

Entrepreneurial trends in the Indian agricultural water ecosystem

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Executive Summary

There is a rapid evolution of agtech startups involved in irrigation in India. We highlight key emerging trends for these startups: transitions from hardware sales to software sales and services; bundling with other agricultural products and vertical integration; and varied partnerships to reduce customer acquisition costs. With increased global focus on the use of data to add value for irrigating farmers, we expect domestic and international growth opportunities for Indian startups that can leverage partnerships to scale quickly.



Overview

India is the largest user of water for irrigation in the world. Agricultural producers in India access irrigation through a wide range and scale of technologies, from large government-operated canal and reservoir schemes to entrepreneurial solar irrigation startups that provide small, individual pumps. Overall, private sector financing and management of irrigation infrastructure are as important as public investment. Private sector involvement in the business ecosystem for agricultural water use is complex and rapidly changing.¹ The purpose of this brief is to highlight key trends in the private, entrepreneurial irrigation business ecosystem in India.

Private sector irrigation development in India is dominated by a relatively small number of industry incumbents. These companies are primarily involved in the manufacturing and distribution of irrigation equipment such as drip lines, sprinklers, and pumps. In the last few years, there has been a rapid rise of smaller agtech startups focused on technology and software solutions for irrigation control. There is currently a disconnect between industry incumbents and startups that may be explained by differences in their basic business models.

Irrigation equipment manufacturers maintain extensive distribution networks to allow them to sell hardware and supplies such as irrigation machinery, pumps, systems, and other related accessories. For farmers, these are infrequent, larger purchases with very little aftersales service or support. Currently, irrigation software solutions bundled with hardware are not an important revenue stream for any of the industry incumbents.

Irrigation startups are developing precision ag solutions such as irrigation scheduling applications and IoT sensors to support automation and decision making. The reach of these companies is much less than that of incumbents. They often sell direct to consumers. For many companies, the goal of sales is recurring revenue through software subscriptions or service provision, with a focus on upselling.

To date, there have been no strategic partnerships between industry incumbents and startups. This is in contrast to what we see in other countries, where irrigation manufacturers have launched partnerships or acquisitions of startups that can add value across their distribution network. Examples include Valmont's acquisition of Prospera, Rivulis's acquisition of Manna Irrigation, and the partnership between Reinke and CropX.

¹A detailed mapping of the business ecosystem for agricultural water use in India is included in a separate report titled "Agtech startups and business ecosystem for agricultural water use in India". This report includes descriptions of major actors involved in the irrigation landscape and detailed business models of several innovative agtech irrigation startups.

These partnerships reflect a growing trend in corporate strategy in agriculture, where it is understood that startups can often develop products much faster than incumbents, but incumbents can scale production and distribution effectively.

Nevertheless, the irrigation agtech startup space in India is attracting investors² (Figure 1). There is global investment and philanthropic interest in companies providing solutions around climate-smart agriculture, including water management. It is likely that investments in the agricultural water space will grow severalfold over the next few years.

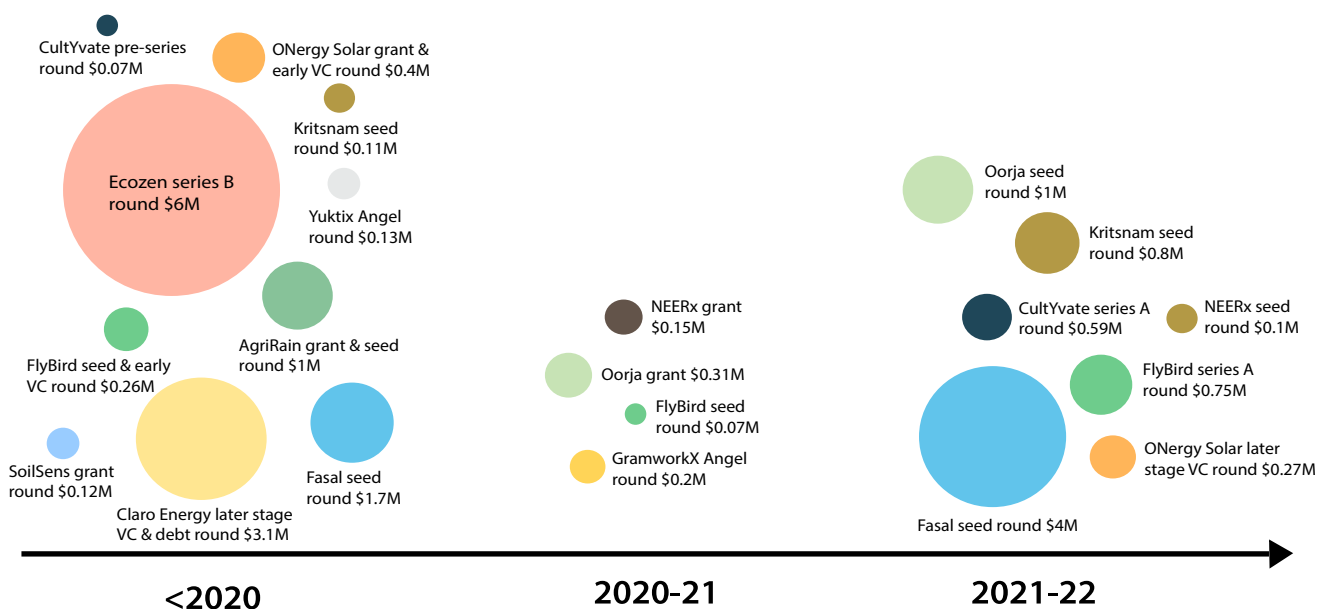


Figure 1. Investment deal size showing trends over the last few years within the irrigation agtech startup space in India. (Source: Public data and interviews with startup founders)

Below, we lay out a typology of irrigation startups based on the source of their innovation. We discuss key challenges and trends as well as possible future pathways for the startups. Our analysis is based on multiple interviews with stakeholders in the Indian agricultural water ecosystem, including farmers, entrepreneurs, investors, private irrigation companies, researchers, and other subject matter experts.



²A detailed table and analysis of financial investments from public, private equity and venture capital firms flowing into the irrigation agtech space is included in the secondary report.

Entrepreneurial innovations in Indian agricultural water

Two categories of irrigation startups may be distinguished based on the source of their innovation:

1. Technology innovation

Startups develop and deploy sensors and IoT solutions and automation products. This includes automated irrigation controls, water flow measurement devices, satellite data, sensors, and IoT devices to measure crop water requirements and schedule irrigation. Examples of startups in this category are GramworkX, Fasal, Flybird, NEERx, AgwiQ/ KisanRaja, Mobitech Wireless, Intech Harness, Soilsens, AgSmartic, Ecozen, Cultivate, Agrimations, Yuktix, Treeni Sustainability Solutions and Kritsnam Technologies.

2. Business model innovation

Startups find new ways of using existing technology to address pain points around water delivery services. A common business model is providing on-farm water delivery services rather than selling irrigation equipment to them. Examples of startups in this category are AgriRain, Oorja, Khethworks, Claro Energy, ONergy Solar, and Bhungroo.



Challenges and Trends

Like most startups, the major challenge for small agtech companies is how to reduce customer acquisition costs while scaling up. This challenge can be exacerbated by time pressure from investors, particularly those without long-term experience in agricultural innovation.

For irrigation startups with a direct to customer channel marketing strategy, both scaling and reducing customer acquisition costs are difficult problems. When working with small farmers, companies use face-to-face marketing and need to provide technology education in-field as well as aftersales support. As a result, many startups in this category don't have sufficient cash to grow their own customer networks. Even with cash on hand, it's not clear that customer acquisition costs can be reduced sufficiently to reach profitability. Consequently, some startups in the space are looking to build partner relationships that will allow them to operate through existing distribution channels.

Below, we discuss three important trends within the irrigation startup space. These trends attempt to address key challenges related to customer acquisition cost and scaling.

1. Revenue strategies have transitioned from irrigation hardware to software to services

In their initial stages, many irrigation agtech startups had a revenue model based solely on selling hardware such as remote controllers, IoT devices, and soil moisture sensors. Over time, these startups have all transitioned towards bundled offerings that include software and/or services. Overall, there are multiple emerging cross-subsidization strategies between hardware, software, and services in the Indian irrigation tech space.

Some companies still generate revenue primarily through hardware sales and use these to subsidize their software offerings. For example, companies may sell soil moisture sensors, remote controllers, and IoT devices and provide field-level data analytics support to inform decision-making such as apps and cloud or API integration as part of the hardware purchase (e.g., KisanRaja, Mobitech Wireless).

Other companies use software subscriptions to subsidize their hardware, which may be provided at low or no cost. These companies generate recurring revenue through monthly software subscriptions. They typically provide access to data and services that underpin actionable insights, such as weather and irrigation management APIs or Vegetation Index (NDVI) data (e.g., GramworkX).

Finally, some startups do not sell hardware at all and have transitioned to full-service models. Oorja, AgriRain, and Claro Energy operate through a pay-per-use irrigation model. Revenue generation is through providing irrigation services or subscriptions offering their irrigation systems and hardware equipment for free.

Irrigation agtech platforms

Hardware



IoT devices, sensors, soil moisture probes, irrigation systems and pumps, valve and pump controllers, other irrigation supplies like solenoids, valves, water flow meters, etc.

Software



Cloud storage, API feeds, mobile applications, remote irrigation controllers, telemetry devices, remote sensing technologies and site-specific images and maps

Service



Irrigation as a service (IaaS), on-farm water delivery application using solar, actionable insights and recommendations to save water and energy

Figure 2. Examples of irrigation agtech platforms illustrating different hardware, software and service models present in the current agricultural water ecosystem in India.

2. Bundling and vertical integration of products/services to address multiple customer pain points is increasingly common

India is a country with more than 130 million farmers. The concept of providing multiple value-added services at the farm gate is rooted in agricultural history. Local ag retailers and agents arrange the purchase, auction, and delivery of harvested crops and provide credit to farmers for their farm operations or personal needs.

As irrigation agtech startups have gained experience with sales to farmers, they have also gained understanding of the larger agricultural ecosystems in which they operate. Some have started to innovate their business models around bundling and vertical integration of multiple products and services beyond water management.

These startups provide innovative solutions around irrigation water. They may also bundle other offerings such as nutrients or fertigation, post-harvest crop management (cooling/cold storage, milling, etc.), sensor devices, data analytics, or other digital marketplace services.

This kind of vertical integration allows startups to build cost-effective, strong relationships with their customers by providing solutions for multiple problems around agricultural production through a sole marketing channel. For example, startups like GramworkX and Fasal bundle hardware and software products. Among other products and services, they offer IoT devices, soil moisture sensors, remote motor control devices, software packages, crop protection, and farm financial management. Startups like Oorja deliver their business model by bundling solar irrigation provision with post-harvest cooling and milling using solar technology. Similarly, Ecozen, an IoT-enabled hardware provider, bundles irrigation and cold storage services.

How do startups bundle new products or integrate into new markets? They may develop products in-house, they may enter new partnerships with other private companies, or they may acquire, or be acquired by, other startups. As of the end of 2022, the only example of an Indian irrigation tech startup exit is GramworkX's IP acquisition by WayCool. WayCool is a downstream supply chain agtech company that provides cold chain as well as farm intelligence. WayCool's acquisition of GramWorkX is a clear example of vertical integration.

Notably, some global irrigation tech companies also seem to be diversifying their business models. CropX, which started by selling soil moisture probes direct to customers, now provides irrigation management as well as custom fertilizer, manure, energy, and greenhouse management services for specialized customers. These offerings presumably complement and add value to each other. CropX's expertise for additional offerings was strengthened through acquiring multiple other startups: CropMetrics, Regen, Dacom and Tule.

3. Non-governmental organizations and aid agencies are subsidizing customer acquisition costs

In some cases, irrigation tech startups are choosing to partner not with private sector partners, but with non-governmental organizations (NGOs) or aid agencies. The driver for such partnerships is likely to be a desire to reduce customer acquisition costs. Many aid agencies, development organizations, and NGOs have capital, scale, and existing outreach and distribution networks that can be used to market a startup's solutions.

This will lower customer acquisition costs for the startup, particularly as many NGOs have longstanding relationships with farmer groups and the capacity and mission to provide educational support. NGOs benefit by supporting growing entrepreneurial networks and new technologies that may be well-suited to the needs of small farmers. Examples of companies with strong NGO partnerships include KisanRaja and AgriRain.

What's over the horizon?

There is a regional concentration of new, data-savvy agtech startups in South India, driven in large part by spillovers from the recent tech boom there. The basic value proposition of many of these startups is easy remote pump control. As a result, the startups are collecting data with a frequency and resolution that hasn't been seen before in the smallholder irrigation space. There is an emerging opportunity to understand how to leverage these data for collective good and to provide additional insights into water management at scale.

Looking at irrigation technology trends elsewhere in the world, it's clear that value-add in irrigation will become more and more data-driven in the coming years. In India, irrigation industry incumbents will struggle to catch the new data-driven irrigation startups in terms of their ability to collect and analyze customer data to provide new and increasingly differentiated products and services. Thus, we would expect to see growing pressure on incumbents to partner or acquire irrigation startups. Looking at the cost structures of some of the Indian irrigation startups, if they can find an international marketing channel, they might be very competitive in the global precision irrigation space.

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About the Daugherty Water for Food Global Institute

The University of Nebraska founded the Daugherty Water for Food Global Institute (DWFI) in 2010 to address the global challenge of achieving food security with less stress on water resources through improved water management in agricultural and food systems. The institute is committed to ensuring a water and food secure world while maintaining the use of water for other vital human and environmental needs. The institute's approach is to extend the University of Nebraska's expertise through strong partnerships with other universities and public and private sector organizations. DWFI develops research, education, and engagement programs in a focused effort to increase food security while ensuring the sustainability of water resources and agricultural systems. The institute works locally and internationally, bridging the water and agriculture communities and worlds of small- and large-holder farmers to deliver innovative solutions to this complex global challenge.

See the DWFI website for more information at waterforfood.nebraska.edu, stay informed through the institute's Facebook page at facebook.com/waterforfoodinstitute, Twitter @water4food, Instagram @waterforfood, and YouTube @waterforfood.