



Rashtriya Krishi Vikas Yojana- Remunerative Approaches For Agriculture and Allied Sector Rejuvenation (RKVY-RAFTAAR)



Trailblazers of Agri-Innovations

NIAM Agribusiness Incubator (NABI)
Centre of Excellence for Innovation,
Entrepreneurship and Skill development
CCS National Institute of Agricultural Marketing, Jaipur, Rajasthan, India.
www.ccsniam.gov.in



In the present times of uncertainty, it is only Agriculture sector which has stood strong and fought the war with triumph. By bringing innovation and technology into its realm Agriculture has succeeded in bringing the Agri-stakeholders the real worth of their hard work.

With more than 14% of the national GDP contribution relying on Agriculture, it naturally makes this sector very important. Agri-based technologies are coming from all corners of the country and the Agri-stakeholders adapting to it promises a great future for agriculture sector in the country. On one front where the entire world is standing still and struck by a global pandemic, it is only Agriculture sector which has kept the wheel of economy moving and reaping fruitful outcomes. From ensuring food security to everyone and by maintaining the nutritional aspect of the food consumption intact Agriculture sector has played its role very efficiently.

RKVY-RAFTAAR scheme is one of the front-runners in the country when it comes to bringing technology and innovation in the field of Agriculture, supported by Ministry of Agriculture and Farmers' Welfare, Government of India. The scheme aims to highlight the Startup ecosystem and give platform to the Agri-innovators to bring out their innovations for the aid and support of Agri-stakeholders. The scheme focuses on finding solution to the problems existing in the agriculture sector by supporting the technologies developed and innovations

made by Agri-startups of the country.

The publication talks about such gems carved out by CCS NIAM via successful execution of the programme at the Knowledge Partner level and also handholding four other states through Partner R-ABIs. The Agri-innovators highlighted in the present publication are future forerunners of the agriculture sector and are all set to bring the much-required change in the stream of Agri-startup ecosystem. The technologies highlighted in the present cohort includes innovative process developed to utilize areca leaves to make areca palm leather, business model promoting gourmet traditional and innovative foods, addition of artificial intelligence in the agriculture value chain and many such innovations promising a radiant future for agri-startup ecosystem.

Such agri-innovators and startups are deciding the future of agriculture sector in the country and incubation support given by NIAM Agri-Business Incubator (NABI) is the fuel running this entire support system by catering to the needs of startups. With firm determination and focus to bring change in the innovation and technology sector in agriculture these agri-innovators will bring the new dawn of the Agri-startup ecosystem in the country, and we wish them all the luck for the endeavors ahead.

Shri. P.K. Swain

Additional Secretary MoA & FW
Director General, CCS NIAM, Jaipur



FOREWORD



CCS NIAM as Knowledge Partner has excelled in successful execution of RKVY-RAFTAAR Scheme and has made crucial contribution in the Agri-startup ecosystem in the last 2 years. By providing incubation support to more than 115 Startups and also hand-holding the four Partner R-ABI, including IIT, Kharagpur, Sri Karan Narendra University-Jobner, Bihar Agriculture University, Bihar, National Rice Research Institute, Cuttack, Odisha, NIAM Agri-Business Incubator (NABI) has acted as the guiding light to many Agri-innovators of the country.

Even when the entire world is succumbed to the drudgery of a pandemic, CCS NIAM has been making continuous efforts to provide Agri-innovators the correct platform and required support for their business models to grow further. NIAM Agri-Business Incubator (NABI) comprehends and caters to every single need of an Agri-startup including innovation management techniques, finance and legal advisory with proper marketing strategies to further explore the business opportunities.

With two programmes running at incubator level including Agripreneurship Orientation Programme and Startup Agri-Business Incubation Programme, NABI has reached out to more than 19 states across the country. With initiatives like investors meet, customized sessions, subject concerned experts and seller-buyer meets, NABI has left no stone unturned to help and support the

Agri-startups incubated at CCS NIAM. Keeping the spirit of women empowerment alive NABI has incubated women entrepreneurs from all corners of country with participation ratio being 70-30 in the incubation programmes. NIAM Agri-Business Incubator has aimed to build collaboration with various ecosystem partner to facilitate strong connection for the Startups including ecosystem partners like FICCI, NABARD, NCML, REEDS and many more.

The book here showcases 14 startups with innovations and technologies brought from across the country to aid agriculture stakeholders and help farmers in making a worth of the hardship put by them on an agricultural field. The startups presented in the book went through two months rigorous training and are prepared to present their business ideas before the Ministry of Agriculture and Farmers' Welfare for seeking grant-aid aid to develop their innovations further and build a business around the idea to cater the needs of agricultural economy.

CCS NIAM wishes these startups a very good luck ahead in their future endeavors.



A handwritten signature in black ink that reads "R Mittal". The signature is written in a cursive style and is positioned above the printed name of the signatory.

Dr. Ramesh Mittal
Director & Chairman

PREFACE



STARTUPS



Mr. Suresh S R

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Mr. Prince Raj

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Mr. Rakesh K R

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Mr. Priyjeet Bose

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Mr. Sandeep Sharma

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Mr. Pranjal Chetia

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Mr. Ravindra Dekate

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Mr. Tejas Deepak Agham

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Dr. Srishti Batra

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Ms. Richa Gadia

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Ms. Ankita Garg

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Mr. Vijay Gawade

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Mr. Jatin Madhra

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BHOOMI AGRI VENTURES

Connecting Forest to Farmers

1



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🎓 Bsc, MBA

Business Idea: Collection of fallen Areca leaves develop into innovative process to convert into Areca Palm Leather (Vegan Leather)

Areca catechu is one of the major commercial crop in Malnad Region of Karnataka. As per government records, there are 27,000 hectares of land areca cultivation is done and each areca tree shed around 5 to 6 leaves per year. These leaves are slow decomposing in nature (will take 100 to 120 days), and these fallen leaves decomposes very slowly and create following problems:

- Major breeding place of mosquitos which cause so many health-related issues
- Farmers faces a lot of problems and require huge labour to dispose of these leaves from the farm

Founder of the startup, Mr.Suresh is a B.Sc and M.B.A graduate with 15years of experience in this field in various capacity. Hailing from a farmer family, Mr. Suresh knew the problem of farmers which areca leaves causes and thus started Bhoomi Agri Ventures in the year 2018.

Startup decided to convert this waste i.e. Areca Leaves into wealth and hence started into Collection of Fallen Areca leaves from small and marginal farmers. It developed innovative process to convert these Areca leaf into Areca Palm Leather (Vegan Leather)

In the year 2018, startup started the operations by supplying 2,000leaves to one overseas customer. The quality was so good that the same client gave repeat order of 12,000 leaves in 2019.

Social impact:

- When one chooses Palm leather products, their decision causes a remarkable ripple effect in the lives of the small farmers, rural women, youths, craftswomen and men behind Palmleather products. With each purchase they are making a significant impact on their lives; improving their life quality, providing them with fair wages and ensuring their permanence in a project

- The customer contributing to nature by using 100% natural, Eco-friendly products.
- Better rural management for sustainability, creating employment, opportunity and additional income to rural eco system.

Startup got the Provisional patent for the product.

The onus of protecting the environment is on each one of us, be it producer or consumer. Startup started supplying of these products to one overseas customer in the year 2018. Now, it has couple of more enquires in the pipeline.

The people are moving more towards the vegan products as per the market research which is opening the doors for the Bhoomi Agri Ventures.

It is planning to add more and more palmleather products and reach the sales target of minimum 20 to 25 lacs in another one year. Currently, startup is employing 6 permanent employees which will increase by 8-10 in coming one year.



AGRI DHAAN GLOBAL PVT. LTD.

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Agriculture To Capital



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🎓 B. Tech in Civil Engineering
From NIT Sikkim

Business Idea : Fully traceable B2B2C service platform for agricultural stakeholders

To promote the market availability to the farmer and fulfill farming requirements like input supplies expert advice and farm machineries.

Being from the farmers family, Mr. Prince Raj probably knew the hardship faced by the farmer and started to work on Agri-issues and found few more of them which are man-made. Mr. Prince Raj found that for each and every requirement of farmer there requires a specific place/ person and based solution and hence developed "Complete Solution to Farmer".

What will it do:

1. To provide the market with best possibilities or higher prices as compared with regional /national market for output harvested produces.
2. To improve the farming practices, with proper information of the soil, water and climate to predict the best possibilities with market demands and present farm conditions/resources

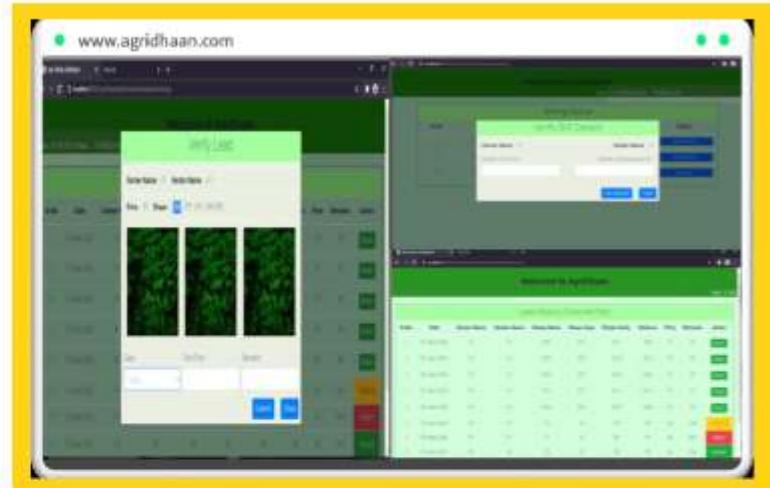
Present:

AgriDhan Pvt. Ltd. Is currently working on customer development and on traceability and GIS to lands for future technology use and prediction. Presently, startup is working with more than 650 farmers on post-harvest market.

The idea aims to transform and restructure the marketing ways with wider reach and will also enhance the reliability on the platform with all the stack holders of the agriculture in mind.



Meeting with FPO in Presence of
DDM, NABARD



By connecting post harvest market to farmers, input with suppliers and machines owner with rent will increase social fabric of market in agriculture as well and will create an ideology of hassle-free market and income.

AgriDhaan will be creating an ideology of one place market for Agriculture.

Achievements, future projections:

- The startup includes input requirements e.g -seeds, fertilizer, etc with farm mechanism renting to farmers at reasonable price.
- The startup will be accumulating data using AI to analyse quality by image processing.
- The business model includes expert support, farm mechanism rent with land-based fertilizer production.
- Agri Dhan aims to work hand in hand all the stakeholders of agriculture from one point by connecting credit linkage, insurance and much more.

CATKIN LATEX

5

Service to Natural Rubber Processing, Storage and Marketing



Rakesh K R

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🎓 B.Tech
(Agricultural Engineering)

Business Idea: To increase the profitability of small and medium rubber farmers by providing service in latex processing, storage and marketing with digital support

Mr. Rakesh K R is Agricultural Engineering graduate, has a vast experience in agricultural inputs sector and banking. He is also trained from Rubber Board on Processing of rubber latex. Being a rubber grower, the founder has come across the problems in processing and storage of rubber sheets. Besides, he also found out that the similar problems were faced by neighbor farmers. It motivated him to start the model processing unit.

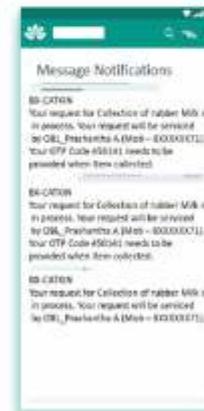
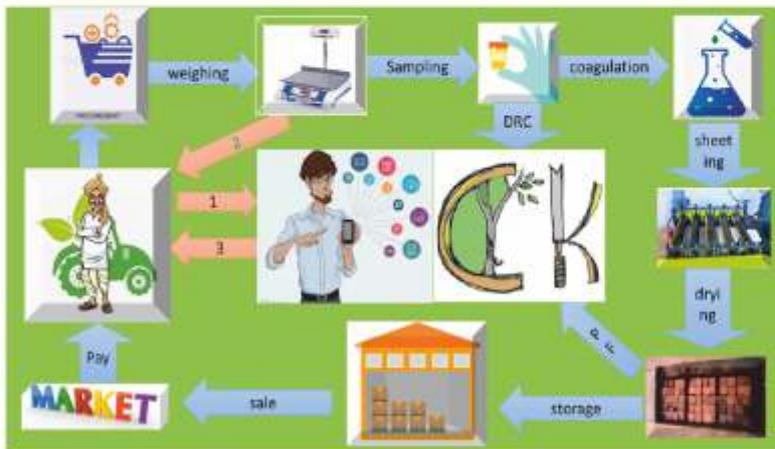
Operations Model of Startup

- Natural Rubber is polymer obtained from milk (latex) of rubber trees. A slit is made on bark of rubber trees, latex flows into cups and it is collected in cans. At this stage tapper will ping through our mobile application which notifies driver, farmer and our processing unit.
- Once latex is procured, we coagulate it with additional acid and water.
- After 24 hours the coagulum is squeezed through series of rollers to drive out water.
- These sheets are dried in smoke house for several days which results in Ribbed Smoked Sheets (RSS).
- As startup succeeded with the processing, it found problems in storage of rubber sheets which lead the farmer to sell at lower price. Hence, it introduced storage facility and marketing linkage so that farmer can sell it when he desires
- With the vision to make the process farmer friendly and more reliable startup introduced a mobile application.
- With the mobile application startup wishes to track the procurement, quantity, dry rubber content, Package of practices and market information.





- The mobile application allows to directly communicate with farmers. It includes useful features like notification on time of procurement, weight, DRC, monthly report and market rate. It also provides flexible solutions to problems relating rubber plantation practices and tapping.
- Startup have target to produce 30Mt dry rubber per month in near future.
- It also targets to generate employments for 12 women employees with in a year of operations.
- Once the large scale production starts, it wishes to link farmer with rubber industries so that farmers can get utmost benefits.



Farmer's Growth Partner



Priyjeet Bose

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🎓 Graduation
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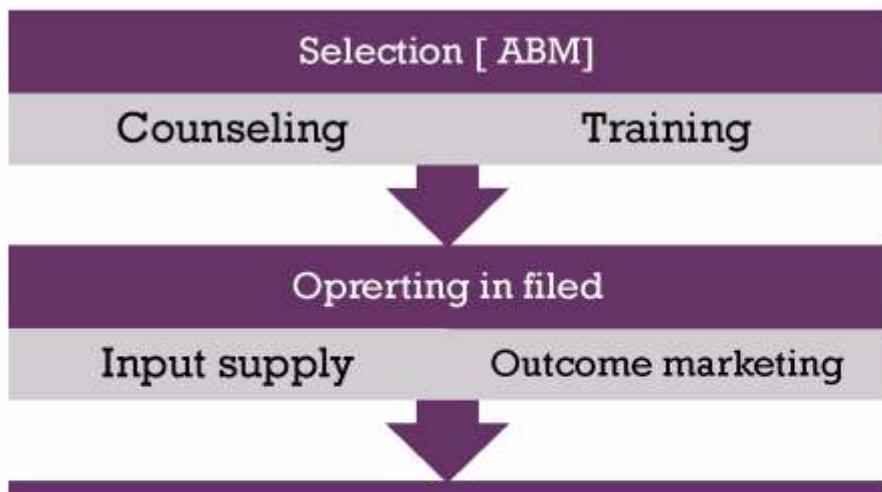
Business Idea: Livestock and Agricultural marketing services for farmer's from self-sustainable, tech enable dealer network of Agrolive business manager

BPN AGRO is one of the fastest growing start-ups in Agriculture & livestock's 'service and marketing' sector company providing end-to-end solutions (services & marketing) to the farming community in Chhattisgarh. Through innovative dealer [ABM] Agrolive business Managers network.

- Priyjeet born in Surguja and his entire childhood was spent in the river, mountains and forests of backward district of Chhattisgarh. Since childhood he always thought about the solution from the resources available here, his current project "GAON - 36" is the result of this underlying thinking of childhood. This is true, the fertile soil of Chhattisgarh is able to enrich and give employment to Chhattisgarh's people.
- The startup established in the year 2018 It is "Service and marketing" focused having phase one - livestock, phase two - Agriculture.

The startup aims to undertake following activities:

- Create a platform for sustainable growth
- Create employment and farmer productivity by available own resources.
- Create a collaborative approach for agriculture and livestock approach
- They are first company to create a self-sustainable tech enable dealer ABM network. First of its kind of network in Chattisgarh
- Future projections - Targeted 500 ABM & 10cr turnover.
- Journey ahead - Start operations in agriculture and reach 80% farmers of Chattisgarh for delivering our [FEMS finance, expertise marketing, services] solution.



TEAM BPN



Mr. Kamlesh Kushwaha
Co-founder
MBA- 15 Year ex.



Mr. Samiran Mitra
Sr. Marketing Manager
6 year ex. IIMC Kolkata



Dr. Major Nalin Sharma
Advisor (Technical)
25 ex. in military



Healthy Animals for Healthy Profits



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🎓 Graduation in Agriculture
Science
P.G. Diploma
(Organic Agri. Management)

Business Idea: App based solution to support animal farmers and to improve the Veterinary-Extension System in rural India.

There is huge gap in the demand & availability of registered veterinarians in India. The norm is at least one veterinary doctor for every 5000 animals while we have just one vet over 20,000 animals, which draws a gloomy picture in the animal healthcare sector specifically in rural areas.

There is a shortage of veterinary extension services throughout the country which often leads to farmers using local medicines suppliers for a vague diagnosis and treatment plan with frequent negative consequences. Farmers also struggle to produce animal products profitably due to expensive or poor feeds available to them, with these making up to ~70% of the cost of production.

Sandeep Sharma, an Agri-graduate, observed these issues closely while working in the villages with farmer co-operatives. He decided to bring a change in the lives of these farmers with the use of some technological interventions. He decided to bring farmers, vets, animal health workers and other stakeholders on a single platform to solve this issue. But the main obstacle lies with the reach and how to make any such platform simple for farmers to understand and use?

To solve this issue, Sandeep with team decided to integrate simple animations on an App. based platform to help farmers access the knowledge and veterinary services they require, in order to look after the health, welfare and profitability of their animals.

ParaVet links farmers to vets and animal health workers allowing immediate and localised collection of animal symptoms by a farmer or Animal Health Worker (AHW), with the help of simple animations for disease symptoms in local language. ParaVet's integration across farmers, vets and AHWs allows information to be shared seamlessly and new symptoms to be identified under the guidance of the App or Vet. through an animation slideshow.



FPO visit near Jaipur

The farmer tool also allows farmers to design their most effective feed plans for bought in, mixed concentrates or even fermented feeds based on the cost, availability and nutritional supply of local feed supplies.

In this app., data capture for surveillance is automatic, allowing machine learning to drive to ever better predictive guidance for veterinary professionals, government planners and agribusinesses. So, there's an added advantage that can be used for planning & surveillance by different stakeholders

As ParaVet's clients are typically low-income farmers, considering this they have developed a blended revenue strategy which allows them to draw incremental revenues from a number of different sources which may vary by region and animal group.

They have virtual consulting fees for vet, set at the price of ~Rs.30-40 with a large share of the fee going to the vets and small percentage (8-10%) goes to the ParaVet.

They also plan to take a share of transactions for feed, medicines and other consumables in future through marketplace component of their App. They are also working to integrate a number of financial products with partners in different project areas, this includes a full package of App, loan and insurance for farmers looking to move from back-yard animal farms to a sustainable semi-industrial production model with higher profits.

They have provided employment to 11 people and plan to increase this number to 20 in the next 2 years. They have a revenue projection of ~Rs.27 crore in the next 2 years.



ParaVet website and mobile App. snapshots



A run through of use case for our platform

INDIGREENZ INNOVATIONS PVT. LTD. II

Good Food Social Enterprise advancing Plant-based Nutrition



Rajkumar Jani

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MBA

Business Idea: Social Start-up promoting Gourmet, Traditional & Innovative foods prepared by Producer Communities.

As living beings, we rely on food and water for basic survival. Food safety is inextricably linked to good health. So, what happens when the consumption of food, a necessity, is considered risky and deemed unsafe? This is the exact scenario that the world is facing today. The COVID-19 pandemic has brought the aspect of food quality and food safety to the forefront. Unfortunately on the demand side, not many choices are available today in the packaged foods which provide healthy nutritive foodstuffs which are minimally processed and are safe substitutes for raw foods.

At the producer end, there is another problem that needs to be addressed. The farmer communities that produce raw don't get the benefits of the premium that market pays for the value added foods that are made of their raw produce. The difference in the price commanded by processed foods as opposed to raw foods is enormous (6-9 times for processed v/s 1.5-2 times for raw foods) but the local farmers and/or producer communities like women SHGs are left out to take advantages of this opportunity.

Raj Kumar Jani, a veteran agri-biz consultant and a mentor to young start-ups saw this as an opportunity to intervene with his good grassroot connect with farmers and producer communities. Together with his co-founder Ratna Singh, he set-up his social-enterprise for promoting goodfood manufacturing mainly at the source i.e. with minimal processing at the farmers'/communities' end.

An impressive array of healthy, nutritious and unadulterated good food in innovative foods and home-based foods range is being marketed to discerning consumers under his start-up Indigreenz Innovations, where a dedicated team of trainers carry-out the capacity building exercise with the producer communities in order to make them prepare traditional and new foods based upon curated recipes which are then marketed in B2B, B2C and B2B2C formats (online & offline) in an affordable and traceable way to urban consumers.

The Startup has set a target to capture a significant share of the current Niche/Organic food market (currently over 10000 Cr.) in times to come; for now the startup plan to achieve a minimum turnover of 5 Cr. In 3 years; and in the process create 300+ jobs for youth, women and farmers through at least 50 FPOs and SHG affiliates.

Blockchain technology through QR code is used to trace the entire supply chain where a customer can check not only the origin of the products but also various intermediary activities viz. the process details, timing of various operations, roles of various supply chain constituents (who does what) and the like.

The raison d'être of Indigreenz is to preserve the rich and lustrous legacy of age old traditional recipes in semblance with the new age meal preferences. The vision of the company is presented in the three core principles of - Co-create, Consume, Contribute.

Co-create

Co-creating with producer communities wholesome delights from elements abundantly available in Mother Nature's bounty.

Consume

Consuming from the core principle of 'live and let live' which embraces the welfare of all living beings along with minimal ecological footprints on our precious planet.

Contribute

Contributing by being a food corridor between growers and curators of food to consumers and connoisseurs at large so that everyone gets to choose a healthy lifestyle day after day.



Home based foods Vegan foods New Age Foods



Raj Kumar Jani- Founder Director
 25+ years of rural development, micro-enterprise and livelihoods experience in India & Africa; active in social entrepreneurship domain both as a start-up and a mentor. His forte is strong grassroot connect with expertise in marketing and social impact creation.



The SHG in Garhwal which supplies raw organic honey and dried apricots, walnuts etc. to INDIGREENZ which in turn blends honey with sun-dried nuts, dry-fruits and seeds to provide nutrition-rich healthy food option to consumers, looking increasingly for such healthy foods in Covid-19 era.

Your alternate life



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🎓 B.E (Computer Science)

Business Idea : Alternative Healthy food options to the conventional food products like green jackfruit flour, banana flour, plant based meat etc.

About Alternative food Industry - The increasing human population and nutritional demands has meant that the food industry has tended to look for alternative sources of food production which yields better and high quality nutritional products . Alternative foods are based on the substitution of one constituent with another, and these should have the same or similar attributes to provide the most efficient dose of nutrition and functional value which are good for body and the ecosystem. Alt food products are of higher quality with body fit nutrition values and cost less than half as much to produce as the animal-derived products.

Pranjal Chetia is a computer engineer by profession and serial entrepreneur by passion. From the initial days, the sting for startups has led to the building of food brands in the QSR space. With an in depth knowledge in F&B Business and a vast experience in running a chain of QSR brands under its portfolio, a leap of interest has ignited the passion to create disruptive products through innovative food processing technologies. After due research on underutilization of resources, farm produce wastages and lack of pre and post harvest facilities have led to eureka moment to create value added alternative products using natural plant based resources with the launch of ALTFOODS .

The startup focuses on the following types of products under the business model

- Plant based Snacks - We manufacture 100% clean and natural fruit based snacks with minimum processing with the best food processing technology retaining maximum nutritional facts.
- Green Jackfruit Flour: Healthy flour option with a potent carbohydrate substitute for people with diabetes as the glucose level in unripe jackfruit is almost half and can add nutritional benefits as supplement by adding to existing rice and wheat flour
- Banana Flour : Healthy flour option with a high level of resistant starch which compliments as a natural vegan supplement amongst health conscious audience globally.

- Plant based Sweet: We at ALT FOODS are trying to disrupt the Indian sweet market with the innovation of Indian sweets which are fruit based sugar free and healthier than market available high calorie sweets
- Plant based Meat: Ready to Cook Young Tender Jackfruits are highly nutritious, tasty, fibrous and best suitable as meat alternative.

Impact of the startup

- Association with 10-15 farms
- Better Resource Utilization
- Direct Farm to Fork Approach
- Fair price to Farmers for produces
- Training & Guidance on cultivation & breeds



BMH TRANSMOTION INDIA PVT. LTD. 15

An innovation in bulk material handling

Business Idea: A foldable & portable grain storage system without any fumigation, which aims to reduce grain losses.

Mr. Ravindra Dekate, founder of BMH Transmotion (I) Pvt. Ltd. has researched in the field of food and grain wastage, the huge losses incurred due to lack of storage space in India leads to think and do something in this field. Startup is working on reducing post-harvest losses and hence invented Foldable Bulk Grain Handling Technology, to look into the massive issue of grain losses. Startup is also working in solving the issues related to other areas, such as, pulses, vegetables, produce, etc, which also suffer from huge food losses.



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B.E.

HERMETIC
STORAGE



FOLDING
DESIGN



EASY +
QUICK ASSEMBLY
& TRANSPORT



AERATION
SYSTEM
Custom option

MONITOR &
REGULATE
MOISTURE & TEMP.



BMH Foldable Bulk Grain Storage System



BMH Transmotion focuses on the Foldable Grain Handling Technologies so as to reduce maximum grain losses which occur at farm level. A lot of factors lead to grain losses, but the major factor is inadequate storage. Startup has found out that open air storage and conventional storage systems have a grain loss percentage of about 10%, but when we dig deeper into this issue, the percentage rises significantly. 75% of this loss happens at farm level. Current systems also don't guarantee protection against any storage pests, another major factor of grain loss. All the research done by the startup concluded that India needs to work on its grain storage facilities, to not let the hard work of farmers' go in waste and from the startup side, they are trying to contribute to that need by developing and promoting Foldable Bulk Grain Storage.

BMH's Bulk Grain Handling Technology, stores all types of grain in a portable foldable storage system with less grain losses. It can be folded and moved to wherever required. For example, at or near farms, where there are no storages & most losses occur. Startup found in their research that low temperature, low moisture and low humidity results in less grain spoilage and also doubles grain's shelf life. To achieve this, their storage is hermetic, which means it is airtight at all times - which ensures insects cannot enter and insects already present will die due to less oxygen. In such cases, usage of insecticides is not required. Storage has an aeration system, which regulates temperature and moisture levels required for good quality grain. Storage is outlined with fabric, which is specially developed, keeping in mind factors required for good quality grain storage. This fabric is food safe, reflects 60% of sun energy, UV resistant, temperature, and cracking resistant, fire and rodent retardant. When implemented, the main advantage to farmers will be that having a storage system nearby will give them the opportunity to store grain safely.



Foldable Bulk Grain Storage - Unfolded (L), Folded (R)



Our storage installed in village of Dongargaon district - Gondia, Maharashtra. In joint venture with Tribal Development Department, Government of Maharashtra

Strengthening Agriculture through digital management of Cold Storage Chains

Business Idea: Building an Integrated Digital Management Platform for the Cold Chain Infrastructure of India, and creating a Nationwide grid of cold storages all across the India.

Tejas has had a quite unique and exemplary journey so far. An All India Merit in Science who got into IIT – Kanpur for his B.Tech, which he left after clearing the Air Force Selection Board interview to join the coveted National Defence Academy (NDA) with a passion to serve the country. But later due to medical issues, had to let go of the dream of serving as an Officer in Armed Forces in between. Coming out of hospital after a brief period of time, he won a full scholarship based on his academics and exam scores for pursuing MS from the prestigious public Ivy League college, University of Washington, Seattle USA. And this is where the idea of Leviathan137 (LVTHN137) started materializing. He observed the food consuming patterns in the USA, and compared it to the Indian perspective. He started discussing with his professors in the University of Washington, about the factors leading to huge post-harvest losses in India and how technology can help reduce it. After lot of consulting and discussions, he found out that if India dealt with managing of cold storages properly, a staggering amount of food and money as much as Rs.44,000 crores can be saved annually.

In the last months of his MS, he started discussing this problem with his long-time team mate from India, Nandan Kumar Singh, who has had experience with leading research institutes like DRDO, DIAT, and was pursuing his PhD in operations and supply chain management from Indian Institute of Management, Visakhapatnam (IIM-V). Tejas & Nandan in past has had a synergic stint together in working as a team for Ministry of New and Renewable Energy (MNRE), as Research Assistants for their HVAC project. And so, they came out with a solution which they named as "Leviathan Integrated Management of Agricultural Cold-storage Systems (LIMACS)". Being always inclined towards serving the country, Tejas left the lucrative job offer from the USA and returned to India to work on his idea and the startup which he finally co-founded with Nandan Kumar Singh.

LIMACS as the name suggests is an all-digital, Integrated Management Platform for monitoring the cold storages throughout India, in real time. It is powered by some of the



LIMACS Basic Features



Tejas Deepak Agham

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Transforming fresh food supply chain with data



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🎓 PhD

Business Idea : Transforming fresh food supply chain with AI. Qzense is digitizing quality and fresh food

Dr. Srishti did her PhD in the area of chemical ecology understanding the sense of smell and its role in agriculture. The potential of this uncaptured sense helps her in digitizing agri supply chain and with aim of revolutionising the agri sector with unique tech, Dr. Srishti left a Postdoctoral job opportunity at Harvard University, USA to start qZense labs. Miss Rubal, is an expert in IoT, with almost a decade of experience in IoT products working with startups at Havells. She was a core member at developing India's first smart bulb IOTA at Cube26. Together they started Qzense in May 2019 with a focus on deeptech technology to digitize the quality of fresh produce. The deep technology solution is based on artificial intelligence integrated with IoT sensors to capture key parameters of quality and freshness.

India is the second-largest producer of fruits (81.285 million tonnes) and vegetables (162.19 million tonnes) in the world, and the third-largest fresh retail market with over \$500 billion in sales. On the other hand, 40 percent of the food produced in India is either lost or wasted. After speaking to several different players in the supply chain, the problem was pretty clear that everyone suffers with ensuring quality, which translates to huge losses. A farmer does not get adequate price for quality produce; aggregators and retailers are unable to manage the inventory without knowing the quality and shelf life of produce. On the other hand there is no transparency on quality parameters, all the checks are done by manual labourers who rely on their intuition for major decisions. Fresh produce is constantly changing its life stage, which makes it really hard to know the shelf life of commodities.

Qzense is an Ai powered end to end IoT solution for accurate grading and management of fresh food. The solution employs a unique blend of spectral and olfactory sensors to capture the internal quality of food and proprietary machine learning models to give an accurate assessment of ripeness, spoilage, and shelf life. It assists in bringing down inventory losses and capturing optimal margins from the same produce. With real time constant monitoring using qZense's olfactory loggers, the health and state of produce can be tracked through its lifecycle, thus giving shelf life predictions with higher accuracy.

Qzense labs has currently launched two of its flagship products qScan and qLog to customers

in India, with deployments with India's biggest retail chain Reliance fresh. The qScan device gives accurate assessment of total soluble sugar (TSS) and internal spoilage of fruits with mean accuracy of higher than 95% as compared to destructive tests. qScan technology has been selected by NASSCOM as emerge50 technologies in 2020. The qLog devices monitor the olfactory gases and volatiles produced by produce and provide analytics on health of commodity. After launching in May 2019, Qzense has over 10+ retail chains in customer pipeline.

Qzense is part of JioGenNext, a startup program by Reliance Industries specifically designed for solutions applicable to the Reliance ecosystem. Reliance retail is the biggest retail player in the country. The startup program facilitated a commercial deployment and mentoring from senior management of Reliance fresh. Qzense also received Startup of the year in Agriculture by Meity-NASSCOM Startup under Women Entrepreneur Awards 2019. Qzense raised pre seed funding from two international VCs - Entrepreneur First, London and SOS Ventures, USA in 2019 valued at over 2 Million USD.

Read more at:

<https://inc42.com/startups/reliance-backed-qzense-leverages-iot-for-quality-control-in-food-supply/>

<https://yourstory.com/herstory/2020/06/women-entrepreneurs-agritech-product-supply-chain>



Fig:1 qScan is hand held scanning device which instantly gives data on internal quality parameters



Fig:2 Warehouse worker using qScan device while sorting and grading apples

Transforming fresh food supply chain with data



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MBA

Business Idea: - Developing Block chain and QR Based technology to track the source of food, especially Honey.

Vargrow is an initiative which aims at revolutionising the food industry in India using latest technologies like blockchain and IoT. The objective is to bring issues like sourcing, authenticity and adulteration of food products at the centre of our conversations. We work with food manufacturers, farmers, FPOs and suppliers to identify the source of produce, audit and authenticate it and make it identifiable through block chain technology. We provide this service as a third-party source auditor to all those manufacturers who produce/procure authentic products but cannot invest in technology.

The problem of adulteration is deep. Most of the spices, packaged foods, honey and lot of other food items have adulterations and it is very difficult to distinguish pure products from adulterated one. Farm to plate model has a limited reach so, to have a bigger impact on the society it is important to use the new technologies and advancements. The startup feels that capturing the source of the product and putting it on the product gives a better confidence to the consumers in terms of its authenticity. For e.g. If Kashmiri saffron has a tracker, which shows the farms from which it was picked, the consumer of saffron can be confident that he/she is using authentic saffron.

Food is one of the cores tattvas needed for survival of any human being on earth. The food we consume defines what we become. VGrow focuses on that very essential element by offering using technology to ensure right quality of food reaches the plates of its consumers. In the startup 4 years of operations it has created huge on ground impact. Till date they have - Provided employment to around 5 FPOs in 3 different places - Provided chemical free and farm fresh vegetables to more than 500 customers - Developed income generation potential in arid lands - Developed more than 100 empowered women as a part of our supply network and sourcing network The real impact is felt when we get positive feedbacks from the customers.



PRECIFY ERUT LUCIRGA PVT. LTD. 23

Precision Agriculture through On-farm weather sensing & predictive modelling

Business Idea: Early identification of Diseases, water & nutrient needs in plants by using predictive models on the weather and soil data collected from sensor machine installed on-farm.

Ankita Garg laid the foundation of Precify to help farmers navigate through climate uncertainties while maintaining productivity and income. Close interactions with the farming community during her 7+ years of working for agri-business global enterprises like Bayer, Monsanto etc. helped her understand farmer challenges. To mitigate the weather & disease risks, farmers resort to indiscriminate use of pesticides and inorganic fertilizers and in-effect pollute water, soil and environment, while throwing their economics off and still not getting the desired productivity.

As a Biotechnologist, she knew that each farm is unique and needs to be managed based on conditions prevalent on the field. Farmers in India use calendar-based application or follow fellow farmers. This may be irrelevant or too late for their farm. Having visualized the usage of technology in developed farming economies like US, Germany and Brazil, while working internationally for 4+ year, Ankita started her quest to bring these to Indian farms in 2019.

Precify aids horticulture farmers in data-driven decision-making based on weather and soil data collected from their farm which is transmitted through a wireless connected network (a.k.a. IOT technology). The location-specific geo-tagged climate data at the cloud level interacts with the crop-specific Decision Support Systems (DSS). DSS integrates and organizes information from crop-specific pest and disease forecasting models, the weather (historical and forecast), plant growth stages, etc. to facilitate day-to-day decisions.



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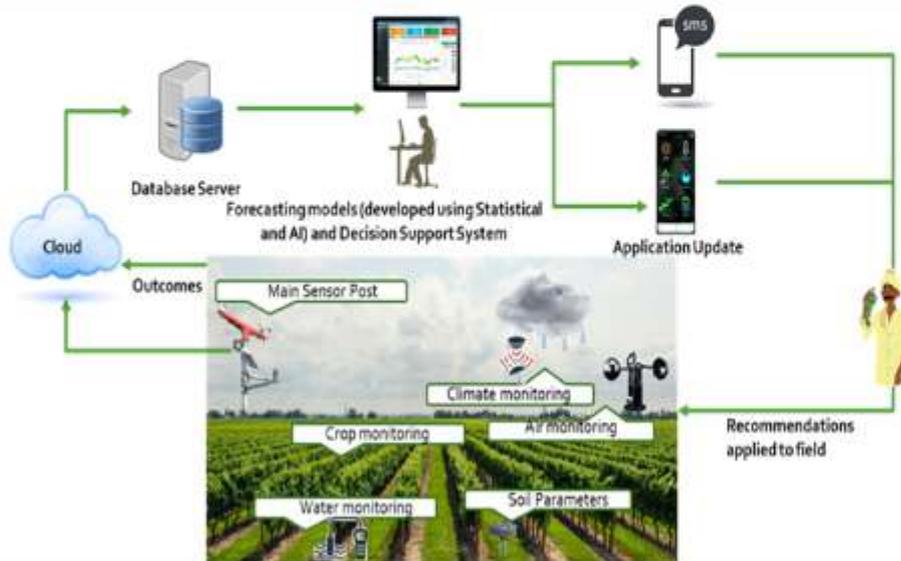
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Precify has an MoU with Indian Agriculture Research Institute (IARI) for the development of disease predictive models. Precify has been able to showcase an increase in revenue by ~20% and reduced cultivation cost by ~10% for grape farmers in Nashik due to improved crop quality fetching better price in export market and reduced usage of pesticides due to timely action on diseases.

The problem of low productivity affects ~140 MM farmers in India, and the number stands at over 200MM when accounting for comparable SEA and East African nations. Starting with horticulture crops in India, gradually diversifying to Row crops and other developing nations, Precify wishes to reach a 0.2 million users in India and other nations by 2025, generating a revenue of ~ Rs. 350 Crore while employing close to 1500 rural women and men as local sales personnel, engineers and call center executives.

System Architecture



Precify has a mission to make Precision Agriculture affordable, accessible and implementable at Indian farm-gate.

The system monitors Temperature, Humidity, Rainfall, sunlight, wind, Soil moisture, Leaf wetness, Soil temperature, 24x7x365 on farm and uploads it to cloud platform



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Water for Agri Stake Holder

Business Idea: - A Mobile App for monitoring water levels in borewells.

With over 30 years of working experience with international donors such as World Bank, Asian Development Bank, FAP, UNICEF, UNOPS, DFID and consulting firms in South & West Asia region and in the Middle East, Mr. Vijay Gawade is an International Water Specialist and is the founder of Water lab Solutions.

In India, nearly 65% of irrigation supply and 85% of drinking water supply is supported by ground water and the dependency on ground water is growing day by day. Ground water availability has been affected by recurrent droughts, dry monsoon or low rainfall leading to exacerbating the extraction of groundwater and further its depletion. There have been situations of overuse and exploitation of ground water to meet irrigation water requirements leading to depleting ground water levels in several parts of the country. In absence of knowledge of ground water especially with respect to borewells, water is being abstracted relentlessly with continuous pumping, until the borewells go dry resulting in an inefficient management of ground water wells and inefficient use of available water. Early drying up of borewells, crop losses for farmers, expensive alternate water arrangements are some of the disadvantages of not knowing the availability of water in borewells. Management for sustainable wells including their recharge and efficient use of available water are the two effective options to prevent depletion of precious ground water resources.

Vijay firmly believes that the ground water management should be taken to the grass root level and empower local communities and individuals to plan and manage their own water resources for long term sustainability meaning securing water requirements for various purposes at local level. Ground Water Management should happen at every Well and for that purpose, individuals need to be empowered with appropriate tools to manage their ground water sources.

Recognizing this gap especially in ground water resource management, Vijay has developed a mobile app called as Bhujal Borewell Monitoring App which can track water levels in borewells. The App is first of its kind globally and can be a powerful decision making and a

demand side tool for borewell users to undertake the following activities:-

- monitor water levels in borewells on regular basis to get first-hand information on ground water fluctuations
- understand the impact of abstractions and recharge on bore well and
- adapt agricultural practices such as type of crops and cropping area or consumption behaviour, with the known availability of water.

The immediate impacts of using the App will be

- enhanced sustainability of a borewell due to regulated use of water
- for farmers crop losses minimised due to improved crop planning based on the known availability of water and
- energy savings due to regulated and optimised pump operations.

Vijay through his start-up Waterlab intends to promote the use of the app among farmers, urban households, institutions, commercial and industrial establishments for improved management of their borewells. Waterlab, led by highly experienced professionals in water and development sector globally, intends to work through aggregated farmers platforms, Farmer Producers Organisations and Companies, NGOs networks, banking sector and governments to promote the App. Vijay firmly believes that the use of the App will help borewell owners to learn the innovative ways of managing borewells and help them to sustain longer. The App is being piloted now in Maharashtra, Karnataka and Rajsthan and likely to be rolled out at a scale soon. The App has been tested by Central Ground Water Board, Pune, IIT Mumbai and ACWDAM, Pune for its accuracy.



CGWB Testing in Pune



Testing at IIT, Mumbai



Testing in Ahire Village, Pune



Testing in Nelamangala, Bengaluru

Nexus Between Farmer & Technology



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Business Idea - A mobile platform for farmers to access infrastructural support for protective farming, full-stack agronomy, farming inputs, credit assessment, credit support, and market linkage.

India has the second-largest arable land in the world. 56% of households in India do farming as their primary occupation. Keeping in-sight, the average landholding in India is below 2 acres that commute 86% of Indian farmers as small and marginal farmers.

Jatin Madhara comes with an experience of handling a bootstrapped tech company before, which later grew to be a company with a 70+ members with a focus on building software products on future technologies like blockchain, AI, and others, plus providing bespoke marketing services to national-international companies. After this endeavour, Jatin moved to US to understand and learn about the venture capitalist ecosystem and hence got exposed to the world of Startups. Upon his return to India, he started to realise the existing problems and hence lead to the creations of Upaaj (उपाज).

Upaaj majorly focus on the problems discovered while working with the farmer in the Sonapat region of Haryana-India. From the very beginning, Jatin realised that Indian farmers are lacking the biggest tech enabled changes which have already created a huge positive impact on the western world. Major problems faced by Indian farmers are financial stability, market linkage, and quality inputs. Understanding these problems at Upaaj is creating a solution with an amalgamation of technology and traditional practices in the farming sector.

Upaaj provides CIBIL like credit scoring for farmers via analyzing 35+ socio-economic parameters using AI and ML, on creating the assessment and also try to push different agriculture- focused financial products by Banks and NBFC to farmers making ease of access to fund their growth. Upaaj also provides access to protected cultivation infrastructure, full-stack agronomy, farming inputs, and market linkage all through our multilingual intuitive mobile application.

Upaaj uses FPO as a governing authority between farmers and itslef, every farmer at Upaaj mobile application is linked through their own regional farmer producer organization.



PIC 1

Picture 1 - Giving Agronomy and Sowing Support to Farmers



PIC 4

Pic 4 - Jatin Talking with farmers and explaining the benefits of direct market linkage and our product.



PIC 2



PIC 3

Pic 2 & 3 - Doing Market Linkage For Farmers Implementing Grading Sorting

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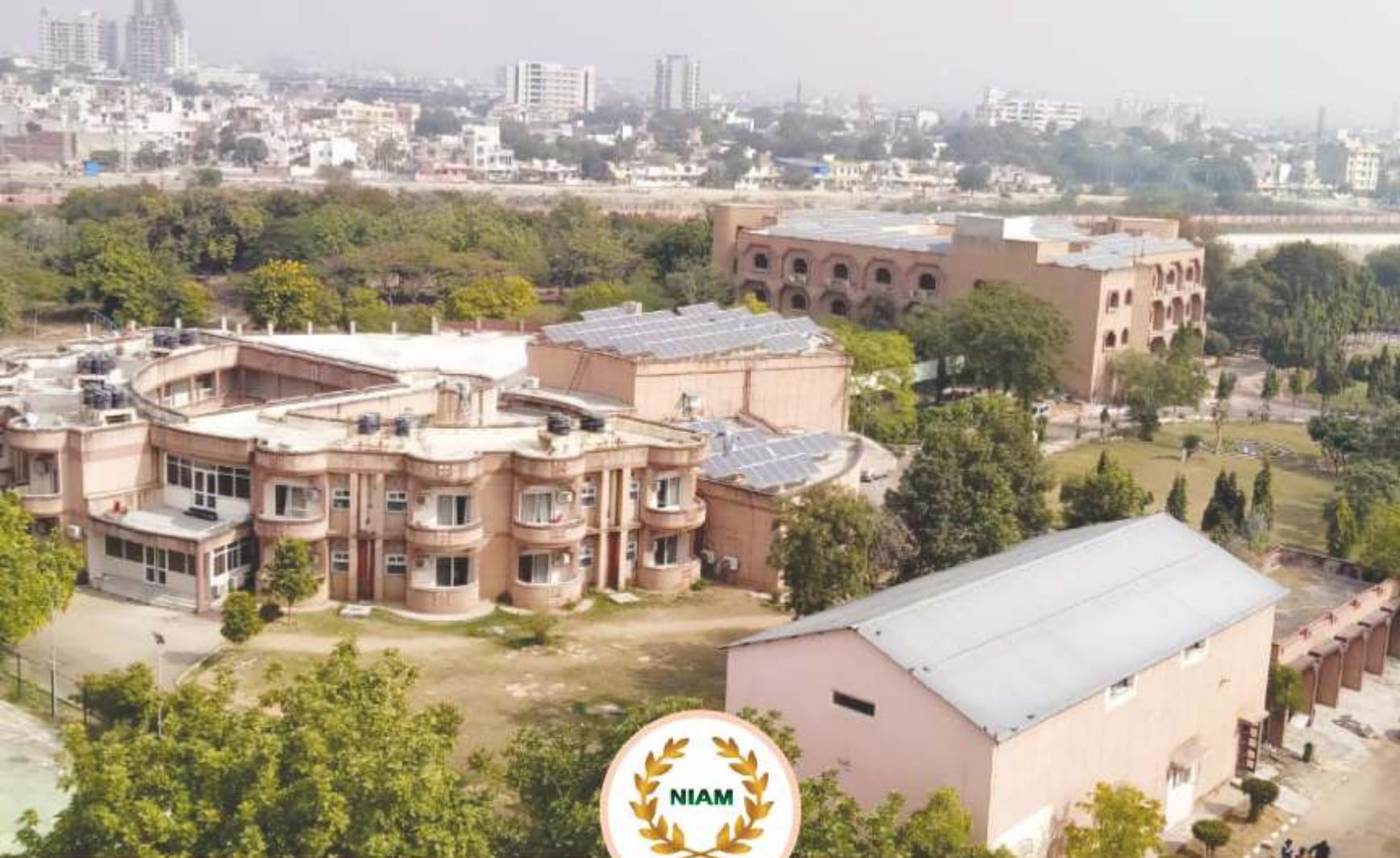
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