

Size Matters

Small Farms and Big Waste Means Huge Opportunity in Indian Agriculture

unitus seed fund

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Foreword

Prior to the Green Revolution, India regularly struggled with famines and could not adequately feed its population. While significant progress has been made in the areas of yield and output, more than half of India's children under five continue to suffer from malnutrition in a country. Even though agriculture accounts for over half of the country's jobs, India's 115M farmers are by-in-large poor – constrained by small lots, poor infrastructure, and lack of resources. Thankfully, India is also one of of the burgeoning IT capitals of the world, and we are starting to see the reduction of waste via technology which is enabling new levels of efficiency and productivity at scale.

This report identifies some of the significant challenges facing Indian agriculture in the next few years. It then highlights some of the innovative trends and the opportunities for entrepreneurs and startups to drive disruptive improvements in India's agriculture ecosystem.

We hope you are inspired!

Unitus Seed Fund Team

About Unitus Seed Fund

Unitus Seed Fund is India's most active seed impact investor, funding BoP startups that serve large low-income populations. Unitus Seed Fund plans to grow its portfolio of 13 companies to at least 30 startups in sectors including agriculture, healthcare, education, livelihoods, technology, and access to basic necessities. Unitus Seed Fund is part of the Unitus Group, a successful financial services group operating in multiple emerging markets since 2000. Unitus Seed Fund has offices in Bangalore and Seattle.

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SIZE MATTERS

Small Farms and Big Waste Creating Huge Opportunity in Indian Agriculture

Unitus Seed Fund is a venture capital fund seeking seed-stage investments into disruptive innovations that can scale to impact at least 100,000 families in 5 years. Unitus Seed Fund is convinced that a significant area of development—with the greatest opportunity to directly and indirectly transform the lives of the global poor—begins with agriculture in India.



This article represents the first of 6 articles on Agriculture in which we explore:

1. Size Matters: Why Small Farms & Big Waste is Creating Huge Opportunity in Indian Agriculture
2. 50 Venture Backed Companies Transforming Ag
3. Financial Services Improving BoP Ag
4. Farm IT: Mobiles in the Mud
5. Cloud Brings Rain to Indian Ag: Startups Bringing Supply Chain Management to the Ag Supply Chain
6. 5 Companies We Like – Indian Ag

This first article provides the big picture of challenges and opportunities. Our look at 50 venture companies identifies a number of trends and hot areas for innovation. The final three articles look at the areas we found to be most interesting in the near term: financial services, farm IT, and cloud-based supply chain management.

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The Paradox

There is a significant paradox between India as a burgeoning superpower with an abundance of natural resources and second largest population in the world, and yet there is an inability to adequately feed and nourish its citizens.

What's Right about Investing in Improving Agriculture in India?

India has unique agriculture opportunities due the scale and scope of its resources and population. Agriculture is the largest employment sector in the world, supporting two billion people on 550 million farms globally. In India, 115 million farms support 600 million people and agribusiness represents 60-70% of those employed. India also has 180 million hectares of arable land (second only to the United States and larger than the European Union's 140M hectares) and is the world's 10th largest economy. While there are vast resources and potential, India's agricultural sector only accounts for 2% of global trade while 230 million of its citizens—including 50% of children under the age of five—are malnourished.

Ag. Food Value Chain AND Opportunities for VC Funded Companies

Before diving into investment opportunities, let's take a quick look at how KPMG has defined the value chain and where there are opportunities for VC funded companies. Within the illustration, input companies are providing physical inputs (seeds, fertilizer and food ingredients) and service inputs (crop protection and crop insurance) to farmers. These activities are characterized as the pre-harvest phase, while the post-harvest phase starts with the transfer crops, meat, dairy from the farm, and ends when the product reaches a final form.

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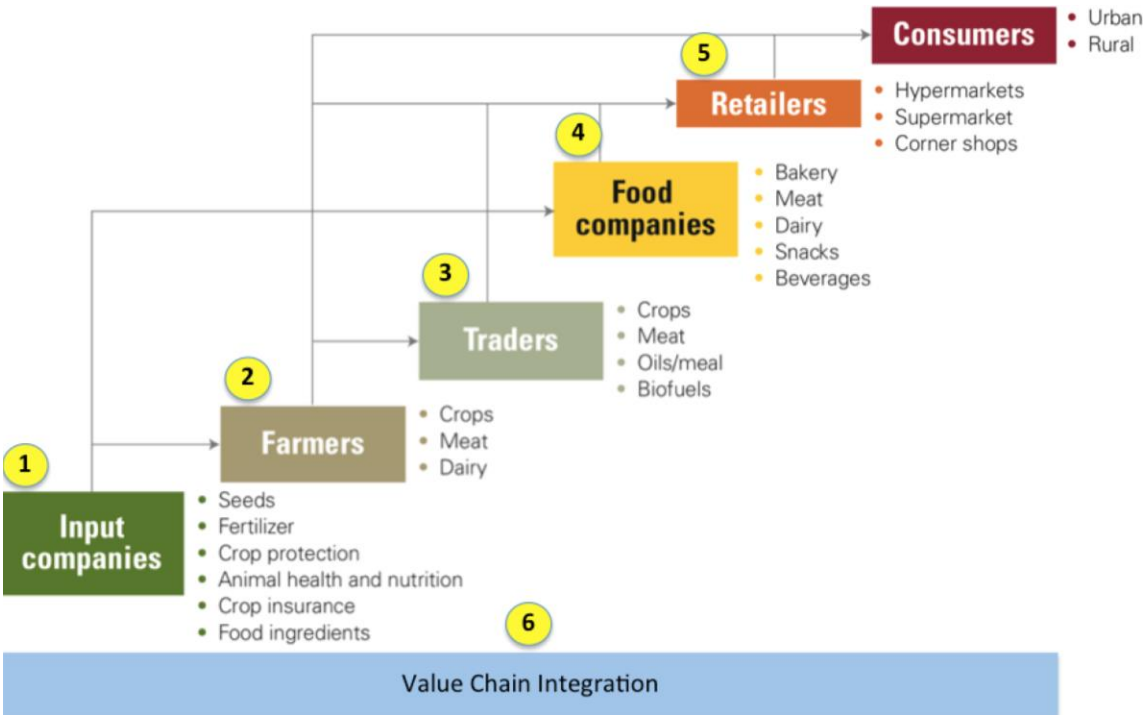


Figure 1: KPMG Agriculture & Food Value Chain

Categories 1-6 represent possible areas for start-ups, while the following evaluations give a relative high, medium or low as to their level of attractiveness for VC funding:

1. There is a high level of VC interest within Inputs, especially within the development of new types of seeds and the provision of services such as crop insurance or animal health & nutrition. For example: Richcore, Barrix Agro Sciences, Khedut Agro Engineering, MITRA, and Sai Sudhir.
2. There is a high level of VC interest within farming and its subcategories of: planting, selling and growing. For example: Skymet, Uniphore, Eurvaka Tech, and Artoo.
3. There is a medium level of VC interest within trading/processing, with some interest into the development of new processing techniques, and the majority of investment going towards the acquisition of processing companies/technologies for vertical integration of the supply-chain. For example: I-WAC, Promethean Power, and Microspin Machine Works.
4. There is a low level of VC interest into acquiring most food companies due to their size, however, there is a high level of interest within food companies and coop's seeking to acquire companies for vertical integration. For example: Zameen, Sresta, Arohan Foods and Milk Mantra.

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5. There is a low level of VC interest into retail due to the capital requirements associated with large-scale distribution. There are however opportunities for businesses utilizing their E2E capabilities to enable more regional and locally focused sales. For example Knids Green KPGL and, Aroghyam.
6. The highest level of VC interest is found within the 'value chain' segment, where IT and cloud based services are being developed to support and integrate the supply chain. For example: Frontal Rain, Stellapps Tech, Thinklink, Sohan Lal Commodity and LEAF.

With the taxonomy of agribusiness understood, it time to focus on the some of the unique opportunities, challenges and trends present in India. (See 50 Venture Backed Companies Transforming Ag for a deeper look at the market and specific insights into seed stage venture capital opportunities.)

Why Is Investing to Improve Agriculture in India is So Hard Challenging?

The primary challenges (from a venture investor's perspective) in agricultural improvements are in dealing with the huge number of small and inefficient farms, and in overcoming obstacles caused by an ineffective infrastructure.

Farms are too small to be productive

Average farm size and poor infrastructure are leading contributors to depressingly-low farm yields and deplorable amounts of food waste. Indian farms are small; 70% are less than 1 hectare, while the national average is less than 2 hectares. Oxfam's information in Image 2 breaks down farm size by region, and shows farms in Europe and the Unites States are 30X and 150X the size of those in India.

Region	Mean size (ha)	% < 2 ha
East Asia	1	79%
South Asia	1.4	78%
South-east Asia	1.8	57%
Sub-Saharan Africa	2.4	69%
West Asia & North Africa	4.9	65%
Central America	10.7	63%
Europe	32.3	30%
South America	111.7	36%
USA	178.4	4%

Figure 2: Oxfam-Who Will Feed the World Report

This is significant because a number of empirical studies have shown there is an inverse relationship between farm size and productivity, along with a number of the other challenges illustrated in Image 3 on the following page.

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While not the only factor, farm size is a significant contributor to a national agricultural yield—or farm level productivity—which is 30-50% lower than in the developed world. Short-term, yield directly impacts cash flow and the ability to respond to fluctuations in the market. Long-term, yield limits a farmer's ability to:

1) Invest into their farm's future to increase productivity and decrease risks associated with their crops (via inputs such as seeds, fertilizer, crop insurance, market/weather info, livestock health support, etc.)
2) Invest into their families in areas such as education, healthcare, training, etc.

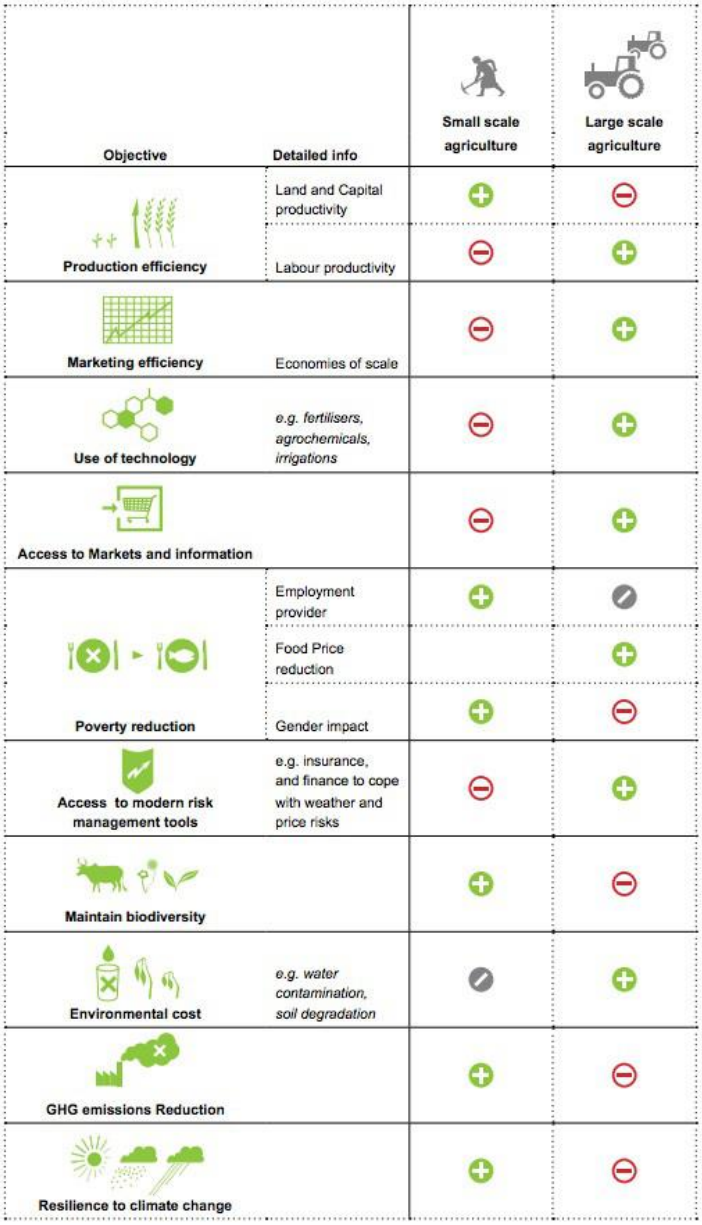


Figure 3: Oxfam-Who Will Feed the World Report

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Exceptionally poor infrastructure

One-third of Indian agriculture spoils, rots or is wasted before reaching consumers due to limited infrastructure and supply chain integration. While significant investment was made during the Green Revolution, lack of maintenance, upkeep and additional development has lead to serious deficits in core areas of water management, storage and transportation. Today, irrigation only reaches 40% of India's arable land (while a third of the water is lost en route), leaving 70% of India's farmland dependent on monsoons.

Politics make investing challenging

Since the Green Revolution, inconsistent government policies and intervention has created a challenging environment for domestic and international investors. Domestic subsidies and investments are used in politics as campaign tools. As a result a near continuous contradiction is created since short-term reforms and changes based on election cycles are seldom complimentary and often contrary to the investments directly preceding them. This trend continues at the international level, leading commentary towards India's agriculture policies to often describe it as "allergic to consistency." This 'allergy', coupled with inconsistent laws and regulations across states, makes doing business difficult and dissuades the deployment of much needed FMI.

Investment is needed throughout the value chain

Indian farmers are not able realize the potential their land is capable of producing in large part due to a number of challenges stemming from land size. Once food is produced, lack of infrastructure and inefficiencies within the supply chain cause the loss of over a third of food produced. It's these challenges, as daunting as they may seem, that create an opportunity—many would say an imperative—for increased investment into innovative solutions to increase farmer productivity and income.

Global Trends on the Horizon

By 2050, the world will need to create 70% more food—than today—to feed a global population of 9.2 billion people. Climate change is making weather increasingly volatile and severe. The food value chain requires new levels of transparency to accommodate new societal values around foods production, and the realities around food security.

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The Challenge of more complexity, volatility and scrutiny

Global agriculture will become more complex, volatile and scrutinized during the coming decades. Demand for food will increase due to population growth—especially within Africa & BRIC nations—while the increasing scarcity of resources and global shifts towards areas such as biofuel will contribute to more complexity.

In addition to these variables, weather volatility from climate change and the increasingly interconnected agricultural markets from globalization will lead to more volatility. Furthermore, global food safety & food security, coupled with increased social awareness towards areas like fair trade, sustainability and organic production, will require new levels of certification and scrutiny into end-to-end production.

The Opportunity for more control, flexibility and transparency

Increased complexity, volatility and scrutiny creates opportunities for those able to bring more control, flexibility and transparency into and throughout the value chain. To accommodate these changes, businesses within agriculture will require a new level of control throughout the supply chain to satisfy additional demand and quality requirements, better IT and data utilization to enable planning and flexibility around weather and market volatility, and, integration throughout the supply chain to create transparency and visibility within the value chain from farm to fork.

No shortage of companies looking to solve the big problems

While there is incredible opportunity for agribusiness in India, there are significant and robust challenges starting at the farm and seen throughout the value chain. The good news is that for every challenge there are an equal number of opportunities for solutions, positive disruption, innovation, increased efficiency, and wise investment. In our next update, we'll share the results of research into over 50 companies that are going after these opportunities to improve agricultural outcomes in India, with a particular focus on opportunities within agtech such as disruptive solutions delivered by mobile phones and cloud-based supply-chain management.

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50 VENTURE BACKED COMPANIES TRANSFORMING AGRICULTURE

Demographic Dividend: the acceleration of economic growth resulting from change in the age structure of a population.

The amount of venture capital invested into agriculture is large and growing. In 2013, VC and PE investment into agriculture ventures tripled to Rs 2,000 crore (~USD 315 million). To understand the types of investment made into the sector during the past decade, we studied a number of companies backed by different VC's with different focuses. 50 companies and 10 funds later, we have assembled a comprehensive overview of the space along with 5 key trends in the sector.



Research Scope and Criteria

We studied a lot of companies to understand where investments have been made and to gain insight into where there are opportunities moving forward. We reviewed different levels of investment made by venture capital across the agribusiness sector—ranging from Rabo Equity's $250 million India Agribusiness Fund to Villgro's seed level incubation. The research was based on the following criteria:

- The company had to be based in India; and
- The company had to be an agribusiness; or
- The company had to offer services tied directly to agriculture

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This analysis provided a wealth of foundational information with which to assess significant investment trends, including opportunities for future growth.

The survey results

Based on the above criteria, funding came from three main sources: VC funds focused solely on agribusiness or agtech, VC funds directing a portion of their portfolio towards agriculture, and a few startups which hadn't yet received venture capital. Combing through these sources yielded the 50 companies and 10 funds represented in our study. In addition to standard background information, the survey captured areas of focus and the parts of the value chain the companies touch. Thus, the results of the survey include the locations of the companies and their customers on the value chain. For trend, the following internal categories were created to provide a snapshot of their specialty:

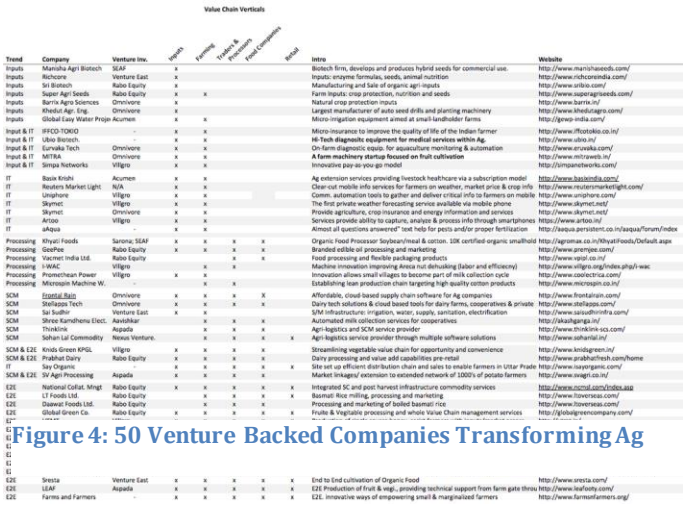
- Inputs: creating physical inputs and technologies
- IT: creating IT services providing information and support services
- Input/IT hybrids
- Processing: creating new of processing technology or techniques
- Supply Chain Management (SCM): creating cloud based solutions for integration of the supply chain via SCM/logistics
- End to End Integration (E2E): integrating their supply chain with new companies or services
- SCM/E2E hybrids

For example, Super Agri Seeds received investment from Rabo Equity, their trend is Inputs, they work within the Inputs & Farm Vertical, and their one line summary states: Farm Inputs: crop protection, nutrition and seeds. Click on Figure 4 for the full chart, organized by VC investor.

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The Five Trends: Inputs, IT Services, Processing, SCM and E2E Integration

Looking at the 50 companies, five areas of focus received a significant amount of investment. Click on the chart below to see where significant investments were made into Inputs, IT, Processing, SCM and E2E Integration.



Value Chain Verticals

Trend	Company	Venture Inv.	Inputs	Farming	Traders & Processors	Food Companies	Retail	Intro	Website
Inputs	Manisha Agri Biotech	SEAF	x					Biotech firm, develops and produces hybrid seeds for commercial use.	http://www.manishaseeds.com/
Inputs	Richcore	Venture East	x					Inputs: enzyme formulas, seeds, animal nutrition	http://www.richcoreindia.com/
Inputs	Sri Biotech	Rabo Equity	x					Manufacturing and Sale of organic agri-inputs	http://www.sribio.com/
Inputs	Super Agri Seeds	Rabo Equity	x	x				Farm Inputs: crop protection, nutrition and seeds	http://www.superagriseeds.com/
Inputs	Barrix Agro Sciences	Omnivore	x					Natural crop protection inputs	http://www.barrix.in/
Inputs	Khedut Agri. Eng.	Omnivore	x					Largest manufacturer of auto seed drills and planting machinery	http://www.khedutagro.com/
Inputs	Global Easy Water Projects	Acumen	x	x				Micro-irrigation equipment aimed at small-landholder farms	http://gewp-india.com/
Input & IT	IFFCO-TOKIO	-	x	x				Micro-insurance to improve the quality of life of the Indian farmer	http://www.iffcotokio.co.in/
Input & IT	Ubio Biotech	-	x	x				Hi-Tech diagnostic equipment for medical services within Ag.	http://www.ubio.in/
Input & IT	Eurvaka Tech	Omnivore	x	x				On-farm diagnostic equip. for aquaculture monitoring & automation	http://www.eruvaka.com/
Input & IT	MITRA	Omnivore	x	x				A farm machinery startup focused on fruit cultivation	http://www.mitraweb.in/
Input & IT	Simpa Networks	Villgro	x	x				Innovative pay-as-you-go model	http://simpanetworks.com/
IT	Basix Krishi	Acumen	x	x				Ag extension services providing livestock healthcare via a subscription model	http://www.basixindia.com/
IT	Reuters Market Light	N/A	x	x				Clear-cut mobile info services for farmers on weather, market price & crop info	http://www.reutersmarketlight.com/
IT	Uniphore	Villgro	x	x				Comm. automation tools to gather and deliver critical info to farmers on mobile	http://www.uniphore.com/
IT	Skymet	Villgro	x	x				The first private weather forecasting service available via mobile phone	http://www.skymet.net/
IT	Skymet	Omnivore	x	x				Provide agriculture, crop insurance and energy information and services	http://www.skymet.net/
IT	Artoo	Villgro	x	x				Services provide ability to capture, analyze & process info through smartphones	https://www.artoo.in/
IT	aAqua	-	x	x				Almost all questions answered" text help for pests and/or proper fertilization	http://aaqua.persistent.co.in/aaqua/forum/index
Processing	Khyati Foods	Saroma; SEAF	x	x	x	x		Organic Food Processor Soybean/meal & cotton. 10K certified-organic smallhold	http://agroma.co.in/KhyatiFoods/Default.aspx
Processing	GeePee	Rabo Equity	x	x	x	x		Branded edible oil processing and marketing	http://www.premjee.com/
Processing	Vacnet India Ltd.	Rabo Equity			x	x		Food processing and flexible packaging products	http://www.vipl.co.in/
Processing	I-WAC	Villgro		x	x			Machine innovation improving Areca nut dehusking (labor and efficiency)	http://www.villgro.org/index.php/i-wac
Processing	Promethean Power	Villgro	x	x				Innovation allows small villages to become part of milk collection cycle	http://www.cleanelectrica.com/
Processing	Microspin Machine W.	-		x	x			Establishing lean production chain targeting high quality cotton products	http://www.microspin.co.in/
SCM	Frontal Rain	Omnivore	x	x	x	x		Affordable, cloud-based supply chain software for Ag companies	http://www.frontalrain.com/
SCM	Stellapps Tech	Omnivore	x	x	x	x		Dairy tech solutions & cloud based tools for dairy farms, cooperatives & private	http://www.stellapps.com/
SCM	Sai Sudhir	Venture East	x	x				S/M infrastructure: irrigation, water, supply, sanitation, electrification	http://www.saisudhirinfra.com/
SCM	Shree Kamdhenu Elect.	Aavishkar		x	x	x		Automated milk collection services for cooperatives	http://kaalsganga.in/
SCM	Thinklnk	Aspada		x	x	x		Agri-logistics and SCM service provider	http://www.thinklnk-scs.com/
SCM	Sohan Lal Commodity	Nexus Venture.		x	x	x	x	Agri-logistics service provider through multiple software solutions	http://www.sohanlal.in/
SCM & E2E	Krods Green KPGL	Villgro	x	x	x	x		Streamlining vegetable value chain for opportunity and convenience	http://www.krodsgreen.in/
SCM & E2E	Prabhat Dairy	Rabo Equity	x	x	x	x		Dairy processing and value add capabilities pre-retail	http://www.prabhatfresh.com/home
IT	Say Organic	-	x	x	x	x	x	Site set up efficient distribution chain and sales to enable farmers in Uttar Prade	http://sayorganic.com/
SCM & E2E	SV Agri Processing	Aspada	x	x	x	x		Market linkages/ extension to extended network of 1000's of potato farmers	http://www.svagri.co.in/
E2E	National Collat. Mngt	Rabo Equity	x	x	x	x	x	Integrated SC and post harvest infrastructure commodity services	http://www.ncml.com/index.asp
E2E	LT Foods Ltd.	Rabo Equity		x	x	x	x	Basmati Rice milling, processing and marketing	http://www.ltoverseas.com/
E2E	Daawat Foods Ltd.	Rabo Equity		x	x	x		Processing and marketing of boiled basmati rice	http://www.ltoverseas.com/
E2E	Global Green Co.	Rabo Equity	x	x	x	x	x	Fruits & Vegitable processing and whole Value Chain management services	http://globalgreencompany.com/
E2E	Sresta	Venture East	x	x	x	x	x	End to End cultivation of Organic Food	http://www.sresta.com/
E2E	LEAF	Aspada	x	x	x	x	x	E2E Production of fruit & vegi., providing technical support from farm gate throu	http://www.leafasty.com/
E2E	Farms and Farmers	-	x	x	x	x	x	E2E. Innovative ways of empowering small & marginalized farmers	http://www.farmsnfarmers.org/

Figure 4: 50 Venture Backed Companies Transforming Ag

Inputs

Input companies are developing innovative tools to allow crop growth to take place on a larger scale. These companies develop products such as seeds, tools and irrigation equipment, which allow farmers to enhance the productivity of, and security around, their output. Within the seed industry, for example, companies typically operate in a couple of major categories. On the one hand we found biotech companies such as Manisha Agri Biotech and Richcore engineering new types of seeds and feeds to enhance the productivity. On the other there are companies like Sri Biotech, Super Agri Seeds and Barrix Agro Sciences focused natural and organic means of enhancing productivity and crop protection. An example of a company creating tools in this space is MITRA, who manufactures specialized machinery for the cultivation and upkeep of fruit. Lastly, a prime example of a company working in the irrigation sector is Global Easy Water Projects (GEWP), who develops and sells micro-irrigation equipment.

IT Services

IT services and mobile enabled technologies are giving farmers affordable access to the types of information and expertise previously only enjoyed by large, well-established companies. Within information services for example, there are companies providing daily, regional insights into

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weather and market conditions, such as Skymet, Uniphore and Reuters Market Light (RML), which provides SMS and voice messages to farmers at an affordable rate. RML also serves farmers by having them take a picture of their crops and send the image to company-sponsored experts who review the pictures and provide real-time, crop-specific advice and assistance.

Other companies, such as Eurvaka Tech, are creating services that allow crops and livestock to be monitored remotely through advanced sensors. These sensors then allow the company to collection of information at the source in order to generate timely opportunities for experts to diagnose and provide assistance. Eurvaka Tech also provides on-farm diagnostic equipment for aquaculture monitoring and automation. In the livestock industry, the innovative use of technology and business practices is allowing Basix Krishi to provide affordable, subscription-based livestock healthcare services with biweekly visits and instant access to support and veterinary expertise.

Processing

The processing opportunities reviewed fall into three main camps. The first type provides farmers the ability to complete the value-add aspect of processing independently. For example, I-WAC's equipment allows farmers to complete the de-husking process of the areca nut and Microspin Machine Works new technology that provides cotton growers better access to the market. The second type is seen in dairy, where new processing capabilities such as cooling—as seen in Promethean Power— allowing milk farmers to become part of the milk collection chain. The final type is within investments into companies who provide large scale processing capabilities; such as the organic food processor Khyati Foods or the branded edible oils company GeePee.

Supply Chain Management & Logistics

Cloud-based supply chain management and logistic services are transforming how companies large and small are able to streamline their operations. In the dairy sector, Stellapps Tech and Shree Kamdhenu Electronics have developed the dairy technology and cloud-based tools which allow for significant amounts of control, flexibility and automation. As a result, private companies, coop's and even NGO's are able to enjoy a superior level of service and expertise that would not have been affordable before. Other key players in this space include Frontal Rain, who provides 'the SCM solution for agribusiness in India,' Sohan Lal Commodity's agri-logistic services and Thinklink's SCM services. (For a more thorough look into Frontal Rain and this space, see article 4).

End to End Integration

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The need for more control, flexibility and transparency described in the first article of this series is seen most clearly in this area of investment. As of this writing there are two major categories of investment broken down according to their scale, both large and small. The large investments were typically strategic acquisitions meant to help with vertical integration. The small investments were typically a result of small, private companies or NGOs inputting capital for full E2E services with the goal of integrating farmers.

In the large investment category, some of Rabo Equity's purchases illustrate these trends well. National Collateral Management is a company focused on developing post harvest infrastructure and companies like LT Foods Ltd. and Daawat Foods Limited have exceptional processing capabilities. Other companies with E2E integration already in place were attractive acquisitions given their potential to scale, as seen in Milk Mantra for dairy, Global Green Company for fruits and vegetables, Arohan Foods for pork and INI Farms within horticulture.

In the small investment category were companies working specifically with farmers to ensure proper inputs are used, technical expertise is provided and market access is available. Companies like LEAF, Aroghyam, Farms and Farmers, and Zameen, a farmer-owned company partnering with marginalized farmers to produce fair-trade, organic and pesticide free cotton.

Conclusion

Our survey demonstrated clear trends with regard to VC investments in agricultural enterprise in India. This article outlined five major investment specialties pursued by the 50 companies in our survey. Ultimately these specialties serve to demonstrate why India is such an attractive place for venture capital investment in the agriculture sector. India has great potential because of its wealth of resources and human capital, and these companies are leading the push to tap into those resources by promoting innovation and integration.

While there are five major trends for venture capital as a whole, our fund chose to on explore 3 areas that are especially attractive for seed stage venture capital investment: inputs focusing on financial services, IT supported services and cloud-based SCM & logistic services. We will explore these three areas in the remaining articles in this series.

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FINANCIAL SERVICES IMPROVING BoP AGRICULTURE

Providing farmers with the resources necessary to weather the storm

Farming in India is all too often a high-risk, low-reward proposition. In the midst of unpredictable weather, disease that impacts crops and animals, and inconsistent market conditions, very few farmers have access to the insurance, loans or banking necessary to save for emergencies. Financial services can provide farmers with an affordable and safe way to invest in tools and machinery, purchase seed and fertilizers, and secure necessary support services for improved agricultural productivity. While agriculture in India can be unpredictable and downright risky, new technology is creating new approaches for access to financial services via Micro Banking and Micro Loans. Small infusions of cash can be the absolute difference between efficiency and inefficiency, great and poor yields, and access to strategic opportunities.



Micro Banking Challenges & Opportunities in Ag

In a country with 550 million mobile phone users, only 4% of the population currently use mobile banking services and less than 2% have access to credit cards. With an additional 220 million mobile phone users anticipated by 2020, there is significant opportunity for banking entities to target the assistance of rural farmers by providing small cash infusions and the ability to access mobile payment services and money transfer options.

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Micro Banking Challenges in Ag

India's rules and regulations have made mobile banking inordinately difficult for companies and excessively confusing for customers. For traditional mobile banking, the Central Bank requires mobile providers to partner with a national or regional bank. For other types of mobile financial services such as mobile wallets, providers must go through time-consuming application processes.

For companies, India's legal framework limits the types of services mobile banks are able to offer and also limits mobile financial service providers ability to scale in size, which impacts the services and ease of use for their customers. In addition, the Central Bank requires mobile banks to partner with a national or regional bank or an application for variations of a 'wallet license' limits the types of transfers and vouchers the company may employ. There is also a cumbersome two-factor authentication process with mobile banking that makes it difficult to navigate transactions through multiple banks and carriers.

Traditional banking and money transfers are currently time-consuming, travel intensive, and expensive. These challenges make it hard for rural farmers to access, receive or save small amounts of money.

Micro Banking Opportunities Within Ag

Those targeting the soon-to-be 800 million mobile phone users by providing a streamlined and more rurally-focused user-friendly service can make mobile banking services easier, faster, and less expensive for farmers. Startup companies like m-pesa India (which opened in April of 2013) understand this opportunity and are seeking to emulate the success of m-pesa in Kenya where it has reached two-thirds of the population. Meanwhile, established players including Oxigen and Airtel Money are already gaining momentum.

Mobile payment systems provide rural farmers, with 1) more secure ways to purchase input products and services—suppliers also enjoy more reliable and traceable avenues for receiving payments, 2) fast and secure ways to transfer wages and subsidies, allowing the recipient to receive their money without middlemen making deductions, and 3) a way to receive remittance from India's 100 million internal migrant workers who have migrated from rural farms to urban settings for better paying jobs.

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Micro Insurance Challenges Within Ag

While 25 million farmers account for over 60% of global weather-based micro-insurance loans, many potential carriers and policyholders are not utilizing micro-insurance because it can be challenging to sell, administer, and support. Mobile technology and IT services are making it easier to support and bundle micro-insurance programs aimed at farmers.

Micro Insurance Challenges

Micro-insurance can be hard to sell and support. One Dartmouth article focused on the willingness to pay for crop insurance captured this well: "It's hard to communicate and educate farmers as to the amount of risk and potential benefit of [insurance] products offered. Even when this is done, there is a high threshold for willingness to pay." Insurance policies are offered based upon multiple variables, including education, family-size, and business opportunities. The willingness to acquire insurance is influenced by factors such as household wealth, risk attitudes, and product literacy, and the amount a household is willing to pay is driven by a careful assessment of other risk-reducing avenues available to a household. Oftentimes, however, lack of information about the benefits of insurance products drives farmers' skepticism when considering whether to purchase policies to cover their crop yields.



The micro-insurance industry suffers from a number of other challenges, including the high cost of selling, difficulty in finding effective distribution channels, companies finding rural social obligations unviable, and the like. Moreover, selling insurance policies and validating claims can require a significant amount of time and money. Finally, while government intervention has helped initiate some aspects of micro-insurance, insurers have not readily embraced micro-insurance yet.

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Micro Insurance Opportunities Within Ag

Insurance is based on volume and scale. Technology is making it easier to distribute and support insurance to large numbers of farmers, which is leading to lower provision costs. As the costs decline and support increases, more farmers are gaining access and taking advantage of micro-insurance programs.

Technology Enabled Livestock Micro-Insurance

While micro insurance has historically been difficult to sell, the provision of mobile support services within agriculture will continue to help make services and benefits easier to understand and more affordable for farmers on the lower end of the economic pyramid. For example, IFFCO TOKIO, a major insurance provider in India, has instituted a collaborative mobile support partnership with Indian Farmers Fertilizer Cooperative Ltd (IFFCO), who represents more than 40,000 farmers' ITGI and is experienced in designing and marketing livestock micro-insurance distributed through farmer cooperatives and cooperative banks.



Within livestock, companies such as IFFCO, UIIC and New India Insurance are using technology like RFID for cattle insurance, with premiums typically around 4-5% of the animals' value and payouts normally around RS 10,000. While these services demonstrate how technology is impacting micro-insurance, there are also big opportunities for companies that can find ways of bundling micro-insurance services with IT services.

Bundling Micro-Insurance with New IT Services

Integration within the value chain, thanks to IT and cloud based services, is creating new partnership opportunities within the agribusiness value chain. While micro-insurance is already bundled with high quality seeds in large-scale agribusiness, the growing availability of IT and mobile enabled services (explored in Farm IT: Mobile in the Mud) are creating new bundling opportunities for loan services. An excellent example of this is within weather-based index

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insurance, where technology makes it possible to assess disbursements and provide compensation based on macro weather trends.

Pioneer Bundling IT Services and Micro-Insurance

A pioneer in this space is the weather forecast provider Skymet (check out 5 Companies We Like-Indian Ag for our profile) and their collaboration with the Weather Based Crop Insurance Scheme (WBCIS). This weather based insurance product is "designed to provide weather based insurance protection against losses in crop yield resulting from adverse weather incidences." Skynet already has 1,800 automatic weather stations spread across 15 states and is working to have "an all India presence in data collection" in the coming year. As a result, Skynet is able to stream live data to insurance companies, which helps settle claims quickly. In addition, Skynet provides data mining support and remote sensing capabilities to help more crop insurance companies—like WBCIS—develop new products under the Modified National Insurance Scheme (MNAIS).

Conclusion

IT and technology Integration of the supply chain and IT and Technology is making it easier and more affordable to provide and support financial services aimed towards farmers. Technology is also making it easier for members of the value chain to provide goods and services because of their ability to bundle services. As risks decline and IT services increase, there are growing opportunities to offer financial services to farmers. While this is true, the industry trends towards more control, coupled with flexibility and transparency, make it increasingly important to take a vested and holistic interest in farmers within their supply chain in the form of relationship with the value chain.

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FARM IT: MOBILES IN THE MUD

How Farm IT can transform a nation and change the world

Want to directly impact the most people on earth? Start with agriculture in India, add the use of innovative mobile technology to current farming praxis, and witness the radical increase of agricultural yield and transformation of a nation. Farm IT in India has the immediate potential to transform the agricultural sector by allowing individual small farms, access to the benefits associated with being a large agricultural producer.



IT Opportunities

IT can enable immediate diagnostic information for farmers by providing timely weather trends that affect planting and harvesting schedules. Farmers can also receive immediate answers from agricultural specialists related to crop or animal disease identification or eradication.

Livestock Diagnostics

One example of a company using technology in an innovative way is Ubio Biotechnology who has created a small, affordable, diagnostic kit able to identify and cure common diseases occurring in farm animals. For example, within ten minutes of administering their bovine tuberculosis test, a farmer will know if the cow has contracted the contagious and debilitating disease which is harmful to both humans and animals.

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Remote crop monitoring answers are a text away

Other services, like the Indian Institute of Technology's aAQUA - almost All Questions Answered – allow farmers to text questions like "how to deal with a certain pest" or "how to properly fertilize wheat". Prices for these services have remained relatively low; the most expensive is approximately 800 rupees per year ($13 USD), a relatively small price to pay. Farmers across over 400 districts claim such services have helped them avoid dramatic losses and increase profits by several thousand rupees a year.

Tech-enabled best-practices

Information technology and the increasing availability of mobile enabled technologies are allowing companies to create affordable services that enhance overall productivity of farms. Farm IT provides the desperately needed support services that assist farmers in making wise decisions about what crop to grow, how to grow it, how to support and harvest it, and finally how to sell it. For daily regional insights into weather and market conditions there are companies like Skymet, Uniphore and Reuters Market Light providing SMS, and even voice messages, to farmers at affordable rates. The collection of information at the source creates timely opportunities for experts to diagnose and provide assistance and automatically adjust growing practices remotely.

With GPS-enabled mobile technology it is now possible to identify specific parcels of land in India, determine best practice in regards to choice of crops and growing season, irrigation needs and weather patterns, in order to maximize yield. Without this technology, a farmer doesn't have access to the most critical information and farming becomes a hit-or-miss, trial-or-error process that all too often results in waste or unrealized opportunity.

Yield and Waste - India's Two Biggest Agricultural Challenges

One of the biggest issues facing the agricultural sector in India is lack of yield. India's farm yield is 30-50% lower than that of developed nations due to the fact Indian farms are generally very small (on average two hectares) and simply don't have access to resources such as:

- Financial services
- Credit (or lenders)
- Support expertise
- Educational services

In contrast, larger farms enjoy the economies of scale necessary to afford these resources and are therefore more productive. The inability to procure these resources is one of the main reasons why

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India's agriculture exports currently only account for 2% of the global food market (even though India has the 2nd most farm land of any country). IT is now giving farmers the opportunity to enhance their productivity and therefore increase their crop yield. One area IT is filling the gap is within education. An illiterate farmer with little formal education and can pick up a mobile phone, take a picture, and have immediate access to agricultural experts and receive much needed assistance at an affordable price.

A third of the food produced in India is wasted

The dreaded partner of low agricultural yield in India is waste. Stunningly, one-third of all food produced in India is wasted (ie, it never makes it into someone's mouth to eat). For example, if a buyer is seeking to purchase corn from a local farmer, and the farmer is growing five different crops spread across a two hectare parcel of land, the resulting amount of corn will be small and of low quality. Due to the buyers need to fill a quota at a certain level of quality, it is not feasible for the buyer to interact with small farms, and as a result, small farmers are not able to sell their products and they go to waste. This cycle is especially troubling in light of the fact that 60% of the Indian population is engaged in agricultural services.

Lack of education and resources is leading to an epidemic of suicides

Despite the fact nearly two-thirds of India is supported by agricultural in some capacity, there is currently little to no training provided in primary or secondary schools that encourages early-skill-development for the next generation of Indian farmers. This lack of education, coupled with the lack of resources already explored, is leaving many farmers squeezed to the point of breaking. As a result, Indian farmers are committing suicide in historically unprecedented and epidemic numbers. Caught in debt cycles with no possibility for paying off what is owed, and seemingly left without options for change or improvement, farmers have no hope for their future.

IT is bringing scalable opportunities

Good news. Data and IT are creating significant, scalable opportunities able to transform farmers' abilities to increase efficiency and yield. As quality and quantity of output increases, farmers become more attractive and sought after members of the value chain. This inclusion not only enhances and grows the market for additional agritech solutions, but also creates more opportunities for investment and further integration, while increasing agricultural access to markets. This is exciting; as farmers succeed, the larger their market and opportunity for additional goods and services at scale. And the more efficient and enabled a farmer, the more attractive they

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will be for investment and integration into markets - locally, regionally and nationally. Through SV Agri Processing for example, thousands of farmers across 5 Indian states are being integrated into the larger potato supply chain.

Agriculture Is The Rising Tide That Lifts All Of India's Economic Ships

As global agri-business becomes more complex, volatile, and scrutinized in route to an anticipated 2050 global population of 9 billion people, food production will need to increase 70% from today's levels. Why is this significant? The value of every piece of land and agricultural resource will also increase. Those individuals and businesses most successful at connecting India's farmers with agricultural best practices, financial and informational resources, in a profitable, humane, and impacting manner will have incredible opportunity.

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CLOUD BRINGS RAIN TO INDIAN AGRICULTURE

How Startups are bringing supply chain management to Indian Agriculture

Cloud based SCM startups are transforming the efficiency of Indian agribusiness through integration. One-third of all food produced in India is wasted before reaching consumer due to poor infrastructure and inefficient supply chains. While infrastructure is capital intensive, there is tremendous opportunity for startups able to bring integration within the supply chain. Integration provides companies greater control over their bottom line through managing risks, driving out wastes and ultimately lowering the cost of doing business.



Figure 5: Credit AP Photo

The Gap Supply Chain Management Is Filling

Lack of visibility and established connections within the value chain make it hard for companies large and small to plan and manage operations efficiently. However, through cloud based Supply Chain Management (SCM), companies large and small can now receive the necessary visibility and information to establish healthy collaborative relationships and holistic planning for their products. For example, in the case of producing and selling a mango, large companies may need access to significant quantities of mangos. Without control, they could under or over plant or buy, in an effort

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to hedge their bets, either wasting precious resource by producing too much fruit that has to be sold at discount, or by losing sales by not producing enough.

An example SCM startup is CropIn Technologies. They provide agri-businesses the technology and expertise needed to create a smarter and safer food supply for consumers around the world. CropIn is creating a network of connected farmers across Rural India and collaborating with the different value chain participants along the supply chain to monitor farm produce status more closely, thus increasing yield and buying efficiency.

Transparency and insight into the factors of production provide companies more control and flexibility. Increased control enables companies to account and plan for possible challenges, allowing them the flexibility and opportunity to quickly redirect course based upon market volatility.

Integration Enables Precision and Planning

Large established companies are able to approach the production of their goods with significant precision and planning, forecasting cost requirements and obligations before a seed is ever planted. In the life of our mango example, farmers must determine the region, secure the inputs, insure the product, provide training and expertise for cultivation, arrange transportation from farm to processing and then ultimately to the market. At the end of the day, this isn't just about managing a product, it's about creating the framework and standards necessary to incorporate current and new agents into the process, over time, across different geographic and social realities. It this sounds complex and riddled with potential problems, that's because it is. Planning at this scale with the complexities agriculture has to offer is difficult.

Companies Creating Cloud Based SCM Solutions

Streamlining and collecting data internally is hard enough, doing it for an entire ecosystem is even more difficult. For scale, a baseline level of sophistication is necessary to provide the basic data points necessary, and it is even more challenging to develop the plans and necessary software to integrate others. Thankfully there are a number of startups in this arena.

Frontal Rain's best-in-class pedigree

A great example is Frontal Rain who offers supply chain software for agribusiness companies on the cloud and was established by three senior executives from SAP with over 50 years of combined business and product development experience in the enterprise software business. Frontal Rain

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consolidates the benefits of tightly integrated business processes of an enterprise application and combines this with collaboration, e-commerce, social networking and mobile capabilities, enabling customers to seamlessly interact with their suppliers and customers. Through their primary product offering, Rain+, large companies enjoy a comprehensive suite of services while smaller agri-business companies are able to benefit from select portions of services.

Streamlining the value chain

Other examples of SCM companies making important contributions include ThinkLink and Lal Commodity's agri-logistic services; Stella Apps provides cloud-based tools and dairy technology to farms, co-ops, and private companies; and the recent start up, Knids Green KPGL, is streamlining the vegetable value chain.

SCM's Impact on Organic and Certified Fair Trade

To receive certifications such as Fair Trade or organic, companies must be able to demonstrate the end-to-end elements of production. IT can help here too.

SCM helps fair trade and organic certification.

Cloud based services provide companies, co-ops and NGOs a means to collect this information in an affordable and scalable way. They also make it easier to plan and incorporate marginal farmers into the value chain. This helps farmers gain access to the inputs and support necessary for productivity and market access. In India, farm gate prices are often only 25% of retail price. A company working to fix this discrepancy is the Mumbai-based Under the Mango Tree (UTMT). UTMT is committed to improving the lives of marginal farmers by advancing sustainable community-based beekeeping using indigenous bees for the purpose of increasing crop yields and garnering a fair market price through the sale of single origin honey.

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Integrated organic and fair-trade companies

Other companies providing SCM services, include Suminter India Organics who produce and export organic grains, rice and cotton; Zameen – a farmer owned marketing company pursuing fair trade pesticide-free organic cotton; and INI Farms who present a Fair Trade horticulture focus with full integration from farm to consumption.

Cloud Supply Chain Management startups are hot

Supply chain management and integration represents a hot area of opportunity within Indian agribusiness, especially for those with the vision and commitment necessary to introduce the innovative and disruptive services. Indeed, it is the startups who are simultaneously reducing risk and waste to achieve greater efficiency that are driving down the cost of doing business, and thereby empowering BoP farmers with an improved bottom line.

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5 COMPANIES WE LIKE – INDIAN AGRICULTURE

Bridging farmers and markets; 5 innovative business models

In the midst of completing a series focused on India's burgeoning Agriculture revolution, we came across a number of companies stepping up to address the gaps across the value chain. While a number of start-ups working to improve agricultural yield or to help reduce waste were explored in 50 Venture Backed Companies Transforming Ag, a few stood out and were worthy of additional attention. The following list represents quick introductions to five Agriculture companies which really stood out.

Frontal Rain

Frontal Rain offers affordable, cloud-based supply chain software for agribusiness and food processing companies on the cloud.



Through their primary product offering, Rain+, large companies enjoy a comprehensive suite of services while smaller agri-business companies are able to benefit from select portions of services. Established by three senior executives from SAP with over 50 years of combined enterprise software experience, Frontal Rain is committed to helping emerging food and agribusiness companies grow rapidly through the use of advanced technological solutions that were previously only available to large agribusinesses.

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Ubio Biotechnology

Ubio is a biopharmaceutical company developing innovative solutions within medical, veterinary and food diagnostics.



Located in Kerala India, Ubio aims to provide affordable and accurate diagnostic products for diseases seriously impact the economy of developing countries. From R&D through manufacturing, Ubio uses the latest technology to develop accurate point of care diagnostic tools for the medical and veterinary areas of agribusiness. Ubio is the only company in India manufacturing animal health diagnostic equipment.

I Say Organic

I Say Organic believes in giving people the option of eating safe food, grown without toxic chemicals



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or pesticides, while recognizing and supporting farmers who grow this food. To accomplish this, I Say Organic partners with producer companies to connect farmers who want to grow organic products with customers who want to buy organic. In December 2011, I Say Organic entered into a partnership with its first farmer group, Dharani Suphalam in Sirsa, Harayana. Their model focuses on developing a market driven approach for organic farming, believing that the biggest challenge for organic farming today is market linkage. Since March 2012, they have been delivering fresh organic produce across Delhi, employing the philosophy that organic produce should be easily and conveniently available, and as easy as making a phone call. Their partnership model is structured to equally divide responsibility between I Say Organic and producer groups for the purpose of self-reliance and sustainability of their farms and livelihoods.

Skymet

Skymet is the first private weather forecasting service available via mobile phone.



Believing that climate data and forecasting should be readily available for all, Skymet uses a cloud-based service model to provide clients affordable access to real-time information so that farmers can understand and organize themselves around the always-changing weather environments. Today, Skymet can provide accurate forecasts at the village level as well as provide reliable seasonal forecasts seven months out, including the monsoon seasons. Through research and analysis by some of India's finest weather scientists, Skymet has created weather-based business solutions for media, power, shipping and telecom. They also provide risk management services to power, renewable energy (wind and solar), aviation, construction and the food & beverage industry

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in India. Skymet is backed by Omnivore, a venture fund focused on early stage agriculture and food companies in India.

Knids Green KPGL

Knids Green KPGL is streamlining the vegetable value chain for opportunity and convenience.



Started in 2008 as a small startup with an idea for refrigerated street carts for selling vegetables, Knids Green has taken big strides towards achieving its goal of organizing the fresh vegetable supply chain with more than 3,000 farmers and 500 vendors. Operating out of Bihar, India, the core product of KGPL is providing convenience to all its stakeholders, through different products and processes, for the procurement of vegetables from small growers. They do so by empowering street vendors and growers to achieve livelihood security, generate higher incomes, provide social security, and generate livelihood opportunities by creating market space, shopping malls, bazaars, and other market areas in order to connect street vendors and growers to the mainstream market.

Conclusion: Entrepreneurs see a problem & smell an opportunity

The Indian agriculture system is indeed full of paradoxes. There are many challenges that lead to poor yields, poor crop/seed choices, and the waste of over a third of India's food produced. Technology is now in a position though to help bring control, flexibility and transparency to the value/supply chain on a massive scale to small and large farmers alike.

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In doing this research, we were inspired by the 50+ startups that we researched and profiled that are taking innovative approaches to building a better agriculture ecosystem in India. To accelerate this opportunity, we are expecting to make a number of investments in early-stage agriculture sector startups over the coming few years. If you know of any interesting agriculture-focused entrepreneurs, please do send them our way!

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