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Assessing a digital agri tech start-up landscape and identifying potential opportunities for partnerships and funding

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Abstract

Agriculture accounts to be the fundamental sector of the Indian economy. The digital agriculture sector is fast growing as each segment of the agricultural supply chain attempts to incorporate data-driven insights into its processes. Digitalization refers to the use of digital technology for the conversion of any business model or idea to generate revenue and opportunities in value production. Startups are proving to be the world's transformation engines. With innovative ideas and the development of disruptive technology, these small start-ups are revolutionizing their industries. Startups are commonly recognised to be small businesses, yet they play an important role in economic growth. They are in charge of producing new jobs, which means more employment and a better economy. Kalgudi Digital Pvt Ltd. is a 100 percent subsidiary of Vasudhaika Software Pvt Ltd. Kalgudi is an innovation for democratizing commerce at the grassroots. It converges all stakeholders at the grassroots and benefits everyone. Through its end-to-end digital platform caters to the needs and connects with different value chain players and enablers like farmers, Farmer Producer Organizations/Companies, service providers, traders, exporters, etc. All business, regardless of its type or scale, requires capital to turn its unique ideas into action. A grant is a cash reward made by one organization (often a corporation, charity, or government) towards a person or a firm in order to support a goal or incentivise achievement. Grants are simply donations that do not have to be repaid in most circumstances. Some direct grant providers or donor organisation are mentioned that will help any digital agritech start up to get their first set of funds for starting any project. Indian companies must look beyond replicating successful foreign concepts and focus on establishing meta-level startups that address fundamental problems that can be scaled internationally.

Keywords: Agriculture, digital agriculture, agritech, startup, donors, grants, funding, partnerships

Introduction

Agriculture accounts to be the fundamental sector of the Indian economy. It has achieved about 19.9 percent contribution towards national GDP in the year 2020- 2021 which is at par with the contribution in 2003-2004 and provides employment up to 41.49 per cent. The food grain production has increased up to 308.65 million tonnes in the crop year 2020-2021. There are tremendous changes in the usage of technologies in the field of agriculture technology. The digital agriculture sector is fast growing as each segment of the agricultural supply chain attempts to incorporate data-driven insights into its processes. Access to available data technologies lowers entry barriers; nonetheless, critical components such as networking and software technology require further development. Digitalization refers to the use of digital technology for the conversion of any business model or idea to generate revenue and opportunities in value production. It is part of the Digital Transformation Pyramid. It is the socio-technical process of applying digital innovations. It comprises phenomena and technologies such as big data, internet of things (IoT), augmented reality, robotics, sensors, 3D printing, system integration, ubiquitous connectivity, artificial intelligence, machine learning, digital twins and block chain among others (Alm *et al.*, 2016)^[1] As the old adage goes, "large things come in tiny packages." This is especially true for new beginning businesses. Startups are proving to be the world's transformation engines. With innovative ideas and the development of disruptive technology, these small start-ups are revolutionizing their industries. Some of the most astounding new firms have lately made headlines, and with their creativity, it's simple to understand why they are the startups transforming the world (Kasteler, 2017)^[2]. Startups should locate in nations with bigger demand and excellent chances. Underdeveloped or emerging countries, countries in war, and countries that are fresh to

technology growth all serve as excellent breeding grounds for entrepreneurs. Each of these nations, with their unique demands, presents unexplored opportunities for entrepreneurs not only to profit but also to improve the country's socioeconomic standing. Startups are commonly recognised to be small businesses, yet they play an important role in economic growth. They are in charge of producing new jobs, which means more employment and a better economy. These businesses not only improve economics, but they also stimulate innovation and competitiveness. Startups create a ripple effect on the socio-economic fabric of the demography in which they operate (Kola, 2014)^[3]. It can be seen in how Infosys altered Bangalore, Alibaba converted Hangzhou, Microsoft transformed Redmond, and Google transformed Mountain View, California, among other places. They have a direct influence on the growth of the cities where these firms have grown. As job prospects expanded, experienced professionals began to relocate to these areas in search of a demanding and high-growth career. As the need for highly skilled workers surged in these locations, the number of recent graduates soared. As more college graduates began to settle in these areas, social patterns and culture underwent a shift. India has an approximately 26,000 startups, calling it the world's third-largest startup ecosystem, with over \$36 billion in consolidated inflows over the last three years and 26 "unicorns" — startups valued at more than \$1 billion. The Indian startup has grown significantly, owing mostly to capital investors such as seed, angel, venture capital, and private equity funds, as well as technical assistance from incubators, accelerators, and the government.

Startup: The Path to Innovation

The word "startup" originated in the United States in the late 1970s, gained popularity in the late 1990s as part of the web excitement and technology, and boomed in the 2000s (Startups Commons, 2021)^[4]. A startup is defined as "a transitory company aiming to seek a repeatable and scalable business model" (Blank, 2013)^[5]. Also, Investopedia defines "a startup is a business that is in its early stages of development. These businesses are frequently funded in the beginning by their entrepreneurial founders in order to capitalize on developing a product or service in which they feel there is a need. Almost all of these small-scale enterprises are not long-term viable without further investment from venture capitalists due to insufficient income or excessive costs".

Startup's Funding: Fuel for the Engine

Any startup, regardless of its type or scale, requires capital to turn its unique ideas into reality. It is very simple to come up with a business idea; but, bringing the firm through the phases of fundraising to fruition is extremely difficult. The majority of firms fail due to an inability to secure adequate financing. In general, entrepreneur's or founder's own funds, family, friends, institutions, angel investors, venture capitalists, and crowdsourcing can be used to support enterprises.

Hence to understand about a startup, its funding opportunities and partnership we have taken two objectives for study:

1. To study about a Digital Agri-tech start-up, an incubatee of International Crop Research Institute for Semi-Arid Tropics (ICRISAT).
2. To find the grants opportunities for a Digital Agri-tech start-up in India.

Research Methodology

Locale of the Study

As the internship was carried out under ICRISAT (Hyderabad, India), the digital agritech startup taken for study purpose is Kalgudi Digital Private Limited, Hyderabad. Kalgudi was an incubatee under ICRISAT.

Data Collection

For data collection in this study, a semi-structured interview schedule comprising closed-ended and open-ended questions was employed. Secondary data was acquired in order to investigate the agritech sub-sector in which the firm operates. It was beneficial in providing a basic backdrop of facts about the startup. The key data was gathered through face-to-face interviews with the startup's founders. For data collecting, focus group talks and the observation method were used.

Period of the Study

The study was done during the internship period at ICRISAT from April 2022 to May 2022.

Digital Agri Tech Startups: Transforming Indian Agriculture with Technology

The Government of India is always seeking methods to enhance agricultural output, food processing, and marketing channels via the integration of newest technology and innovations, generating a tremendous opportunity for food and agritech entrepreneurs in the country (Balaji, 2018)^[6].



Fig 1: Scope for agitech startups in Indian agriculture (Kaalari, 2018)^[7]

Kalgudi Digital Private Limited

Established in Nov 2020, Kalgudi Digital Pvt Ltd. is a 100 percent subsidiary of Vasudhaika Software Pvt Ltd. Kalgudi is an innovation for democratizing commerce at the grassroots. It converges all stakeholders at the grassroots and benefits everyone. Kalgudi is working with International Crops Research Institute for the SemiArid Tropics (ICRISAT), Digital Green, Aghub, Professor Jayashankar Telangana State Agricultural University (PJTSAU), Society for Elimination of Rural Poverty (SERP) -Andhra Pradesh, Odisha Rural Development and Marketing Society (ORMAS), Government of Sikkim, Ripples of Change Foundation (ROCF), National 11 Bank for Agriculture and Rural Development (NABARD) Telangana, in their initiatives and interventions. Kalgudi, through its end-to-end digital platform caters to the needs and connects with different value chain players and enablers like farmers, Farmer Producer Organizations/Companies, service providers, traders, exporters, etc.

Services Provided by Kalgudi

Ecosystem: There are several issues in agricultural and related sectors, spanning from inputs to output, markets to consumption, and all in between. There is no silver bullet, but they feel that a vibrant network of all ecosystem stakeholders can perform wonders. The majority of the issues people

confront now have solutions within the ecosystem. In fact, these are transformed into possibilities for others. Kalgudi takes advantage of this aspect by connecting all of the players on a satisfaction model. Kalgudi essentially unites farmers, traders, input dealers, logistics providers, academia, institutional buyers, POs, government agencies, and consumers. Interactions such as information, assistance, advice, purchase, sale, and service occur between them, fixing each other's issues and benefiting jointly.

For Everyone: Every member of the ecosystem seeks quick and tangible fulfillment. Producers are content with appropriate information and access to fair market places, agribusinesses need visibility and should be able to find markets, and consumers are satisfied with acquiring high-quality produce at reasonable pricing. Kalgudi makes certain that everyone in the ecosystem benefits in the long run.

Core Services: Standardized agricultural products, locations, profiles, structure, interactions, and activities are among the platform's key features. The data driven services meet the needs of all stakeholders in comprehensively managing their operations. Farmers operate their farms, non-governmental organizations run extension programmes, and agribusinesses run their enterprises. Through core services, all agricultural and related activities are digitized.

Stores: Kalgudi features a wide range of shops. Each specializes in a particular agricultural activity. The input store aggregates demand and links it to suppliers. Allows for unique techniques to choose the best input. The output store connects agricultural product buyers and sellers. Our contextual traceability is generated and allocated automatically to every product on the market, and it can extend all the way to the final mile. The consumer store sells rural and agricultural products. Instead of merely stating specifications, the story of each product and maker is told. This is a collaborative commerce store with no inventory, and it is their solution to the major issue.

Key Highlights

The platform presents itself customized to the user. The whole Kalgudi appears like a simple web/mobile app for a farmer. Most of the benefits reach farmers, even passive & non-tech-savvy farmers. The following are the users of Kalgudi and how they see it:

- Kalgudi Core
 - Seedx
 - Connectx
 - Kuber
 - Input Sore
 - Output Store
 - Consumer Store

Kalgudi Core

Core Application Supply Chain and Impacts

The core application has Farmers application and Farmers Producers Organization (FPO) application. This core app registers NGOs, FPOs, Farmers, Universities, Research Institutions, Regulatory boards and various Organizations etc. The core app works around these bodies as can be understood from figure 2.

Proposals are first prepared and pitched. This aids the team in obtaining projects and funding. Following that, the farmers or FPOs are onboarded, and various programmes are developed for the farmers and FPOs to work on in the field. The next step is to add various statutory bodies or members for advisory purposes. Universities like PJTSAU and ANGRAU, as well as government agencies like the India Meteorological Department, Agmarket, NCIPM (National Research Centre for Integrated Pest Management), and APMC (Agricultural Produce Market Committee). They serve as advisory bodies for weather alerts, market information, input offers, crop calendar preparation, and pest management, among other things.

The next step is to move the project forward and reach a specific deliverable. These deliverables must be a long-term project that farmers can implement and use as success stories to encourage other farmers to adopt the method.

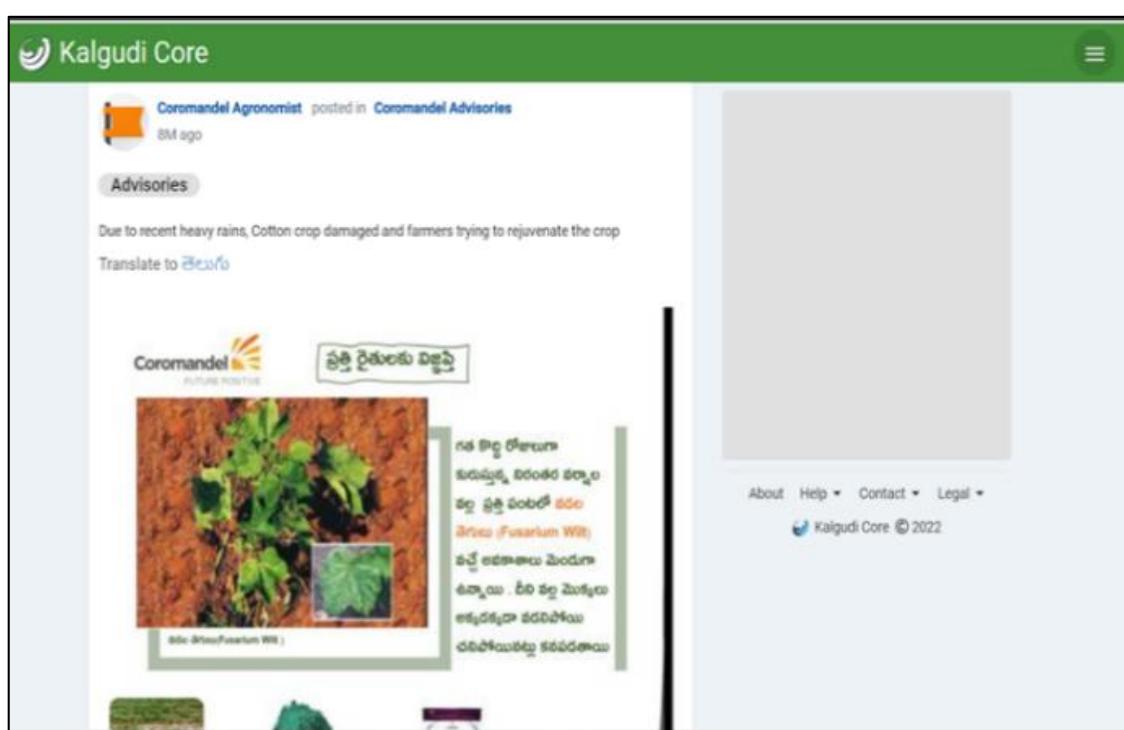


Fig 2: Screenshot of Kalgudi core services website
[Note: <https://core.kalgudi.com/app/home>]

SeedX

Kalgudi provides its customers with a comprehensive online presence. Every product has been cured, translated, published, and indexed. Farmers must sign up for seed production, manage contracts, share knowledge, schedule tasks, measure, ask questions, and track progress, among other things. All of this is handled transparently and effectively by Kalgudi's SeedX as is shown in the figure 3. All of one's seed multiplication sites can be easily and effectively managed. Kalgudi easily reaches out to every end customer. It

distributes product literature, answers questions, recommends best practices, and sends information about other products. Customers are organized by product for ease of use. All seed production activities are automatically incorporated into a comprehensive, incomparable traceability system. This can be integrated to one's seed processing systems and made available to end users after confidential parameters have been filtered. Kalgudi adds new distribution channels without interfering with existing ones. Seeds can be sold directly online or via distributor networks.



Fig 3: Screenshot of SeedX website of Kalgudi Digital Private Limited.

[Note: <https://corporate.kalgudi.com/sites/seedx.html>]

ConnectX

Kalgudi is a network interaction platform that brings together all actors in agriculture and its allied industries. Farmers, traders, input dealers, logistics, academia, market facilities, institutional buyers, producer organizations, NGO, government departments, and consumers are linked together through interactions for information exchange, Q&A, agricultural training, advice, buy, sell, connect, like, promote, rent, service, and so on. The convergence of all participants through innovative interactions brings substantial value to the

entire ecosystem. Farmers and producer organizations are well informed, their requirements are met in markets, and they deal online. Organizations, institutions, funders, non-governmental organizations, and government departments can manage a big number of farmers and also have a protracted impact. Agribusinesses and self-help groups are also reaching out to end users through the platform in a collaborative manner. All these are done easily in this website as depicted in the figure 4.

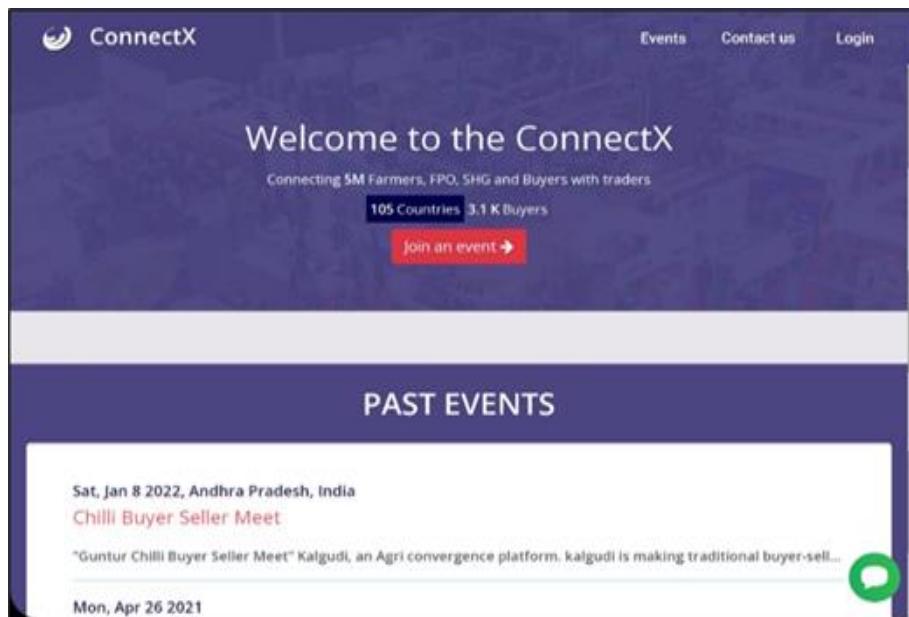


Fig 4: Screenshot of ConnectX website of Kalgudi Digital Private Limited.

[Note: <https://connectx.kalgudi.com>]

Kuber

Kuber is a Kalgudi app, that can be understood from the below figure 5, that allows you to start your own online reseller business and earn extra money in addition to the regular job. This is India's first reseller programme for agriculture and rural lives. The Kuber app is downloaded, the products are explored from the vendors, and shared via social media platforms such as WhatsApp, Instagram, and Facebook. Kalgudi's AI and machine learning algorithms recommend relevant and targeted items to the Kuber community, which one can share with their friends. Kalgudi

offers a wide range of high-quality products from a variety of manufacturers and suppliers at cheap pricing.

One can search for and identify relevant products based on crop, area, and other criteria. And can supplement your income by adding margin to the goods you offer to end users. All of your orders, margins, and payment settlements are right at your fingertips. There is no inventory and no investment required to start an internet resale business; all that is necessary is a basic smartphone to start earning from home or anywhere.

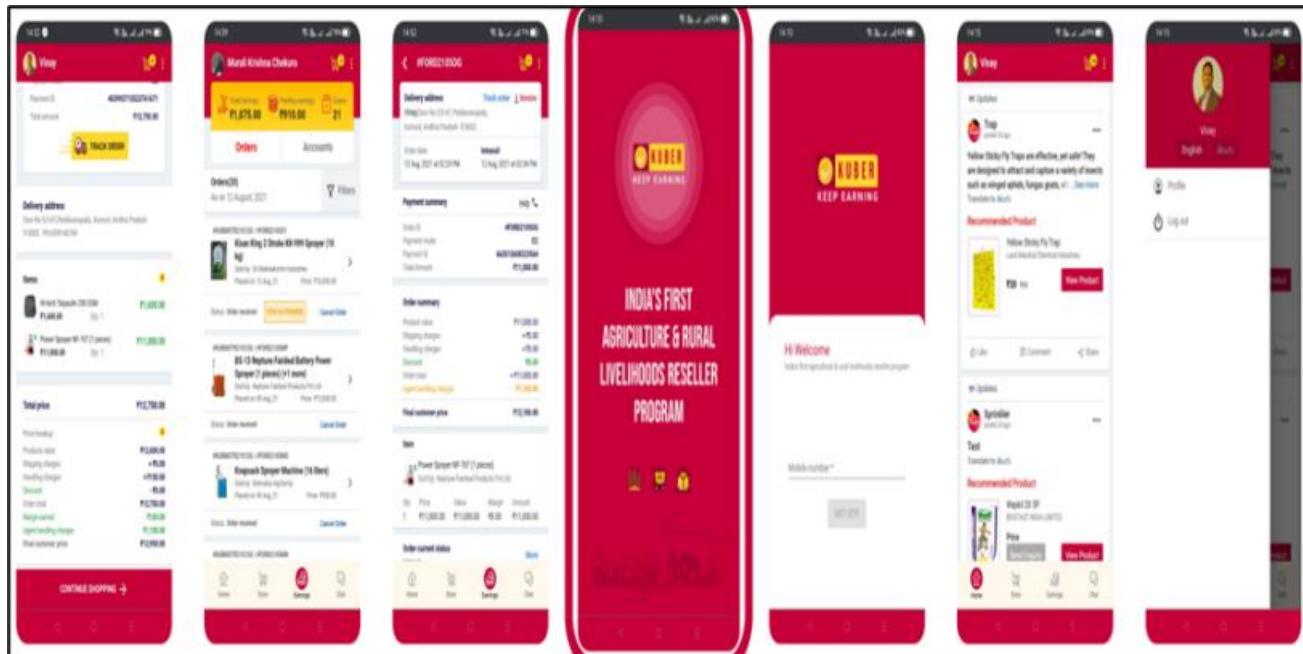


Fig 5: Screenshot of Kuber mobile application.

[Note: https://play.google.com/store/apps/details?id=farm.kuber.app&hl=en_IN&gl=US]

Input Store

Input Supply Chain and Impact

Kalgudi's AI anticipates, standardises, and gathers possible supply corresponding to one's needs dynamically. Supply aggregates at a logical level, allowing for rapid exchanges and discussions. The contextual traceability of Kalgudi is an innovative synthesis of all product information. Any orchestrated fake traceability generation activities are prevented by our network-based trust assessments. All negotiations or responses in Kalgudi are one-on-one and confidential. Assisted commerce facilitates translation and ensures that both parties comprehend the terms. To avoid future conflicts, all discussions and agreed-upon terms are archived and attached to each transaction. Digital supply chains are enabled through networked, digital exchanges on

Kalgudi. A digital transaction pipeline integrates all discrete operations in forecasting demand, reaching out to customers, managing orders, involving distribution channels, third party logistics, settlements, and customer engagement. The majority of the transactions in inputs have several payment periods. Pay upfront, advance, cash on delivery, and many other options are available. Transacting online now creates an even greater trust challenge. Escrow-based payment options are available through Kalgudi. Terms agreed upon are implemented in an easy handshake format. Traditional events such as buyer-seller meets, consumer involvement, and product displaying are now online possible. All the above facilities can be availed in the input store that is shown in the figure 6.

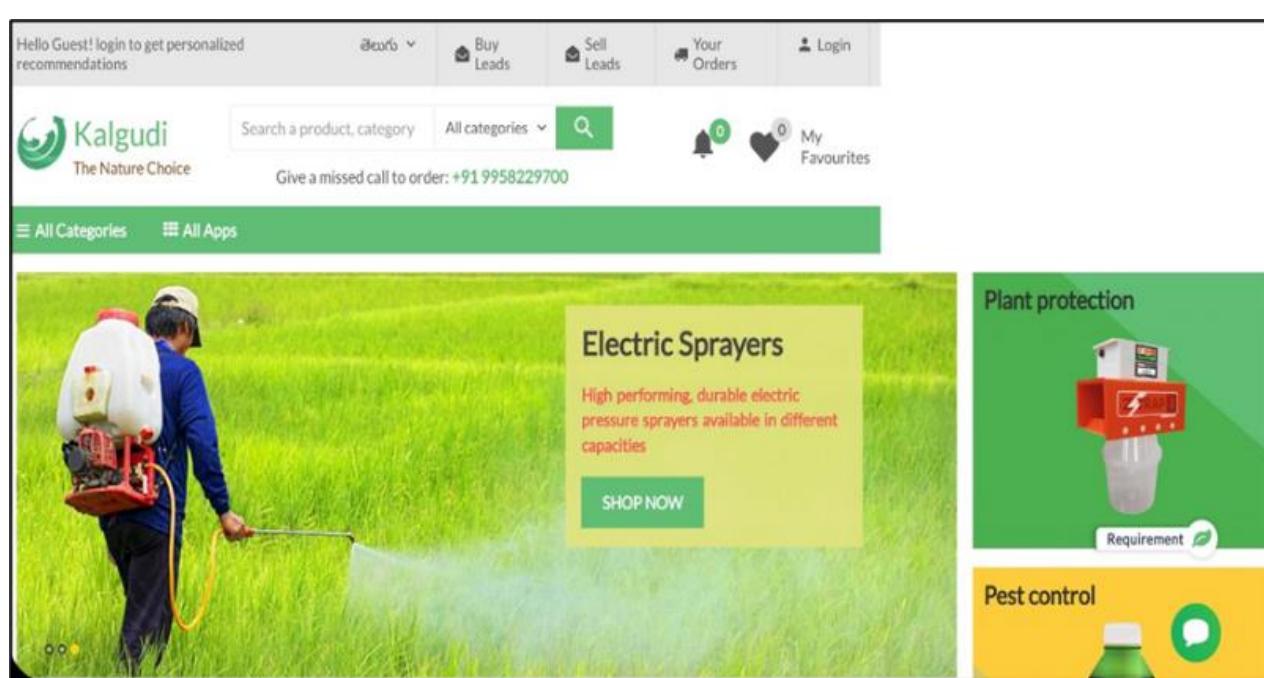


Fig 6: Screenshot of input store of Kalgudi Digital Private Limited

[Note: <https://inputs.kalgudi.com>]

Output Store

Output Supply Chain and Impact

The merchants have listed more than 60 commodities on the Kalgudi output store website. This store has been opened for the benefit of Kalgudi's farmers, traders, processors, exporters, institutions, and other stakeholders can be understood from figure 7.

The business begins with a buyer's requirement for a commodity situated anywhere in the country. The commodity is then requested by the buyer in the application. The Kalgudi insight team digitally facilitates the procedure without the

involvement of middlemen. They serve as the two parties' regulating body. The commodities seller next lists the merchandise, along with a few detailed images, that he has in the output store. Kalgudi's field team sorts through the many grades and quality levels of the commodity before driving the buyer to the seller's warehouse for a physical inspection. When the buyer accepts the contract, the seller transits the commodity and the buyer transfers the consented payment to Kalgudi's Nodal account. Kalgudi releases the receivables to the seller upon successful delivery of the product.

The screenshot shows the Kalgudi Outputs Store homepage. At the top, there is a search bar with placeholder text "Search a product, category" and a magnifying glass icon. To the right of the search bar are links for "English", "Buy Leads", and "Login". Below the search bar, there is a section titled "All Categories" with a dropdown arrow. Underneath it, there is a section titled "Fruits & Vegetables" with four items displayed:

- Mango**: 17 Varieties
- Sweet Lime**: 1 Variety, 410 Tons, [See All](#)
- Watermelon**: 2 Varieties, 139 Tons, [See All](#)
- Onion**: 1 Variety, 26 Tons, [See All](#)

Each item has a small image and a yellow callout box indicating the number of varieties or tons available. There is also a "Requirement" button with a leaf icon and a "All" button. On the right side of the page, there is a message: "Have any requirements? [create here](#) or call us on +91 8069107746" and a "View all (31)" link.

Fig 7: Screenshot of output store of Kalgudi Digital Private Limited.
[Note: <https://outputs.kalgudi.com>]

Consumer Store

Kalgudi is your one-stop shop for regional, nostalgic, authentic, and unadulterated direct-from-producer products

from across India. All these exotic and authentic products can be seen in the figure 8 below.

The screenshot shows the Kalgudi Consumer Store homepage. At the top, there is a header with the Kalgudi logo, a search bar, and links for "Categories", "About Us", "Our Stores", "English", "Login", and a "My Cart" section showing "₹0.00". Below the header, there is a large banner for "Traditional SPICES" with the text "Every Indian dish you cook tastes even better with our spices." and a "ORDER NOW" button. To the left of the banner, there is a circular image showing various spices in bowls. To the right of the banner, there are links to "eMahila" and "Swayan Sikkim" with their respective logos and descriptions. At the bottom of the page, there is a "Popular In" section with icons for different regions and a "Chat" button.

Fig 8: Screenshot of consumer store of Kalgudi Digital Private Limited.
[Note: <https://kalgudi.com>]

Survey

A very basic smartphone digital poll was performed to measure farmer's digital knowledge and awareness. Kalgudi workers aided farmers in filling out the survey replies on their smartphones. Total of 1700 farmers participated in the survey. The survey concluded as shown in the pie chart figure 11 and

figure 12, that 55% of the farmers are selling their produce at digital marketplace and can be deduced that they are using smartphones. But even though they use smartphones and are aware of digital technologies, 98% of them are not interested in accepting and incorporating digital technologies into their farmlands.

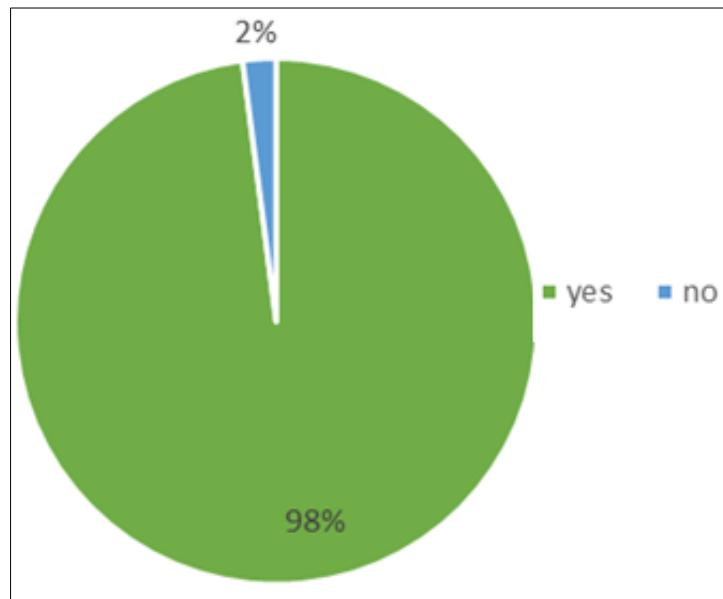


Fig 9: Farmers interested in accepting digital agriculture technology

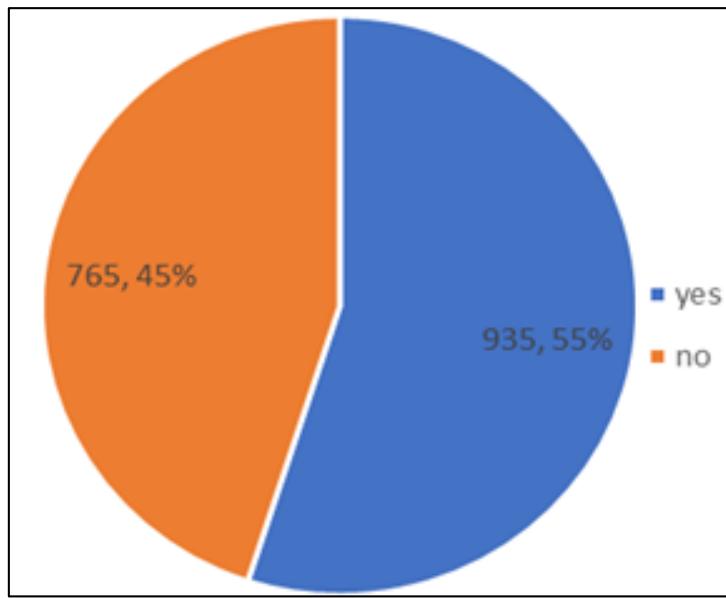


Fig 10: Farmers using digital marketplace to sell produce

Grants Opportunities for a Digital Agri-tech Startup in India

All business, regardless of its type or scale, requires capital to turn its unique ideas into action. It is very simple to come up

with a business idea; but, bringing the firm through the phases of fundraising to fruition is extremely difficult. The majority of firms fail due to an inability to secure adequate financing.

Types and rounds of funding for a startup:

Table 1: Funding Available for Startups at Each Stage of Their Development (David *et al.*, 2020) [8]

Funding Type (Avg US\$ Value in India)	Startup Stage	Investor Type and Nature of Funds Raised
Angel funding (10K–1M)	Early/idea stage: seek funds for developing prototype of product/service	Individual/angel investors who provide mentorship to founders and early access to markets
Seed Funding (10K–1M)	Early/idea stage: test and develop the idea and require R&D funding (e.g., for patents)	Individual investors and VCs focused on seed funding to further support startup until it generates revenue
Pre-Series A (10K–1M)	Early stage: with some market traction looking for individual-bridge round	Bridge between individual and institutional investors focused on smaller cheques
Series A (1M–5M)	Early stage: demonstrated traction ready to expand operations and uses funds for capex, working capital, expansion	First round of institutional investors with existing individual investors and may include corporate venture arm of large corporations
Series B (3M upwards)	Early stage: established with demonstrated traction and needs to scale after demonstrating product-market fit	Second round led by institutional investors, can include existing individual investors, and venture capital funds
Series C, D (6M upwards)	Growth stage: established and successfully running at scale and poised to expand using funds for capex, organic, or acquisition growth	Institutional investors including large/late-stage VCs, Pes, hedge funds, and banks come in, buy out early investors, often with handsome returns
Series E, F, and beyond (15M upwards)	Growth stage: well established and successfully running at scale and maybe poised for IPO	Institutional investors including large/late-stage VCs, Pes, hedge funds, and banks fund further expansion or increase valuation before IPO

Grants and List of Donors for Agritech startups:

According to Investopedia, a grant is a cash reward made by one organization (often a corporation, charity, or government) towards a person or a firm in order to support a goal or incentivise achievement. Grants are simply donations that do

not have to be repaid in most circumstances. Education loans, research funds, and stock options are examples of these. Some awards need waiting periods, known as lock-up or vesting periods, before the recipient may fully possess the cash incentive.

Table 2: Grants Providing Agencies supporting Agri-tech startups in India.

Donors Name	Website	Topic of Interest
Catalyst Foundations	https://roddenberryfoundation.org/our-work/catalyst-fund/	Technology in Agriculture
Aspen Network Of Development Entrepreneurs (India)	https://www.andeglobal.org/india/	Climate and Environmental action, Digitalization
Global Agriculture And Food Security Programme	https://www.gafspfund.org/small-scale-grants	Agricultural value chain
Asian Development Bank	https://www.adb.org/	Agriculture, digital technology
Lacuna Fund	https://www.adafoundation.org/en	Agriculture (AI & Remote sensing) and Climate
Global Innovation Fund	https://www.globalinnovation.fund/	Agriculture, aquaculture, business services, digital identity, financial services, recycling, water, domestic resource mobilization
Bill & Melinda Gates Foundation	https://www.gatesfoundation.org	Overall Agricultural Development
Multiplier Grant Scheme	https://www.meity.gov.in/content/multiplier-grants-scheme	IT, Data Analytics, IoT, AI
Nasscom	https://nasscom.in/	SaaS based Agriculture
Ankur Capitals	https://www.ankurcapital.com/	Digital and Deep Science technology
Hello Tomorrow	https://hello-tomorrow.org/global-challenge/	Energy, food, agriculture & environment
Japan International Cooperation Agency	https://www.jica.go.jp/english/our_work/thematic_issues/index.html	Digital devp, Agriculture and rural devp, Poverty
Catholic Relif Services	https://www.crs.org	Emergency response, health, agriculture, water, education, microfinance
Ifad- International Fund For	https://www.ifad.org/en/	Climate and Environment, Rural finance,

Agricultural Development		Value chain, FPO
Walmart Foundation	https://corporate.walmart.com	Agricultural Sustainability, Community
Thought For Food Challenge	https://thoughtforfood.org/challenge/tff-challenge-2022/	Agriculture, Smart agri, Climate
Christian Relief Fund	https://crf.com	Agriculture, Disaster Relief, Sustainability
India Development and Relief Fund, Inc. (IDRF)	https://www.idrf.org	Education, Women's Empowerment, Eco-friendly development, Health, Good Governance, Disaster Relief and Rehabilitation
Asha Impact Fund	https://ashaimpact.com	Technology, Agribusiness and Rural Supply chain
Agri Business Capital Fund	http://agri-business-capital.com/index.html	Crops, Value Chain, Climate, Aquaculture

Conclusion

The Indian government must now focus on developing top-tier technical expertise and international business capabilities through "reverse brain-drain" as well as on making the country startup-friendly. India can learn from other nations that invest extensively in research and development, and it can increase ties between entrepreneurs, corporations, universities, and the government. In terms of global innovation, India fights above its weight, but much can be done to build human capital, invest in higher learning, and implement an intellectual property strategy in innovation. Startups in India will also require assistance for entrepreneurs and inventors who are frequently just engaged and limited in generating their own goods and services and lack the ability and capacity to grow with improved bookkeeping, promotion, and sales.

Despite the fact that we have many national and international donors, Chinese startups have received protection and have entry barriers to well-funded and foreign competition, whereas Indian startups do not have that luxury and, as a result, have not generated domestic global players (e.g., Amazon in the US and Alibaba in the People's republic of China) without even being acquired. However, most of these ambitious businesses lack the vision and know-how required for global development, necessitating regulations to encourage their globalization. Singapore established International Enterprise a government body formed to assist these enterprises in establishing a global footprint. Indian companies must look beyond replicating successful foreign concepts and focus on establishing meta-level startups that address fundamental problems that can be scaled internationally.

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