkage & e-commerce	16	Pilot	2	Digital solution	29
Government	10	Supply-chain management	29	Beta	12	Digital platform	24
Finance institutions	3	Finance	12	Commercialized	59	Digital product	27
Agri-food value chain companies	50	Ecosystem support	3				

Supply chain management

Most SMEs struggle to scale-up while working with SSFs as they use various non-inclusive tools such as spreadsheets, surveys, and paper-based organisation. Integrating farmer producing organisations in the agri-value chain can help to overcome some of the challenges of agri-enterprises working directly with SSFs, offering better market transparency and procurement prices.

“We provide an ICT platform-based enterprise resource planning (ERP) tool for SMEs. Our tool is inclusive, works offline and in remote areas, even with 2G connectivity, allowing better resource management among value chain actors.” eProd Solutions⁷, supplier of ERP for agribusiness.

In India, EKGAON⁸ shares the Application Programming Interface (API) of its enterprise resource planning tools, so as to be able to work effectively with FPOs. APIs allow full farm traceability and accountability, to ensure that product quality meets consumer demand, providing a competitive advantage over rivals that do not have such traceable and accountable solutions for their supply chains.

“We are one-of-a-kind organisations in India that have a fully integrated value-supply chain from farm to fork. We leverage technology, services and a range of institutional innovations to serve farmers clustered around FPOs in our value supply chain. SSFs registered to our platform via FPOs get almost 10-15% more than the conventional market rate for their produce at farmgate, plus a bonus of up to 10% as a share in end sale. Farmers are not just producers, but shareholders in our farm to fork value chain.” EKGAON, digital platform for agri-food products.

Financial inclusion

In India, government banks predominantly regulate financial inclusion for small-scale producers and are largely responsible for providing crop insurance schemes. Due to erratic rainfall patterns, the government uses a rainfall index-based policy to support farmers for the crop insurance scheme. By predicting damage due to excess rainfall or a shortfall, farmers receive compensation against crop loss (Lajoie-O'Malley et al., 2020).

“The Government of India rolled out one of the world's largest crop insurance schemes, namely Pradhan Mantri Fasal Bima Yojana (PMFBY), in 2016. However, this scheme is constrained by high premium rates for specific crops and the skewed nature of claim distribution. Other challenges include the reliable, transparent and early estimation of crop loss to avoid delays in claim settlement, which is the biggest bottleneck in drawing adequate interest among large segments of the farming communities, particularly the small and marginal farmers.” National Rainfed Area Authority (NRAA)⁹, India.

The International Food Policy Research Institute (IFPRI), a research centre of worldwide agricultural research partnership CGIAR, is working in India with digital technologies that can promote financial inclusion for small-scale producers. These include microcredit, Kisan Credit Cards (KCCs)¹⁰ and Picture Based Insurance (PBI). PBI allows farmers to click on pictures of their crop damage from smartphones and upload them onto a digital platform. By using satellite imagery to monitor crop phenology, farmer engagement with insurance firms can be improved, helping producers to obtain reimbursement against individual crop damage.

“For SSPs, we need to consider their struggle individually such as crop damage or crop loans. Current government policies do not entertain the tailored financial needs of SSPs and are a big barrier. Through digital innovations such as PBI, farmers can receive tailored financial support based on disaggregated credit and risk data.” IFPRI, India.

7 Offers enterprise resource planning to manage agricultural supply chains. www.eprod-solutions.com.

8 A leading social enterprise that uses a digital platform to link consumers to community-based agrifood products. www.ekgaon.com.

9 NRAA serves as an expert body of India's Ministry of Agriculture to provide knowledge inputs regarding systematic upgrading and management of the country's dryland and rainfed agriculture. www.nraa.gov.in.

10 The Kisan Credit Card scheme is a credit scheme introduced in August 1998 by Indian banks. This model scheme was developed by NABARD to provide term loans for agricultural needs.

Lessons learned

1. Farmers are less interested in paid advisory services. Bundling services and creating partnerships between multi-stakeholders (market actors and financial institutes) is key to sustaining agri-tech business models and working effectively with small-scale producers.
2. The role of farmer producing organisations is critical for market linkages and for reaching SSPs. Digital FPOs have massive potential to link large numbers of farmers to value chains and create various market linkages.
3. Inclusive enterprise resource planning tools are important for SMEs working in remote areas with poor data connectivity (2G), using traceable and accountable digital technologies for effective market linkages.
4. In India, existing government policies for crop loans and insurance targeting small-scale producers are largely ineffective. There is a need for dynamic risk assessment portfolios to provide tailor-made financial services. Financial institutes should use digital technologies to enable digital payments via KCC, PBI and Agri-wallets.¹¹
5. Further study is required to analyse the impact of digital entrepreneurship on small-scale producers from the policy, social, economic, cultural and environmental perspective.

Future research

Researchers have recently started investigating digital agriculture from the perspective of organisation, social, market and institutional dynamics (Klerkx *et al.*, 2019). Digital agripreneurship has the potential to transform traditional businesses, while overcoming a number of societal, institutional and organisational barriers (Trendov *et al.*, 2019). However, this study has shown that in India, there is an uneven distribution of digital agripreneurship, and further studies are required to analyse the impact of digital entrepreneurship on small-scale producers from the policy, social, economic, cultural and environmental standpoint.

¹¹ Agri-wallet is an innovative mobile business account to save, borrow and pay for income generating activities to increase food security and fight poverty.



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