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ASSESSMENT OF OPERATIONAL CHALLENGES AND REMEDIAL STRATEGIES AMONG AGRICULTURAL STARTUPS IN KARNATAKA INDIA

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ABSTRACT

Agricultural startup entrepreneurs encountered several constraints that adversely affected their operational efficiency and growth potential. This study collected responses from 40 entrepreneurs and categorized the constraints into financial, technological, marketing, and personnel domains. Financial constraints emerged as the most critical, with a mean score of 3.16. Among them, Inadequate financial support by investors ranked highest (3.63), while Lack of collateral security was rated lowest (2.49). Marketing constraints ranked second (mean = 2.74), led by Competition in the market (3.60), and the lowest was Lack of market information (2.51). Technological constraints ranked third (mean = 2.28), with Lack of skills in handling and maintaining latest technologies scoring highest (3.45), while Lack of technical guidance was the least severe (2.64). Personnel constraints were relatively less critical (mean = 1.83), where Lack of entrepreneurial education and training received the highest score (3.49), and Frequent employee absenteeism of employee's overall productivity was ranked lowest (2.56). The Wilcoxon signed-rank test revealed statistically significant differences between constraint categories. Financial constraints were significantly more severe than technological ($Z = -3.138$, $p = 0.002$), marketing ($Z = -2.058$, $p = 0.040$), and personnel constraints ($Z = -4.725$, $p < 0.001$). Marketing constraints were more pressing than technological ($Z = -1.974$, $p = 0.048$) and personnel issues ($Z = -3.704$, $p < 0.001$), while technological constraints also exceeded personnel in severity ($Z = -2.036$, $p = 0.042$). In response, entrepreneurs strongly suggested improving financial accessibility (95.00%), enhancing infrastructure (92.20%), reducing taxes (87.50%), and developing better marketing platforms (85.00%). Additional recommendations included promoting new farm technologies (77.50%), offering training (70.00%), establishing incubation centers (67.5%), simplifying certification (62.5%), supporting research collaboration (60.00%), and encouraging networking (55.00%). These findings highlight the urgent need for targeted policy interventions to strengthen the agricultural startup ecosystem in India.

Keywords **:** Agricultural startups, Constraints, Suggestions

Introduction

Agricultural startups have emerged as a transformative approach to revitalizing the agricultural sector, where innovation, technology, and entrepreneurship are intrinsically combined to achieve sustainable growth and efficiency. These enterprises incorporate various domains such as agri-tech, farm mechanization, input supply, food processing, animal husbandry, and digital platforms for marketing and logistics. The outputs of one segment are often leveraged to create value in another, resulting in a synergistic system that enhances productivity, profitability, and resilience (Patil et al., 2023). A more dynamic and competitive agricultural ecosystem is realized when all entrepreneurial components interact in coordination, each complementing the other, much like the interlinked parts of a modern agribusiness framework. This approach is particularly vital in a country like India, where agriculture not only sustains livelihoods but also underpins food security and rural development (Rao and Kulkarni, 2024).

In Karnataka, which is one of the pioneering states in promoting Agri-entrepreneurship, the startup ecosystem has gained momentum in recent years. With diverse Agro-climatic zones, a strong research and development base, and proactive policy support, the state offers unique opportunities for agricultural entrepreneurs. Agri-startups in Karnataka have ventured into diverse areas such as precision farming, supply chain management, organic farming, farm inputs, animal nutrition, and value addition. These enterprises serve as catalysts for rural employment generation, market linkage creation, and dissemination of innovative farming practices (Joshi *et al*., 2022).

However, in spite of the promising potential, the entrepreneurial journey of agricultural startups in Karnataka is fraught with multiple challenges. Constraints such as inadequate access to capital, fragmented markets, low levels of awareness among farmers, infrastructural bottlenecks, and gaps in institutional support systems often impede growth and scalability (Sharma and Gupta, 2021). Additionally, the mismatch between standardized entrepreneurial models promoted through incubation and extension programs and the ground-level realities of farming communities sometimes leads to partial or slow adoption of startup-driven solutions. Understanding these constraints is critical for designing supportive frameworks and tailored interventions that can empower entrepreneurs to thrive in the agricultural sector.

Against this backdrop, the present study aims to identify the real and perceived barriers faced by agricultural startup entrepreneurs in Karnataka and to document their strategic suggestions for overcoming these challenges. By focusing on their lived experiences and coping mechanisms, the study contributes to bridging knowledge gaps on how entrepreneurial ecosystems can be strengthened to align with both agribusiness objectives and farmers' socio-economic contexts.

Materials and Methods

The research was carried out in Karnataka, a leading state in agricultural innovation and startup development. With a strong presence of agricultural research institutes, favourable Agro-climatic conditions, and a growing innovation ecosystem, Karnataka offers an ideal environment for Agri-entrepreneurship. These features made it an appropriate region for examining the challenges and recommendations of startup entrepreneurs in the agricultural sector. A total of 40 agricultural startup entrepreneurs were selected using a snowball sampling method. Participants were chosen based on their active engagement in agri-business areas such as farm input supply, food processing, farm mechanization and tech-driven farming solutions and Animal feed nutrition. Care was taken to include a diverse group of startups from different geographical locations (urban and rural), sizes, and stages of development.

Primary data were gathered through a structured interview schedule containing both open-ended and closed-ended questions. The schedule was divided into two core sections. In the first section, entrepreneurs were asked to rate the severity of various constraints using a three-point scale: High (3), Moderate (2) and Low (1). In the second section, respondents were requested to suggest practical solutions for improving the Agri-startup ecosystem and rank the effectiveness of these suggestions.

Data Analysis

The collected data were analyzed using descriptive statistics and non-parametric methods. To rank the severity of constraints, the Friedman Mean Rank Test was employed, as it is suitable for comparing related samples. This statistical test helped identify which constraints were most commonly experienced across the sample group. In addition, the mean scores of individual constraints were computed to assess their average impact. Suggestions given by respondents were analyzed using percentage analysis to determine the most widely endorsed strategies for supporting startup growth and development.

Friedman rank test: The Friedman test analysis was used to study the constraints faced by Agricultural startup entrepreneurs. The prime advantage of this technique over simple frequency distribution is that the constraints are arranged based on their severity from the point of view of respondents. Constraints were divided into four main divisions with sub heads viz; Financial Constraints, Technological constraints, Marketing constraints and Personnel constraints. The responses to these constraints were recorded on a three point continuum of 'High, Moderate and Low' with the respective weightage of 3, 2 and 1. Nonparametric test i.e., Friedman ranks test, as elucidated by Tripathi in 2014 and this method is also used to identify the most severe constraints among the four broad constraints faced by Agricultural startup entrepreneurs by using the following formula:

$$F_r = \frac{12}{nk(k+1)}\left(\sum_{j=1}^{k} R_j^2\right) - 3n(k+1)$$

Where:

- n = number of subjects (rows or blocks)
- k = number of treatments/groups (columns)
- Rj = sum of ranks for treatment j (column-wise rank totals)

Wilcoxon signed rank test: Wilcoxon signed rank test is a non-parametric test used to test whether there is any significant difference between matched or paired samples when the data is measured in an ordinal or nominal scale. In the present study, Wilcoxon signed rank test was used to check whether the constraints faced by Agricultural startup entrepreneurs were significantly difference between each other or not. If there is a significant difference between the two conditions, then the rank totals will be quite different and one of the rank totals will be quite small. On the other hand, if the two conditions are similar, then high and low ranks will be distributed evenly and the rank totals will be fairly similar. Compute the value of z using the following formula:

$$z = \frac{T - \frac{n(N+1)}{4}}{\sqrt{\frac{N(N+1)(2N+N)}{24}}} \sim SND(0,5)$$

Where,

T = Sum of the ranks with less frequent sign

N = Number of paired observations whose difference is not zero

Result and Discussion

The data from Table 1 shows that constraints faced by Agricultural startup entrepreneurs**.** Constraints were categorized into four major dimensions which were financial, technological, marketing and personnel constraints. Mean scores were computed to determine the severity of each constraint. Friedman test was conducted to identify the major constraints faced by Agricultural startup entrepreneurs.

Financial Constraints emerged as the most significant among the four dimensions, with an overall mean score of 3.16. Within this category, inadequate financial support by investors was the highest-rated constraint (3.63), followed by inadequate incentives from the government was also a notable concern (3.26), high rates of interest (2.91) and high GST (2.71) were additional challenges, indicating the burden of financial liabilities. Lack of collateral security was the least pressing financial issue (2.49), but still contributed to financing difficulties for early-stage ventures.

Technological Constraints were moderately severe, with an average score of 2.28. Among them High cost of technologies scored highest (3.45), followed by lack of technological knowledge (3.19) and lack of modern technology (3.03) were also prominent concerns. Lack of technical guidance (2.69) and Lack of skills in handling and maintaining latest technologies (2.64) were comparatively less severe, yet remain barriers to technology adoption.

Marketing Constraints had a collective mean score of 2.74, indicating their substantial impact on startup operations. Competition in the market emerged as the most significant challenge with the highest mean score of 3.60, This was followed by lack of market information (3.20), suggesting inadequate access to timely and relevant data. Lack of market infrastructure ranked third with a mean score of 2.95, low market demand affects for startup products the fourth position (2.74), low knowledge about marketing strategies was identified as the least constraining factor, with a mean score of 2.51

Personnel Constraints recorded the lowest overall severity among the categories, with a mean score of 1.83. Nevertheless, lack of entrepreneurial education and training was rated significantly high (3.49followed by difficulty in attracting investors (3.13) and the non-availability of trained manpower (2.86) also posed barriers to growth. Low levels of innovative capability (2.94) and frequent employee absenteeism (2.56) were relatively less critical, yet still influenced performance outcomes.

The result depicted in Table 17, Financial constraints emerged as the foremost challenge with the highest mean score (3.16), indicating that limited access to credit, inadequate investor support, and high input costs hinder the smooth functioning and growth of agricultural startups. This reflects the capital-intensive nature of Agri-based ventures, where initial investments in technology, infrastructure, and raw materials are substantial, but financing options remain inadequate.

Market constraints ranked second with mean score of 2.74, highlighting difficulties in accessing stable markets, price fluctuations, and competition. Personnel constraints (1.83) were least significant, implying that human resources are relatively manageable. To address these, policy interventions, financial inclusion schemes, and market linkages must be strengthened for sustainable entrepreneurial growth. The results were in line with Chokhani (2017) findings.

Table 1: Constraints faced by Agricultural startup entrepreneurs

Sl. No	Constraints	High	Moderate	Low	Mean score	Rank
I Financial constraints (3.16)						
1	Inadequate incentives provided by the Government	25	13	02	3.26	**II**
2	High GST	16	20	04	2.71	**IV**
3	High rate of interest	20	16	04	2.91	**III**
4	Inadequate financial support by the investor	31	06	03	3.63	**I**
5	Lack of collateral security	13	22	05	2.49	**V**
II. Technological constraints (2.28)						
1	High cost of technologies	21	14	05	3.45	**I**
2	Lack of modern technology	15	15	10	3.03	**III**
3	Lack of technological knowledge	17	14	09	3.19	**II**
4	Lack of technical guidance	11	18	11	2.69	**IV**
5	Lack of skills in handling and maintaining latest technologies	10	18	12	2.64	**V**
III. Market constraints (2.74)						
1	Lack of market information	20	17	03	3.20	**II**
2	Competition in the market	27	10	03	3.60	**I**
3	Low market demand affects for startup products	15	17	08	2.74	**IV**
4	Lack of market infrastructure	17	17	06	2.95	**III**
5	Low knowledge about marketing strategies	12	16	12	2.51	**V**
IV. Personnel constraints (1.83)						
1	Lack of entrepreneurial education & training	18	15	07	3.49	**I**
2	Non-availability of trained manpower	10	16	14	2.86	**IV**
3	Difficulty in attracting investors	11	19	10	3.13	**II**
4	Low level of innovative capability	11	16	13	2.94	**III**
5	Frequent employee absenteeism reduces overall productivity.	7	17	16	2.56	**V**

The results depicted in Table 2 reveal, that Pairwise comparison of constraints faced by Agricultural startup entrepreneurs. Wilcoxon signed rank test was followed to determine the comparison of each constraint faced by Agricultural startup entrepreneurs. A statistically significant z-value indicates severity of constraints. All the constraints have shown severity at statistically significant at 1.00 per cent and 5.00 per cent level of significance.

A majority (67.5%) of respondents felt financial problems were more severe than technological issues and difference is statistically significant. Half of the respondents believed financial issues were more serious than marketing and result is statistically significant, showing financial constraints are more challenging than marketing barriers. An overwhelming (80.00%) said financial constraints were more severe than personnel constraints This is the most significant result, clearly showing that finance is a major obstacle. Half of the startups felt marketing issues were more severe than technological constraints. The difference is significant. More than half (55.00%) believed technological barriers were more problematic than personnel issues. The result is statistically significant. Most of the respondents (67.5%) felt marketing constraints were more severe than personnel constraints. The result is highly significant.

The Wilcoxon signed rank test results clearly demonstrate that agricultural startup entrepreneurs face constraints of varying severity, with financial barriers emerging as the most critical. Around (67.5%) of respondents viewed financial issues as more serious than technological ones, and (80.00%) considered them more severe than personnel-related challenges. These findings reflect ongoing challenges such as limited investor support, restricted access to affordable credit, and insufficient government incentives who identified financial inaccessibility as a major obstacle to Agri-startup development in India. Marketing constraints followed closely, with (67.5%) of respondents perceiving them as more significant than personnel challenges and (50.00%) ranking them above technological barriers. This is supported by Sharma and Bhatia (2020), who noted that poor market infrastructure and lack of information reduce competitiveness. Technological issues, while moderately severe, continue to limit scalability due to high costs and inadequate technical skills, as highlighted by Winberg et al (2024). These insights suggest the need for targeted policy support in finance, market access, and technology adoption.

Table 2: Pairwise comparison of constraints faced by Agricultural startup entrepreneurs

Sl.No	Indicators	Rank and statistics		P value	Remarks
1	Financial vs technological	Negative	27		A majority (67.50%) of respondents felt financial problems
		Positive	09		
		Ties	04		
		Z value	**-3.138***	**0.002**	
2	Financial vs Marketing	Negative	20		Half of the respondents believed financial issues were more serious than marketing ones
		Positive	11		
		Ties	09		
		Z value	**-2.058***	**0.040**	
3	Financial vs Personnel	Negative	32		An overwhelming (80.00%) said financial issues were more severe than personnel problems
		Positive	04		
		Ties	04		
		Z value	**-4.725****	**0.002**	
4	Technological vs Marketing	Negative	11		Half of the startups felt marketing issues were more severe than technological constraints.
		Positive	20		
		Ties	09		
		Z value	**-1.974***	**0.048**	
5	Technological vs Personnel	Negative	22		More than half (55.00%) believed technological barriers were more problematic than personnel issues
		Positive	14		
		Ties	4		
		Z value	**-2.036***	**0.042**	
6	Marketing vs Personnel	Negative	27		Most of the respondents (67.50%) felt marketing constraints were more severe than personnel constraints.
		Positive	08		
		Ties	05		
		Z value	**-3.704****	**0.001**	

**1% level of significance *5% level of significance

The study captured valuable suggestions and from agricultural startup entrepreneurs regarding the key actions needed to overcome the challenges they face and to support the growth of the Agri-startup ecosystem.

The data in Table 3 shows most widely endorsed suggestion was easily available of loans and funds (95.00 %) suggested by majority of the Agricultural startup entrepreneurs. This was followed providing good infrastructure facility (92.20 %) and reducing taxes on agricultural products and services (87.50 %), which were ranked second and third respectively. The fourth most common suggestion was creating opportunity for better marketing platforms (85.00%), support for the use of new farm technologies (77.50 %) ranked fifth, followed by the Need to provide training for young entrepreneurs (70.00 %), Set up more startup incubation centres (67.50 %) was ranked sixth and seventh. Reduce the cost and complexity of certification was the suggestion given by 62.50 per cent of entrepreneurs followed by encouraging Reduce the cost and complexity of certification research collaborations (60.00 %) and promote awareness and networking for sustainability (55.00 %) were followed by above.

The findings reveal from the Table 3 indicate that easy access to loans and funding was the most widely endorsed suggestion (95.00 %), followed by building better infrastructure for startups (92.20%) and reducing taxes on agricultural products and services (87.50%). Since agriculture is highly capital-intensive, requiring investments in equipment, technology, and raw materials, the availability of affordable credit is critical for sustaining operations and fostering innovation. as inadequate storage, processing, logistics, and transportation facilities often lead to post-harvest losses and restrict market competitiveness. As high taxation directly impacts profit margins and discourages expansion. These priorities clearly emphasize that entrepreneurs seek a supportive ecosystem with reduced financial burdens, enhanced infrastructural support, and favourable policy frameworks. Moving forward, coordinated efforts between government, financial institutions, and private stakeholders are essential to design inclusive financial schemes, strengthen rural infrastructure, and introduce tax reforms to boost agricultural entrepreneurship. This might be reason for the above result. The findings were aligned with results of Vikram (2015).

Table 3: Suggestions given for improvement of Agricultural startup entrepreneurs

Sl. No	Suggestions	Frequency	Percentage
1.	Easily available of loans and fund	38	95.00
2.	Providing good infrastructure facility	37	92.20
3.	Reduce taxes on agricultural products and services	35	87.50
4.	Create opportunity for better marketing platforms	34	85.00
5.	Support use of new farm technologies	31	77.50
6.	Provide training for young entrepreneurs	28	70.00
7.	Set up more startup incubation centres	27	67.50
8.	Reduce the cost and complexity of certification	25	62.50
9.	Encourage research collaboration	24	60.00
10.	Promote awareness and networking for sustainability	22	55.00

Conclusion

The study highlights that agricultural startups in Karnataka face critical constraints, primarily financial, followed by technological, market, and personnel challenges. Inadequate investor support, lack of skills in advanced technologies, poor market information, and limited entrepreneurial education were major issues identified. To address these, entrepreneurs emphasized the need for improved access to finance, better infrastructure, reduced taxes, and enhanced market platforms. Training programs, incubation centers, and research collaboration were also recommended. Addressing these multifaceted challenges through coordinated policy and institutional support is essential to foster innovation, sustainability, and growth in the agricultural startup ecosystem of Karnataka.

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