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Constraints and suggestions on artificial intelligence agristartups perceived by agristartup entrepreneurs and farmers

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Abstract

The transforming of Indian agriculture in today's world is connected to the digital technologies and startups. Government policies are also focusing on the startup growth and modernizing the agricultural sector. As the entrepreneurs in recent times are aspiring to serve the agricomunities they face some challenges in different stages of startups and also in reaching farmers. The present study was selected with 30 agristartup entrepreneurs and 90 farmers were selected randomly who are receiving services from three successive years. Lack of awareness on supporting institutions (86.66%) in the ideation stage followed by Agristartups are bootstrapped and there is no awareness of grants from the government (83.33%) in concept development and Lack of quality and reliable data sets (80.00%), in commitment stage are among entrepreneurs and lack of knowledge on services related to agristartups on AI (81.11%) as personal constraint faced by farmers followed by shortage of time to know the agristartups on AI (78.89%) and Lack of services from seed to harvest (88.88%) as technological constraint were reported by farmers. The suggestions were effective agristartups on artificial intelligence concentrating on farmers oriented services (73.33%), followed by encouraging agri graduates in setting up agristartups on artificial intelligence (71.66%), quick response from the agristartups on artificial intelligence (70.83%).

Keywords: Digital agriculture, agri-startups, artificial intelligence, startup challenges, entrepreneurs constraints.

Introduction

Agri-Startups help in changing the world, but also act as a source of optimism, by facing a lot of difficulties along their way (Ekhande and Suradkar, 2023) ^[2]. These tech-agriculture hybrid startups have the capability to completely change the face of agriculture in the twenty-first century by utilizing modern techniques, sustainable methods, and help in putting efforts in issues tackling the world's food systems (Shaikh, F. F., 2019) ^[7]. Startups help in tackling the major challenges by understanding and limiting themselves as well as the important objective of transforming the agriculture industry (Pal and Misra, 2016) ^[4]. Multiple challenges including inadequate infrastructure, absence of quality appraisals, inadequate technical support, and a dearth of knowledge sources hinders the utilization of the agristartups on artificial intelligence (FICCI, 2020). Various websites are providing agriculture information but many gaps and inconsistencies exist in their utilization, and much of the information available is not responsive to the demands of the farmers becomes the major constraint to the farmers

(Perumal, 2014) ^[5]. The constraints faced by farmers in utilizing digital tools were lack of required skills to use digital tools, lack of proper infrastructure, lack of awareness about their utilization and lack of reliable and useful content online (Sagar, 2017) ^[6]. Understanding these opportunities various constraints in several stages would be acting as a footway for the emerging artificial intelligence agristartups.

Methodology

An *expost-facto* research design was taken for the study conducted in the year 2020-2021. Telangana state was selected purposively for the study in the year 2020-2021. Three (3) Artificial intelligence based agristartups were selected purposively from based, precision management and agro advisory startups namely Thanos technologies, Bharat Rohan and Plantix respectively were selected purposively. From each agristartup 30 farmers were selected randomly. Total sample consists of 30 entrepreneurs and 90 farmers were selected randomly (based on farmers who are receiving services continuously from last three years from that particular startup). A total number of thirty agristartups

entrepreneurs and ninety farmers were selected for the study. The constraints and suggestions were identified by conducting an opinion survey of the agristartup entrepreneurs and farmers and the findings were presented in table 1 and 2. As the agristartup entrepreneurs faced problems in different stages were considered and also

Results and Discussion

Constraints perceived by agristartup entrepreneurs

From the table 1 it can be seen that lack of awareness on supporting institutions (86.66%), was found to be the most severe constraint in the ideation stage followed by Agristartups are bootstrapped and there is no awareness of grants from the government (83.33%), Poor accessibility of raw material (83.33%) was found to major constraint in concept development followed by Lack of quality and reliable data sets (80.00%), Lack of proper funds for infrastructure (86.66%) was found to be major constraint in commitment stage followed by lack of proper testing facilities (66.66%), followed by, guidance and knowledge in expansion of agristartups (83.33%), Lack of quality and reliable data sets (80.00%), Lack of proper platforms for connecting investors and agristartups (80.00%) was found to be the major constraint in scaling up stage followed by lack of specific policies on agristartups on AI (73.33%). lack of

awareness of genuine failure commercialisation loan guarantees (93.33%) was found to be the major constraint in establishment of agristartup stage. It is observed from the results that due to lack of awareness of agristartups regarding the supporting institutions and lack of proper policies from the government were reasons for the challenges.

Constraints perceived by agristartup entrepreneurs

Form table 2 it can be seen that lack of knowledge on services related to agristartups on AI (81.11%) was found to be the most serve personal constraint faced by the farmers followed by shortage of time to know the agristartups on AI (78.89%). Lack of services from seed to harvest (88.88%) were reported by the respondents as major technological constraint followed by restricted availability of agristartups on AI (86.66%). Inadequate service facilities from agristartups (92.22%) were reported by the respondents as the major situational constraint followed by late responses from the agristartups (91.11%) were found to be situational constraint. It is observed results might lack of awareness on the agristartups on artificial intelligence and lack of the accessibility of agristartups due to poor internet connectivity to rural areas.

Table 1: Constraints faced by the agristartup entrepreneurs on selected agristartups on artificial intelligence

S. No.	Stage wise	Category	Frequency	Percentage	Rank
A.	Ideation stage	Agristartups are bootstrapped and there is no awareness of grants from the government	25	83.33	II
		Lack of awareness of proper channels for technical support	13	43.33	IV
		Lack of knowledge about reaching farmers	21	70.00	III
		Lack of awareness on supporting institutions	26	86.67	I
B.	Concept development stage	Lack of proper funding of research	20	66.67	III
		Lack of quality and reliable data sets	24	80.00	II
		Poor accessibility of raw material	25	83.33	I
C.	Commitment stage	Poor maintenance of employees	13	43.33	III
		Lack of proper funds for infrastructure	26	86.66	I
		Lack of proper testing facilities	20	66.66	II
D.	Validation Stage	Lack of networking with institutes and SAUs	27	90.00	II
		Lack of awareness of genuine failure commercialisation loan guarantees	28	93.33	I
E.	Scaling up stage	Lack of proper platforms for connecting investors and agristartups	24	80.00	I
		Poor maintenance of financial records	16	53.33	III
		Lack of specific policies on agristartups on AI	22	73.33	II
F.	Establishment of agristartups	Shut down agristartups due to fear of competitors	23	76.66	II
		Lack of proper guidance and knowledge in expansion of agristartups	25	83.33	I

Table 2: Constraints faced by the farmers on selected agristartups on artificial intelligence

S. No	constraints	Category	Frequency	Percentage	rank
A.	Personal	Lack of knowledge on services related to agristartups on AI	73	81.11	I
		Insufficient skills to understand the services provided	64	71.11	IV
		Shortage of time to know the agristartups on AI	71	78.89	II
		Lack of confidence on the agristartups on AI	66	73.33	III
		Fear using the services from agristartups on AI	62	68.88	V
		High cost of services related to drone startups	25	27.77	VI
B	Technological	Restricted availability of agristartups on AI	78	86.66	II
		Poor connectivity of farmers with pesticide dealers in plantix	24	26.66	V
		Less accessibility of drone services for small farmers	46	51.11	IV
		Poor battery life for drones	49	54.44	III
C	Situational	Lack of services from seed to harvest	80	88.88	I
		Poor connectivity of network in plantix	27	30.00	III
		Inadequate service facilities from agristartups	83	92.22	I
		late responses from the agristartups	82	91.11	II
		Services are provided through private companies (drone spraying)	23	25.55	IV

Suggestions perceived by respondents

From the table 3. suggestions given by the respondents for effective agristartups on artificial intelligence were concentrating on farmers oriented services (73.33%), followed by encouraging agri graduates in setting up agristartups on artificial intelligence (71.66%), quick response from the agristartups on artificial intelligence (70.83%), personal visits to farmers before providing services (70.00%) Providing training skills on usage of artificial intelligence applications and technical viability support from the institutions (69.17%), better internet connectivity in rural areas (68.33%), conducting awareness

programmes on agristartups on artificial intelligence (67.50%), creating proper awareness of agristartup funding support from incubators (66.66%), specific and complete information regarding chemical dosages (64.16%), need based services from the agristartups on artificial intelligence (63.33%), proper promotional support from institutions (61.66%) creating good accessibility of agristartups on artificial intelligence to farmers (60.00%), Providing training programmes for agristartup entrepreneurs on agristartups on artificial intelligence (58.33%), availability of reliable data sets from the government (37.50%).

Table 3: Suggestions on agristartups on artificial intelligence as perceived by respondents

S. No.	Suggestions	F	%	Rank
1.	Quick response from the agristartups on artificial intelligence	85	70.83	III
2.	Providing training programmes for agristartup entrepreneurs on agristartups on artificial intelligence	70	58.33	XIII
3.	Providing training skills on usage of AI applications	83	69.16	V
4.	Availability of reliable data sets from the government	45	37.50	XIV
5.	Need based services from the agristartups on artificial intelligence	76	63.33	X
6.	Personal visits to farmers before providing services	84	70.00	IV
7.	Specific and complete information regarding chemical dosages	77	64.16	IX
8.	Better internet connectivity in rural areas	82	68.33	VI
9.	Conducting awareness programmes on agristartups on artificial intelligence	81	67.50	VII
10.	Creating good accessibility of agristartups on artificial intelligence to farmers	72	60.00	XII
11.	Concentrating on farmers oriented services	88	73.33	I
12.	Proper promotional support from institutions	74	61.66	XI
13.	Technical viability support from the institutions	83	69.16	V
14.	Creating proper awareness of agristartup funding support from incubators	80	66.66	VIII
15.	Encouraging agri graduates in setting up agristartups on artificial intelligence	86	71.66	II

Interventions involved in the Ideation stage

- Center of Excellence on artificial intelligence at various levels of stake holders may be established by connecting various institutions.
- A mechanism which would help ICAR institutes and SAUs allowing their scientists and faculty to give their expertise service to startups.
- There is a need of creating awareness about agencies which encourage and facilitate idea-stage enterprises using improved technologies and innovations about startup funding sources in the country.
- Platform connecting the agristartups with the agriculture universities and institutions
- Data policy pertaining to package of practices and weather modified coded structure data from previous years

Interventions involved in the stage of concept development

- Treasure of scientific and technical archival inter-temporal and spatial data relating to agriculture domains are existing in various public sector institutions. All these available data (especially archival non-digitized data) should be brought into digital domain in a usable/standard formats.
- Recognize that the young entrepreneurs and startups appreciate and value the worth of their potential IP assets. Which would IP counselling to help identify needs and guide solutions from the early stage.
- For gathering and storing valuable scientific and advisory service data in the current digital environment

There should be appropriate awareness on IT Act/Rules/Notifications, Information Technology Security Policy, Legal authentication of e- records is need for effective data management and protection.

Interventions involved in the stage of commitment

- The public sector needs to increase its R&D spending, especially in risk taking research projects to encourage innovation for developing and commercialization of technologies which may enhance the performance of agriculture.
- Applications of Block Chain Technology, AI and IoT in agriculture are at concept stage or small scale pilot so the incentive mechanism could be strengthened for those entrepreneurs who can scale up such technologies.
- A platform is required through SAUs and institutions to make the agristartups technically viable.
- The agristartups have difficulty to pay the employees in this stage. There is need of a platform connecting students and the agristartups as a interns and providing them work experiences.

Interventions involved in the stage of validation

- Importance for capacity building is necessary for formulating potential agristartups for diffusion of innovative solutions and advisory services in agriculture.
- The startup ecosystem should be nurtured by professional incubators in agri-industry to facilitate the exchange of information and knowledge between

farmers and community groups, research institutes and other intermediary organizations or service providers.

- Creating awareness and utilization of provision of loan guarantee scheme/equity participation to cover the risk of genuine failures in commercialization.

Interventions involved in the stage of scaling up

- Government intervention by improving provisions for solving problems through proper incubation policy is needed to scale up startups in core sectors.
- There should be a strategy and policy framework to bring in funds/capital from general venture capitalists, MNCs and other investors to scale up startups focusing in agriculture and food sector.

Interventions involved in the stage establishment of agristartup

- Importance need to be given in areas of agristartup services on skill development and entrepreneurship training institute.
- The academia and startups linkage is necessary for reducing the gap between scientific research and its translation into marketable product and processes.
- Drones agristartups should be supported by including them as a functionary in the custom hiring centers which would be easily accessible for farmers.

Conclusion

In Telangana the agristartup ecosystem is still in budding there are still several initiatives from the government side supporting the agripreneurs should come forward and also students in the universities also to be trained under these scenarios practically which would be helpful them. Most of the startups fail in technical viability there should so focus on training or introducing some incentives at this stage would be gaining advantage.

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