

Knowledge of Agriculture Students towards Entrepreneurship in Odisha of India

Rajeeb Kumar Behera*¹, Rabindra Kumar Raj²

¹Department of Agricultural Extension and Communication, Faculty of Agricultural Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India.

Email: rkbehera28594@gmail.com | ORCID: <https://orcid.org/0000-0002-2565-6036>

²Department of Agricultural Extension and Communication, Faculty of Agricultural Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India.

Email: raj_rabindra@rediffmail.com | ORCID: <https://orcid.org/0009-0006-0637-921X>

*Corresponding author

How to cite this paper: Behera, R.K. and Raj, R.K. (2024). Knowledge of Agriculture Students towards Entrepreneurship in Odisha of India. *Grassroots Journal of Natural Resources*, 7(3): 128-145. Doi: <https://doi.org/10.33002/nr2581.6853.070308>

Received: 03 September 2024

Reviewed: 24 September 2024

Provisionally Accepted: 30 September 2024

Revised: 12 October 2024

Finally Accepted: 28 October 2024

Published: 31 December 2024

Copyright © 2024 by author(s)

Publisher's Note: We stay neutral with regard to jurisdictional claims in published maps, permissions taken by authors and institutional affiliations.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Generating entrepreneurial knowledge among students is a way to solve the problem of food and job security in India. Therefore, the present study was undertaken in agriculture colleges of Odisha to explore and improve their entrepreneurial knowledge. The respondents were final-year students in their B.Sc. (Agriculture) undergraduate course. The data were collected through a pretested survey questionnaire. After analysis of the collected, it was found that the majority (62.04%) of the respondents had a medium level of entrepreneurial knowledge. Among various components of entrepreneurial knowledge, the respondents had more knowledge of legal requirements and marketing than credit and finance and technological adaptation. The analysis showed significant positive correlations between entrepreneurial knowledge and attributes like Economic, Social, and Scientific Aptitude, Decision-Making, Leadership, and Information Access, with Leadership Ability being the most influential. In contrast, Family Type and Higher Land Holding had significant negative correlations with infrastructure and legal knowledge, suggesting that students from joint families or with larger landholdings had slightly lower exposure to these entrepreneurial resources. This highlights the importance of individual skills and suggests that family structure and landholding background can also impact entrepreneurial competency.

Keywords

Entrepreneurial knowledge; Agriculture students; Odisha; Technological adaptation; Educational interventions

Introduction

For the growing population of India, food and job security are becoming scarce and our country is going to face a dangerous stage (Senapati and Padhi, 2020). However, this problem can be solved by generating entrepreneurial knowledge among people (Senapati and Padhi, 2020). As today's students are the future of the nation, government should focus on them in developing their

Executive (Chief) Editor

Dr. Hasrat Arjjumend

Associate Editors

Dr. Usongo Patience

Ms. Areej Sabir

Assistant Managing Editor

Mr. Kartik Omanakuttan

entrepreneurial knowledge (Dauda and Esther, 2023). Every institution in India has helped them in this matter from childhood, but the higher education institutes focus mostly and seriously on the development of entrepreneurial knowledge among students (Roy and Mukherjee, 2017; Subramanian, Dubey and Singh, 2012)). Therefore, institutions at the undergraduate level are introducing entrepreneurship-related courses. Mostly, in agriculture colleges, students are not only reading entrepreneurship courses, but they are also practising the various entrepreneurial process (Wang, 2019). They are involved in practices for the preparation of agricultural products like jam, jelly, mushrooms, pickles, juice etc. The students are involved in growing flowers, fruits, vegetables, cereals, pulses etc. with higher profit. They are using advanced technologies to generate more income from agriculture practices (Dangore, Wakle and Raut, 2020). They are also in preparation of hybrid seeds and HYV seeds and selling and exporting those seeds (Neesh *et al.*, 2020). They are involved in income generation activities of agricultural institutions. In their course, ELP (Experiential Learning Programme) is added, where they are being trained in both business and skill-based programs like organic farming, Azola preparation, seed production, food processing units, post-harvest management practices etc. (Thorat, Deshmukh, and Shriram, 2021). So, during undergraduate courses, students are getting knowledge on entrepreneurship.

Therefore, this study entitled “Entrepreneurial Knowledge of Agriculture Students in Odisha state of India” is an attempt to know the entrepreneurial knowledge of the agriculture students in Odisha state of India, so that based on their knowledge level and lacuna in any particular type of knowledge related to entrepreneurship, teachers will be able guide and can give training to build up their efficiency and capabilities to be an entrepreneur. This will be helpful to make Odisha state particularly self-sufficient and will help support food security throughout the state. As agriculture students are from mostly all the villages of Odisha. Similar studies can be done in all states and India, so that based on the demand and need of the students regarding knowledge on entrepreneurship, teachers will be able to guide and govt can also support them in this matter. The courses offered to agriculture undergraduate can be redesigned to make them knowledgeable and self-sufficient to earn money in their upcoming future.

The following hypotheses were tested in this study:

- H₁: The entrepreneurial knowledge of agriculture students in Odisha are at a low level on average.
- H₂: Socio-economic factors do not significantly influence the entrepreneurial knowledge of agriculture students in Odisha.
- H₃: Personal attributes do not significantly influence the entrepreneurial knowledge of agriculture students in Odisha.
- H₄: There is no significant difference in the entrepreneurial knowledge based on gender, caste and family major occupation.

Accordingly, the study is guided by the following objectives:

- To evaluate the levels of entrepreneurial knowledge among agriculture students in Odisha.
- To analyze the relationship between socio-economic factors and entrepreneurial knowledge.

- To know the relationship between the personal attributes and entrepreneurial knowledge of the respondents.
- To assess the differences in entrepreneurial knowledge based on gender, caste and family major occupation.

Methodology

This research adopted a quantitative framework, leveraging cross-sectional data to provide a comprehensive analysis. The respondents were B.Sc. (Agriculture) final year bachelor's degree students of all the 9 agriculture colleges in Odisha, India (Table 1). All nine agricultural colleges in Odisha were selected for the study to comprehensively assess the entrepreneurial knowledge of final-year B.Sc. (Agriculture) students, representing diverse socio-economic and regional backgrounds. This inclusive approach ensures a holistic understanding of their knowledge levels and gaps, enabling teachers to design targeted training programs to enhance their entrepreneurial capabilities. The study leverages a quantitative framework with cross-sectional data, providing actionable insights to improve curriculum effectiveness and guide state-level strategies for fostering entrepreneurship in agriculture. The data required for the study of entrepreneurial knowledge were collected through a survey questionnaire which was developed with the help of non-respondent students, experts and literature such as:

- 1) Infrastructure (Audretsch, Heger and Veith, 2015; Calvo *et al.*, 2019; Qandah *et al.*, 2021).
- 2) Legal requirement (Siemieniak and Rembiasz, 2019; Plumly *et al.*, 2008)
- 3) Technological adaptation (Carayannis *et al.*, 2006; Abdelfattah, Al Halbusi, and Al-Brwani, 2023; Ardelean, 2021; Laranja and Fontes, 1998)
- 4) Credit and finance (Tran *et al.*, 2024; Seghers, Manigart and Vanacker, 2012; Sutikno, 2022)
- 5) Marketing (Øystein 2005; Karyaningsih, 2020; Gilmore and Carson, 1999; Besterfield *et al.*, 2013).

Table 1: Details of the study area and respondents

Sl. No.	Name of the College	Name of the District	Total No. of Students in Final Year B.Sc. (Hons.) Agriculture
1.	Institute of Agricultural Sciences, Siksha 'O' Anusandhan, Bhubaneswar	Khordha	352
2.	M.S. Swaminathan School of Agriculture, CUTM, Paralakhemundi	Gajapati	275
3.	Gandhi Institute of Engineering and Technology (GIET), Gunupur	Rayagada	160
4.	MITS Institute of Professional Studies (MIPS)	Rayagada	94
5.	CV Raman Global University	Khordha	34
6.	SRI SRI University	Cuttack	111
7.	College of Agriculture, OUAT, Chiplima	Sambalpur	59

8.	College of Agriculture, OUAT, Bhawanipatna	Kalahandi	98
9.	College of Agriculture, OUAT, Bhubaneswar	Khordha	200
Total	9 colleges		1383

For capturing responses on the Entrepreneurial knowledge of the respondents, a three-point Likert scale: Most essential (3), Essential (2) and not essential (1) was used. Permissions were taken from all the concerned authorities of the study institutions for data collection from the final year students of B.Sc. (Agriculture) and after that, institutions were visited. Interaction and discussion were made with the professors, assistant professors and students on the objectives framed under the study and data collection process. After that, questionnaires in Google Forms were distributed to all the final year students of agriculture in Odisha students during 2023-24 through personal visits to the colleges one by one individually with the help of concerned faculties and authorities by using WhatsApp groups and emails for communication. While using WhatsApp and emails facilitated quick communication and response collection, potential limitations included accessibility issues for students with limited internet access, potential non-responsiveness, and a lack of personal interaction that could influence the accuracy of responses. To mitigate these issues in future studies, a mixed-methods approach combining online and offline data collection could be adopted, ensuring inclusivity and higher response accuracy. Additionally, follow-ups through personal visits or phone calls could address non-responsiveness and enhance data reliability. A total of 588 questionnaires were returned during the study. Out of these, 569 questionnaires were deemed suitable for analysis based on specific inclusion and exclusion criteria. The inclusion criteria required that the questionnaires be fully completed, with clear and valid responses to all items on the three-point Likert scale. Questionnaires with incomplete responses, ambiguous answers, or missing data were excluded from the analysis to ensure the reliability and validity of the results. After applying these criteria, the finalized dataset was analyzed using SPSS v21. The final questionnaire is attached as Annexure.

Results

Entrepreneurial Knowledge of the Agriculture Students in Odisha

The analysis of entrepreneurial knowledge among agriculture students in Odisha (Table 2), based on a sample of 569, reveals varying levels of understanding across different dimensions of entrepreneurship, including Infrastructure, Legal Requirements, Technological Adaptation, Credit and Finance, Marketing, and Overall Entrepreneurial Knowledge. For Infrastructure, the average mean score was 2.63, with 17.93% of students having low knowledge, 50.09% medium, and 31.99% high, ranking it third overall. Legal Requirements had the highest average mean score of 2.67, with 19.86% of students with low knowledge and 80.14% at medium, but none reaching high knowledge. Technological Adaptation, with an average mean score of 2.59, ranked fifth, where 19.86% had low knowledge, 50.97% medium, and 29.17% high. Credit and Finance had an average mean score of 2.61, ranking fourth, with 20.39% of students with low knowledge, 48.33% at medium, and 31.28% at high. Marketing, with an

average mean score of 2.66, ranked second, where 19.33% of students had low knowledge, 80.67% medium, and none high. Overall Entrepreneurial Knowledge had an average mean score of 2.63, with 17.75% of students at low knowledge, 62.04% at medium, and 20.21% at high knowledge levels.

Table-2: Rank and Level of Entrepreneurial Knowledge (n=569)

<i>Factors of Entrepreneurial Knowledge</i>	<i>Average Mean Score*</i>	<i>Rank</i>	<i>Level</i>		
			<i>Low</i>	<i>Medium</i>	<i>High</i>
<i>Infrastructure</i> (For Levels Mean=2.63, SD=0.35)	2.63	III	102 (17.93%)	285 (50.09%)	182 (31.99%)
<i>Legal requirement</i> (For Levels Mean= 2.67, SD= 0.35)	2.67	I	113 (19.86%)	456 (80.14%)	0 (0.0%)
<i>Technological adaptation</i> (For Levels Mean= 2.59, SD= 0.36)	2.59	V	113 (19.86%)	290 (50.97%)	166 (29.17%)
<i>Credit and Finance</i> (For Levels Mean= 2.61, SD= 0.38)	2.61	IV	116 (20.39%)	275 (48.33%)	178 (31.28%)
<i>Marketing</i> (For Levels Mean= 2.66, SD=0.34)	2.66	II	110 (19.33%)	459 (80.67%)	0 (0.0%)
<i>Overall Entrepreneurial knowledge</i> (For Levels Mean: 2.63, SD: 0.3)	2.63		101 (17.75%)	353 (62.04%)	115 (20.21%)

*Minimum score = 1, and maximum score = 3

Correlation among Variables

The correlation analysis aimed to understand the relationship among various socio-economic attributes, personal attributes and entrepreneurial knowledge of the respondents. After analysis, the results depicted in Table 3 revealed both positive and negative significant correlations with entrepreneurial knowledge across various dimensions. On the positive side, Economic Aptitude, Social Aptitude, Scientific Aptitude, Decision-Making Ability, Leadership Ability, and Source of Information exhibited significant positive correlations, with Leadership Ability showing the strongest association, particularly in credit and finance knowledge. Social and Scientific Aptitude were also notably influential, emphasizing the importance of interpersonal and technical skills for entrepreneurial success. Conversely, Family Type and Parents' Higher Land Holding showed significant negative correlations with specific dimensions of entrepreneurial knowledge, particularly with infrastructure and legal requirements. This suggested that students from joint families or those with higher landholdings may have had slightly lower exposure to certain entrepreneurial resources, potentially due to different resource management or family responsibilities. These findings indicated that while fostering individual skills could strengthen entrepreneurial competencies, addressing the nuances of family structure and landholding background might also be beneficial.

Table 3: Spearman's Rank Correlations

Sl. No.	Variables	Infra-structure	Legal Requirement	Technological Adaptation	Credit and Finance	Marketing	Overall Entrepreneurial Knowledge
1	Locality	-0.062	-0.042	-0.043	-0.03	-0.026	-0.05
2	Family Type	-.085*	-.089*	-0.043	-0.043	-0.081	-.087*
3	Family Size	-0.065	-0.06	-0.057	-0.028	-0.024	-0.063
4	House Types	-0.012	0.031	0.015	0.057	0.047	0.035
5	Education of the head of the family	-0.002	-0.033	-0.031	0.044	0.022	0.007
6	Family Annual Income	-0.05	-0.072	-0.078	-.084*	-0.004	-0.066
7	Parents Land Holding	-.094*	-.087*	-0.071	-0.049	-0.059	-0.081
8	Economic Aptitude	.126**	.130**	.133**	.157**	.138**	.165**
9	Social Aptitude	.217**	.276**	.250**	.279**	.238**	.300**
10	Scientific Aptitude	.227**	.231**	.259**	.257**	.216**	.283**
11	Decision-Making Ability	.272**	.251**	.171**	.277**	.283**	.291**
12	Leadership Ability	.265**	.290**	.297**	.350**	.290**	.354**
13	Source of Information	.219**	.211**	.267**	.195**	.189**	.258**

**Significance at 1% level (two-tailed)

*Significance at 5% level (two-tailed)

Entrepreneurial Knowledge Based on Gender

To compare entrepreneurial knowledge between male and female agriculture students in Odisha across various dimensions, researchers employed the Mann-Whitney-U Test (Table 4). Factors examined included Infrastructure, Legal Requirements, Technological Adaptation, Credit and Finance, Marketing, and Overall Entrepreneurial Knowledge. For Infrastructure, male students had a mean rank of 288.96, while females had 282.03, with a Mann-Whitney U of 38,683.5, Z-score -0.509 and p-value 0.611, revealing no significant differences in the case of gender. In the Legal Requirements category, males scored a mean rank of 285.58 and females 284.57, with a Mann-Whitney U of 39,509.0, Z-score of -0.075, and p-value of 0.941, again showing no significant disparity. Technological Adaptation results indicated mean ranks of 296.01 for males and 276.73 for females, with a Mann-Whitney U of 36,963.0, Z-score of -1.411, and p-value of 0.158, demonstrating no significant statistical difference. Credit and Finance dimension yielded mean ranks of 291.42 for males and 280.18 for females, with a Mann-Whitney U of 38,084.0, Z-score of -0.824, and p-value of 0.410, indicating no significant gender gap. Marketing results showed mean ranks of 286.51 for males and 283.87 for females, with a Mann-Whitney U of 39,282.0, Z-score of -0.194, and p-value of 0.846, suggesting

no significant difference. Lastly, Overall Entrepreneurial Knowledge analysis produced mean ranks of 291.78 for males and 279.91 for females, with a Mann-Whitney U of 37,994.5, Z-score of -0.854, and p-value of 0.393, further supporting the absence of significant gender-based differences.

Table 4: Mann-Whitney U Test (Entrepreneurial Knowledge based on Gender)

	<i>Infra-structure</i>	<i>Legal Requirement</i>	<i>Technological Adaptation</i>	<i>Credit and Finance</i>	<i>Marketing</i>	<i>Overall Entrepreneurial Knowledge</i>
Mann-Whitney U	38683.500	39509.000	36963.000	38084.000	39282.000	37994.500
Wilcoxon W	91658.500	92484.000	89938.000	91059.000	92257.000	90969.500
Z	-.509	-.075	-1.411	-.824	-.194	-.854
Asymp. Sig. (2-tailed)	.611	.941	.158	.410	.846	.393

a. Grouping Variable: Gender

Entrepreneurial Knowledge Based on Caste

To investigate differences in entrepreneurial knowledge between agricultural students in Odisha from the Lower, Middle, and Upper caste groups, a Kruskal-Wallis test was utilized. The analysis focused on six dimensions: Infrastructure, Legal Requirements, Technological Adaptation, Credit and Finance, Marketing, and Overall Entrepreneurial Knowledge (Table 5). With a Chi-Square of 0.328, two degrees of freedom, and a p-value of 0.849, the mean ranks for infrastructure were 276.34 (Lower Caste), 288.26 (Middle Caste), and 285.48 (Upper Caste), indicating no discernible variance in perception. With a Chi-Square of 1.347, two degrees of freedom, and a p-value of 0.510, Legal Requirements revealed mean rankings of 269.10 (Lower Caste), 293.30 (Middle Caste), and 284.44 (Upper Caste), further suggesting no significant difference.

The mean ranks for technological adaptation were 262.22 for the Lower Caste, 300.97 for the Middle Caste, and 281.66 for the Upper Caste. A Chi-Square of 3.654, two degrees of freedom, and a p-value of 0.161 indicated that there was no significant difference between the castes. With a Chi-Square of 4.386, two degrees of freedom, and a p-value of 0.112, Credit and Finance showed mean ranks of 257.02 (Lower Caste), 300.69 (Middle Caste), and 283.33 (Upper Caste), indicating no significant difference. With a Chi-Square of 1.923, two degrees of freedom, and a p-value of 0.382, the mean rankings in the Marketing dimension were 263.94 for Lower Caste, 284.75 for Middle Caste, and 291.23 for Upper Caste, indicating no significant variance. Last but not least, there was no significant difference between the caste categories for Overall Entrepreneurial Knowledge, with mean rankings of 262.34 (Lower Caste), 295.99 (Middle Caste), and 284.72 (Upper Caste) with a Chi-Square of 2.469, 2 degrees of freedom, and a p-value of 0.291.

Entrepreneurial Knowledge Based on Family Major Occupation

Taking into account the principal occupation of their family, the Kruskal-Wallis Test was utilized to examine differences in entrepreneurial knowledge among agriculture students

in Odisha (Table 6). The analysis covered several aspects: Infrastructure, Legal Requirements, Technological Adaptation, Credit and Finance, Marketing, and Overall Entrepreneurial Knowledge. For Infrastructure, the test revealed mean ranks of Labour (154.50), Caste Occupation (338.75), Cultivation (302.91), Business (284.50), Private Job (289.61), and Government Job (280.70), with a Chi-Square of 2.756, 5 degrees of freedom, and a p-value 0.738, indicating no significant differences across family occupations. In the Legal Requirements category, mean ranks were Labour (116.25), Caste Occupation (361.88), Cultivation (312.19), Business (284.92), Private Job (256.33), and Government Job (286.99), with a Chi-Square of 7.227, 5 degrees of freedom, and a p-value of 0.204, suggesting no significant variations based on family occupation. Technological Adaptation showed mean ranks of Labour (262.00), Caste Occupation (361.88), Cultivation (313.40), Business (287.78), Private Job (274.63), and Government Job (279.82), with a Chi-Square of 3.394, 5 degrees of freedom, and a p-value of 0.639, demonstrating no significant differences across family occupations. For Credit and Finance, mean ranks were Labour (73.25), Caste Occupation (271.00), Cultivation (288.35), Business (300.16), Private Job (274.30), and Government Job (281.60), with a Chi-Square of 5.187, 5 degrees of freedom, and a p-value of 0.394, indicating no significant variations. Marketing displayed mean ranks of Labour (116.50), Caste Occupation (411.75), Cultivation (281.59), Business (298.99), Private Job (257.24), and Government Job (285.56), with a Chi-Square of 7.951, 5 degrees of freedom, and a p-value of 0.159, suggesting no significant differences. Lastly, Overall Entrepreneurial Knowledge showed mean ranks of Labour (122.25), Caste Occupation (348.50), Cultivation (305.19), Business (291.26), Private Job (265.45), and Government Job (283.27), with a Chi-Square of 4.722, 5 degrees of freedom, and a p-value of 0.451, indicating no significant variations across family occupations.

Table 5: Kruskal-Wallis test (Entrepreneurial Knowledge Based on Caste)

	<i>Infra-structure</i>	<i>Legal Requirement</i>	<i>Technological Adaptation</i>	<i>Credit and Finance</i>	<i>Marketing</i>	<i>Overall Entrepreneurial Knowledge</i>
Chi-Square	0.328	1.347	3.654	4.386	1.923	2.469
df	2	2	2	2	2	2
Asymp. Sig.	0.849	0.510	0.161	0.112	0.382	0.291

Table 6: Kruskal-Wallis test (Entrepreneurial knowledge based on Family major occupation)

	<i>Infra-structure</i>	<i>Legal Requirement</i>	<i>Technological Adaptation</i>	<i>Credit and Finance</i>	<i>Marketing</i>	<i>Overall Entrepreneurial Knowledge</i>
Chi-Square	2.756	7.227	3.394	5.187	7.951	4.722
Df	5	5	5	5	5	5
Asymp. Sig.	0.738	0.204	0.639	0.394	0.159	0.451

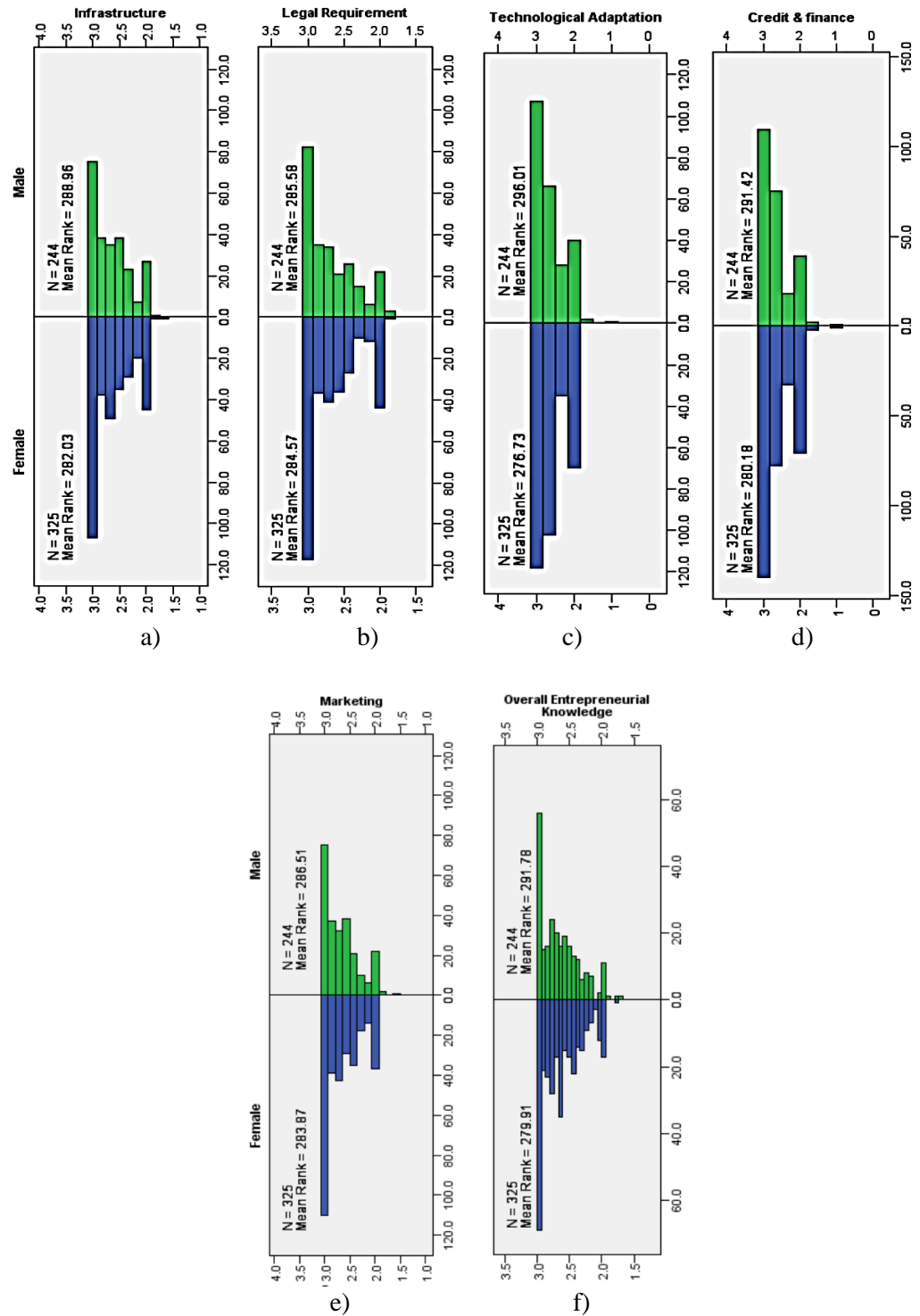


Figure 1: Comparison between Entrepreneurial Knowledge of Students: a) Infrastructure, b) Legal requirement, c) Technological adaptation, d) Credit & Finance, e) Marketing, f) Overall entrepreneurial knowledge

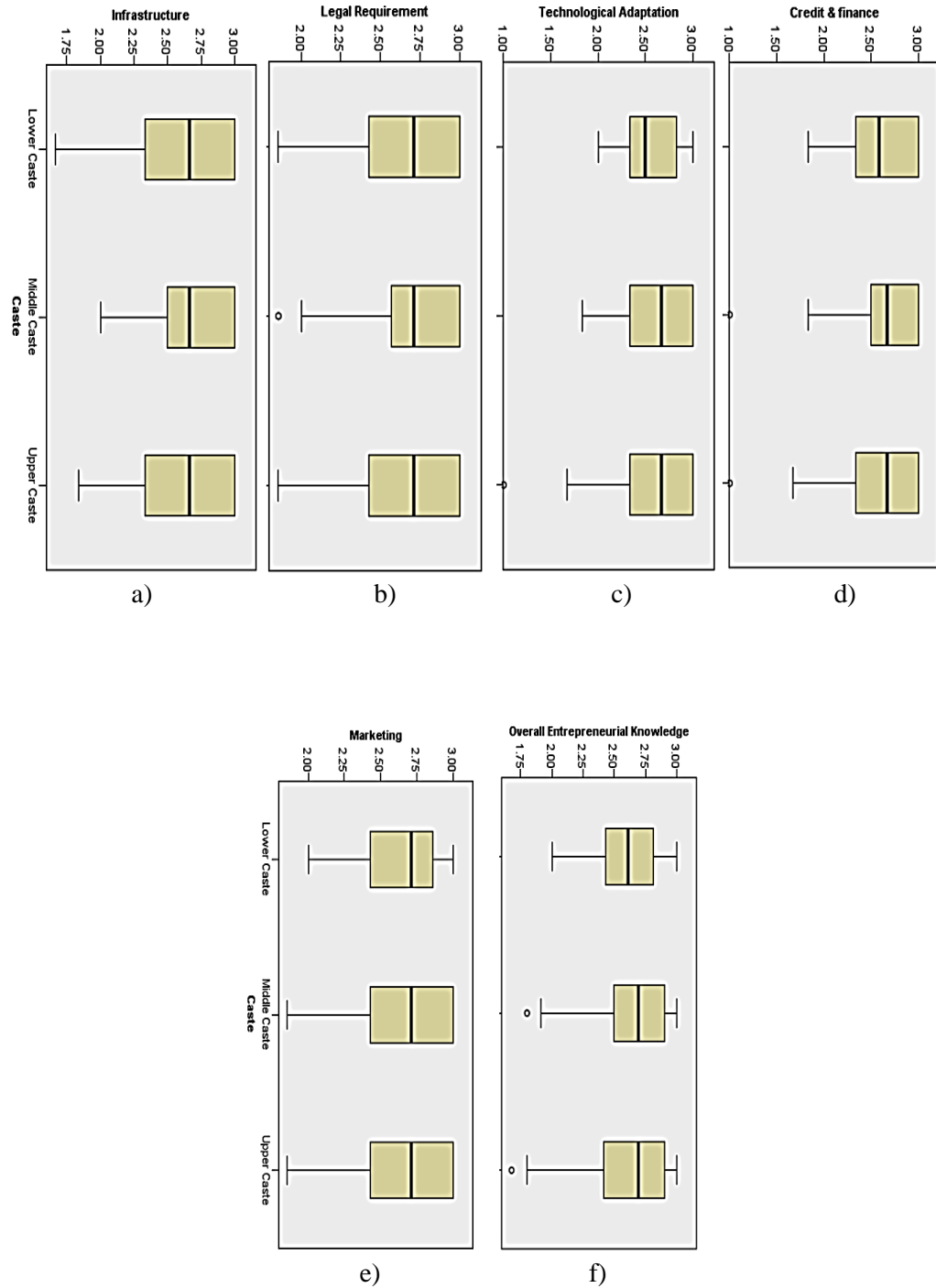


Figure 2: Kruskal-Wallis Test based on Caste: a) Infrastructure, b) Legal requirement, c) Technological adaptation, d) Credit & Finance, e) Marketing, f) Overall entrepreneurial knowledge

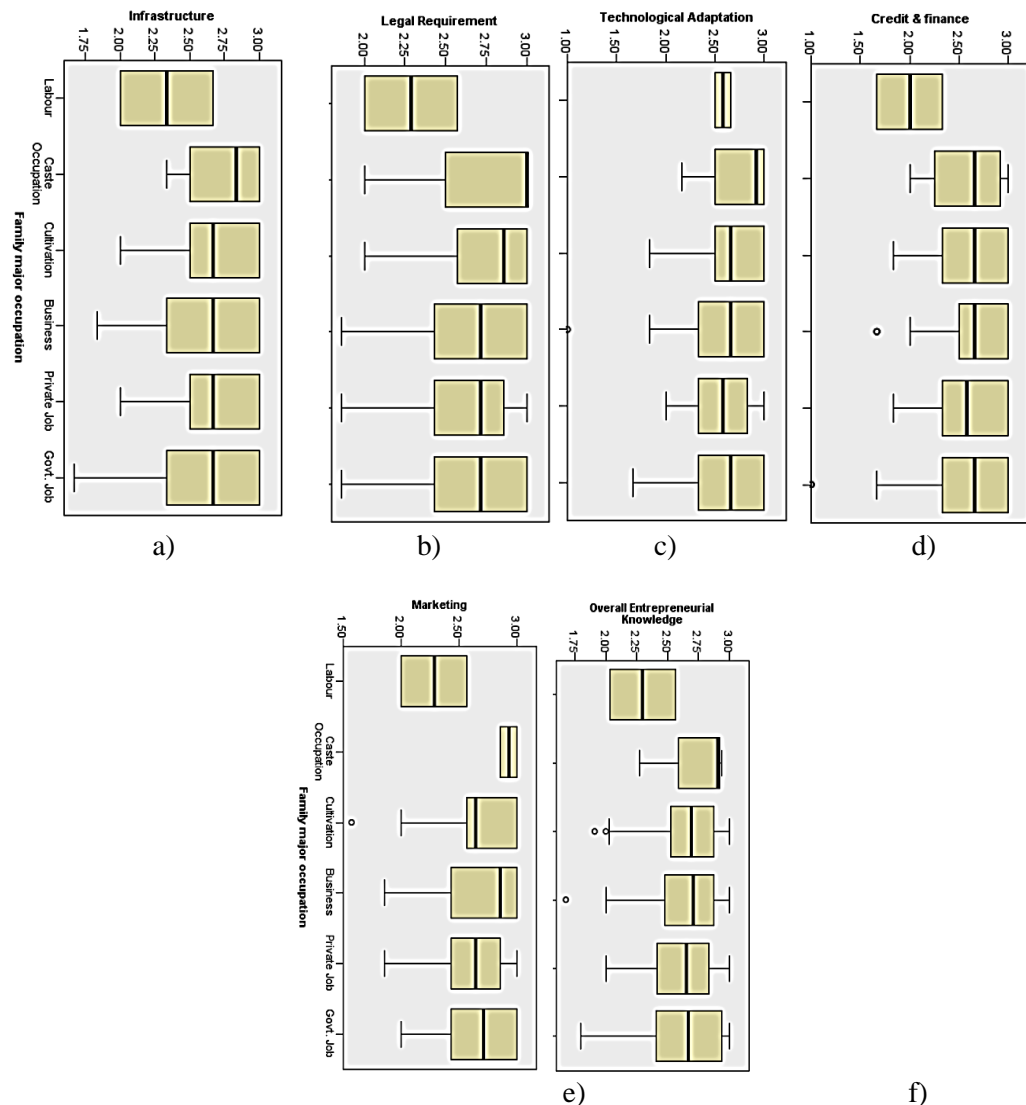


Figure 3: Kruskal-Wallis Test based on Family Major occupation: a) Infrastructure, b) Legal requirement, c) Technological adaptation, d) Credit & Finance, e) Marketing, f) Overall entrepreneurial knowledge

Discussion

The results indicate that agriculture students in Odisha possess varying degrees of entrepreneurial knowledge across different dimensions. Legal Requirements rank highest in terms of average mean score, with the majority of students (80.14%) possessing medium-level knowledge and no students reaching a high level of understanding. This highlights a strong foundational knowledge of legal aspects but also suggests a potential area for further development to achieve higher competency. Marketing knowledge also ranks highly, with 80.67% of students having medium-level knowledge, indicating a well-rounded understanding in this area. However, like Legal

Requirements, no students reached a high knowledge level, which could point to gaps in advanced marketing concepts. In contrast, Technological Adaptation ranks lowest, with a significant portion of students (19.86%) having low knowledge, and only 29.17% reaching high knowledge. This suggests that technological aspects of entrepreneurship might be an area where students are less confident or where educational interventions could be more focused. Infrastructure and Credit and Finance show a more balanced distribution of knowledge levels, with substantial portions of students achieving high knowledge (31.99% and 31.28%, respectively). These areas, while important, do not exhibit the same knowledge gaps as Technological Adaptation. Overall, while most students possess medium-level entrepreneurial knowledge, there is a clear need for enhanced education and resources in specific areas, particularly to elevate students from medium to high knowledge levels. Focusing on advanced concepts in legal requirements, marketing, and technological adaptation could help bridge the gaps identified in this study, ultimately better-preparing students for entrepreneurial challenges in the agricultural sector. Similar findings are reported by Soam *et al.*, (2023).

The correlation analysis indicates that there are generally weak relationships between family background factors and various dimensions of entrepreneurial knowledge among agriculture students in Odisha. The negative correlations observed in some cases suggest that more diverse or complex family backgrounds might slightly reduce students' perceived knowledge in areas such as infrastructure, legal requirements, and overall entrepreneurial knowledge. Nevertheless, these correlations are not strong, indicating that the entrepreneurial knowledge of students in agriculture is not significantly influenced by their family background. This suggests that other factors, such as formal educational programs, availability of resources, or individual drive, may have a greater impact on the development of entrepreneurial skills and knowledge among these students than their family circumstances. Similar results are also obtained by Georgescu and Herman (2020). The weak correlations also imply that interventions aimed at improving entrepreneurial knowledge might not need to focus heavily on family background, but rather on providing equal access to education and resources for all students. Future research could explore other potential factors influencing entrepreneurial knowledge to develop more targeted educational programs and policies.

According to the Mann-Whitney U Test findings, no statistically significant disparity exists between male and female students of agriculture in Odisha regarding various aspects of entrepreneurial knowledge. The analysis shows that both male and female students possess similar levels of understanding and competence in infrastructure, legal requirements, technological adaptation, credit and finance, and marketing. The overall entrepreneurial knowledge, when compared across genders, also reflects no significant disparity.

This lack of significant difference may suggest that the educational environment and exposure to entrepreneurial knowledge are relatively uniform across genders in the study population. It could also indicate that both male and female students have equal access to resources, opportunities, and information regarding entrepreneurship in agriculture. The findings emphasize the importance of continuing to provide equal opportunities and resources for both genders in agricultural education to foster a more inclusive entrepreneurial environment. Additionally, future research could explore other factors that may influence entrepreneurial knowledge, such as socio-economic background,

educational interventions, and regional disparities, to provide a more nuanced understanding of the entrepreneurial capabilities of agriculture students in Odisha.

According to the Kruskal-Wallis Test findings, no statistically significant variations were observed in the entrepreneurial knowledge of agriculture students in Odisha when considering their caste. This lack of significant differences was consistent across all evaluated dimensions, which encompassed Infrastructure, Legal Requirements, Technological Adaptation, Credit and Finance, Marketing, and Overall Entrepreneurial Knowledge. The average rankings across caste groups were found to be similar, with p-values exceeding the 0.05 threshold for statistical significance in all dimensions. This suggests that caste background does not significantly impact these students' entrepreneurial knowledge. These findings suggest that entrepreneurial education and opportunities may be uniformly distributed across different caste groups in Odisha, leading to similar levels of knowledge and understanding. This could be a positive indicator of equitable access to resources and educational content across caste lines. However, it may also imply that other factors, such as socio-economic status, access to mentorship, or regional disparities, could be more influential in shaping entrepreneurial knowledge than caste alone. Subsequent studies could investigate additional variables to obtain a more thorough insight into the factors influencing entrepreneurial knowledge among students of agriculture in Odisha.

According to the Kruskal-Wallis Test findings, no statistically significant variations were observed in the entrepreneurial knowledge among agriculture students in Odisha when examining their families' primary occupations. The p-values exceeded the 0.05 significance level in all dimensions—Infrastructure, Legal Requirements, Technological Adaptation, Credit and Finance, Marketing, and Overall Entrepreneurial Knowledge—showing that family occupation has no discernible impact on students' entrepreneurial knowledge. These findings suggest that entrepreneurial knowledge among agriculture students is consistent regardless of their family's occupational background. This could imply that educational programs and resources related to entrepreneurship are uniformly accessible to students, regardless of their socio-economic background. However, it may also highlight the need to explore other factors that could impact entrepreneurial knowledge, such as individual motivation, access to technology, or regional differences. Further research could help to identify these factors and provide more tailored interventions to enhance entrepreneurial education for agriculture students in Odisha.

Conclusion

The research on the entrepreneurial knowledge of agriculture students in Odisha reveals a varied landscape, with certain strengths and clear areas for improvement. The study indicates that students possess a solid foundation in Legal Requirements and Marketing, with the majority demonstrating medium-level knowledge in these areas. However, the absence of students reaching high knowledge levels in these critical domains suggests the need for more advanced educational interventions to enhance their competency.

Technological Adaptation emerges as a particularly challenging area, with a significant portion of students exhibiting low knowledge. This highlights the importance of focusing educational efforts on improving students' confidence and capability in technological

aspects of entrepreneurship. While Infrastructure and Credit and Finance show more balanced knowledge distributions, the relatively lower scores in Technological Adaptation underscore a critical gap that needs addressing.

The analysis of correlations indicates that students' entrepreneurial knowledge is minimally influenced by their family background. This suggests that other factors, such as formal educational experiences and resource availability, may have a more substantial influence on their entrepreneurial understanding. This finding reinforces the need for educational strategies that provide equal access to resources and opportunities, irrespective of students' familial backgrounds.

Statistical analysis using the Mann-Whitney U Test reveals no notable disparities in entrepreneurial knowledge between male and female students, indicating a consistent educational experience across genders. Likewise, the Kruskal-Wallis Test outcomes show no significant variations based on caste or family occupation, suggesting that entrepreneurial learning and prospects are evenly distributed among these socio-demographic categories.

Overall, the study highlights the necessity of enhancing educational programs to bridge the knowledge gaps identified, particularly in advanced concepts of legal requirements, marketing, and technological adaptation. The uniformity observed across gender, caste, and family occupation groups suggests that educational interventions should focus on content quality and accessibility rather than demographic targeting. Future research could explore additional factors influencing entrepreneurial knowledge, such as socio-economic status, access to mentorship, and regional disparities, to develop more targeted and effective educational policies for agriculture students in Odisha.

References

- Abdelfattah, F., Al Halbusi, H. and Al-Brwani, R.M. (2023). Cognitive style and fostering of technological adaptation drive E-entrepreneurial of new mature businesses. *International Journal of Innovation Studies*, 7(3): 230-243. <https://doi.org/10.1016/j.ijis.2023.04.001>.
- Ardelean, B.O. (2021). Role of technological knowledge and entrepreneurial orientation on entrepreneurial success: A mediating role of psychological capital. *Frontiers in Psychology*, 12: 814733. DOI: <https://doi.org/10.3389/fpsyg.2021.814733>.
- Audretsch, D.B., Heger, D. and Veith, T. (2015). Infrastructure and entrepreneurship. *Small Business Economics*, 44: 219-230. DOI: <https://doi.org/10.1007/s11187-014-9600-6>.
- Besterfield-Sacre, M., Ozaltin, N.O., Robinson, A., Shuman, L., Shartrand, A. and Weilerstein, P. (2013). Factors related to entrepreneurial knowledge in the engineering curriculum. *The Journal of Engineering Entrepreneurship*, 4(1): 31-38. DOI: <https://doi.org/10.7814/jeen5v4p3borssw>.
- Calvo, N., Rodeiro-Pazos, D., Rodríguez-Gulías, M.J. and Fernández-López, S. (2019). What knowledge management approach do entrepreneurial universities need? *Information Systems*, 85: 21-29. DOI: <https://doi.org/10.1016/j.is.2019.06.002>.
- Carayannis, E.G., Popescu, D., Sipp, C. and Stewart, M. (2006). Technological learning for entrepreneurial development (TL4ED) in the knowledge economy (KE): Case

- studies and lessons learned. *Technovation*, 26(4): 419-443. DOI: <https://doi.org/10.1016/j.technovation.2005.04.003>.
- Dangore, P.A., Wakle, P. and Raut, G.A. (2020). Skills level of agriculture technology school students. *Excellent Publishers*, 9(11): 3540-3545. DOI: <https://doi.org/10.20546/ijcmas.2020.911.423>.
- Dauda, M.A. and Esther, G. (2023). Entrepreneurial education as a panacea for national integration and security sustainability in Nigeria: A literature review. *Eurasian Journal of Management & Social Sciences*, 4(1): 56-69. DOI: <https://doi.org/10.23918/ejmss.v4i1p56>.
- Georgescu, M. and Herman, E. (2020). The Impact of the Family Background on Students' Entrepreneurial Intentions: An Empirical Analysis. *Sustainability*, 12 (4775): 1-18. <https://doi.org/10.3390/su12114775>.
- Gilmore, A. and Carson, D. (1999). Entrepreneurial marketing by networking. *New England Journal of Entrepreneurship*, 2(2): 31. DOI: <https://doi.org/10.1108/NEJE-02-02-1999-B004>.
- Karyaningsih, R.P.D. (2020). Does entrepreneurial knowledge influence vocational students' intention? Lessons from Indonesia. *Entrepreneurial Business and Economics Review*, 8(4): 138-155. DOI: <https://doi.org/10.15678/EBER.2020.080408>.
- Laranja, M. and Fontes, M. (1998). Creative adaptation: The role of new technology-based firms in Portugal. *Research Policy*, 26(9): 1023-1036. [https://doi.org/10.1016/S0048-7333\(97\)00057-7](https://doi.org/10.1016/S0048-7333(97)00057-7).
- Neesh, R., Sisodia, S.S., Sharma, F.L., Bairathi, R. and Jain, H.K. (2020). Promotion strategies for development of agriprenurship in Rajasthan. *International Journal of Current Microbiology and Applied Sciences*, 9(3): 2167-2173. DOI: <https://doi.org/10.20546/ijcmas.2020.903.248>.
- Øystein Widding, L. (2005). Building entrepreneurial knowledge reservoirs. *Journal of Small Business and Enterprise Development*, 12(4): 595-612. DOI: <https://doi.org/10.1108/14626000510628252>.
- Plumly Jr, L.W., Marshall, L.L., Eastman, J., Iyer, R., Stanley, K.L. and Boatwright, J. (2008). Developing entrepreneurial competencies: A student business. *Journal of Entrepreneurship Education*, 11: 17.
- Qandah, R., Suifan, T.S., Masa'deh, R.E. and Obeidat, B.Y. (2021). The impact of knowledge management capabilities on innovation in entrepreneurial companies in Jordan. *International Journal of Organizational Analysis*, 29(4): 989-1014.
- Roy, A. and Mukherjee, K. (2017). *Entrepreneurial Education in India*, 2(1): 15-15. DOI: <https://doi.org/10.24999/ijoaem/02010008>.
- Seghers, A., Manigart, S. and Vanacker, T. (2012). The impact of human and social capital on entrepreneurs' knowledge of finance alternatives. *Journal of Small Business Management*, 50(1): 63-86.
- Senapati, R. and Padhi, N. (2020). Assessment of challenges and potential factors of OUAT students for farm-entrepreneurship development. *AkiNik Publications*, 8(2): 993-998. DOI: <https://doi.org/10.22271/chemi.2020.v8.i2o.8897>.
- Siemieniak, P. and Rembiasz, M. (2019). Importance of knowledge in the process of shaping the entrepreneurial attitudes of young people. *MATEC Web of Conferences*, 290: 13010. DOI: <https://doi.org/10.1051/matecconf/201929013010>.

- Soam, S.K., Rathore, S., Yashavanth, B.S., Dhumantaroo, T.R., S., R. and Balasani, R. (2023). Students' Perspectives on Entrepreneurship and Its Intention in India. *Sustainability*, 15(10488): 1-20. <https://doi.org/10.3390/su151310488>.
- Subramanian, T.S.S., Dubey, P. and Singh, A. (2012). Need of promoting entrepreneurship at institution level for engineering students in India. *Proceedings of the 2012 IEEE International Conference on Advanced Communication and Computing Techniques*, 1-3. DOI: <https://doi.org/10.1109/AICERA.2012.6306694>.
- Sutikno, S. (2022). Marketing of bank products through entrepreneurship training and credit financing for entrepreneurs students. *Journal of Management Science (JMAS)*, 5(1): 1-4.
- Thorat, R., Deshmukh, N. and Shriram, M.J. (2021). Knowledge gained by students of commercial vegetable production (ELP) module. *International Journal of Current Microbiology and Applied Sciences*, 10(2): 995-1002. DOI: <https://doi.org/10.20546/ijcmas.2021.1002.117>.
- Tran, Q.N., Phung, T.M., Nguyen, N.H. and Nguyen, T.H. (2024). Financial knowledge matters entrepreneurial decisions: A survey in the COVID-19 pandemic. *Journal of the Knowledge Economy*, 15(1): 2274-2297.
- Wang, Y. (2019). Problems and countermeasures of innovation and entrepreneurship education in agricultural colleges and universities. *Advances in Social Science, Education and Humanities Research*, 336: 1104–1107. DOI: <https://doi.org/10.2991/icsshe-19.2019.267>.

Authors' Declarations and Essential Ethical Compliances

Authors' Contributions (in accordance with ICMJE criteria for authorship)

<i>Contribution</i>	<i>Author 1</i>	<i>Author 2</i>
Conceived and designed the research or analysis	Yes	Yes
Collected the data	Yes	No
Contributed to data analysis & interpretation	Yes	Yes
Wrote the article/paper	Yes	Yes
Critical revision of the article/paper	Yes	Yes
Editing of the article/paper	Yes	No
Supervision	No	Yes
Project Administration	Yes	No
Funding Acquisition	No	No
Overall Contribution Proportion (%)	60	40

Funding

No financial support was received for the research and writing of this article.

Research involving human bodies or organs or tissues (Helsinki Declaration)

The author(s) solemnly declare(s) that this research has not involved any human subject (body or organs) for experimentation. It was not a clinical research. The contexts of human population/participation were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of Helsinki Declaration does not apply in cases of this study or written work.

Research involving animals (ARRIVE Checklist)

The author(s) solemnly declare(s) that this research has not involved any animal subject (body or organs) for experimentation. The research was not based on laboratory experiment involving any kind animal. The contexts of animals were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of ARRIVE does not apply in cases of this study or written work.

Research on Indigenous Peoples and/or Traditional Knowledge

The author(s) solemnly declare(s) that this research has not involved Indigenous Peoples as participants or respondents. The contexts of Indigenous Peoples or Indigenous Knowledge were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or prior informed consent (PIC) of the respondents or Self-Declaration in this regard does not apply in cases of this study or written work.

Research involving Plants

The author(s) solemnly declare(s) that this research has involved the plants for experiment and field studies. Some contexts of plants are also indirectly covered through literature review. Thus, during this research the author(s) obeyed the principles of the Convention on Biological Diversity and the Convention on the Trade in Endangered Species of Wild Fauna and Flora.

Research Involving Local Community Participants (Non-Indigenous) or Children

The author(s) solemnly declare(s) that this research has not directly involved any local community participants or respondents belonging to non-Indigenous peoples. Neither this study involved any child in any form directly. The contexts of different humans, people, populations, men/women/children and ethnic people were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or prior informed consent (PIC) of the respondents or Self-Declaration in this regard does not apply in cases of this study or written work.

(Optional) PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)

The author(s) has/have NOT complied with PRISMA standards. It is not relevant in case of this study or written work.

Competing Interests/Conflict of Interest

Author(s) has/have no competing financial, professional, or personal interests from other parties or in publishing this manuscript. There is no conflict of interest with the publisher or the editorial team or the reviewers.

Attribution and Representation

All opinions and mistakes are the author(s)' own and cannot be attributed to the institutions they represent. The publisher is also not responsible either for such opinions and mistakes in the text or graphs or images.

Rights and Permissions

Open Access. This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

To see original copy of these declarations signed by Corresponding/First Author (on behalf of other co-authors too), please download associated zip folder [Declarations] from the published Abstract page accessible through and linked with the DOI: <https://doi.org/10.33002/nr2581.6853.070308>.