

# AGRIPRENEURIAL POTENTIAL OF UNIVERSITY AGRICULTURAL SCIENCE STUDENTS: OPPORTUNITIES IN AGRI-FOOD SYSTEMS FOR AFRICA'S DEVELOPMENT

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**Abstract.** Africa's higher education institutions must transform to meet evolving economic conditions by fostering agripreneurship among students. This study examined the enterprising tendency of agricultural science students at the University of Education, Winneba (UEW), using the General Measure of Enterprising Tendency version 2 (GET2) framework to assess agripreneurial potential and opportunities for agri-food systems development. A survey of 176 students was conducted using structured questionnaires, with data analysed through frequency, percentage, mean, standard deviation, and two-way multivariate analysis of variance. The findings revealed that 81.3% of the respondents were male, with an average age of  $24.10 \pm 4.19$  years. A significant majority (91.5%) expressed interest in establishing agri-food enterprises, particularly in livestock and crop production, after graduation. Most students (90.9%) demonstrated a moderate level of entrepreneurial tendency. While students exhibited intermediate levels of achievement motivation, creativity, calculated risk-taking, and internal locus of control, their need for autonomy was notably low. These findings highlight the need for targeted interventions to strengthen students' agripreneurial capabilities, particularly by enhancing their autonomy. By implementing tailored training programs, UEW can more effectively prepare its agricultural science students to become successful agripreneurs, contributing significantly to the advancement of Africa's agri-food system.

**Keywords:** agricultural science students, agri-food system, agripreneurship, higher education institutions

## INTRODUCTION

Imagine a future where Africa is not only self-sufficient in food production but also emerges as a global powerhouse in agricultural innovations. This vision is not far-fetched; it lies within the largely untapped potential of university students pursuing agricultural science across the continent. The prospect of entrepreneurship has been a central topic of long-lasting policy discourse in many Sub-Saharan African nations (Agholor et al., 2024). For example, Ghana's commitment to fostering entrepreneurship is demonstrated by the creation of the National Employment Policy, the execution of the National Entrepreneurship and Innovation Plan (NEIP), and the clauses found in the National Medium Term Development Policy Framework (NMTDPF) 2018–2021, which is also known as the Medium-Term Expenditure Framework (MTEF) (Adu et al., 2020). It has been said that entrepreneurship is a universal concept that advances a nation's social and economic development since it

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fosters innovation and competitive markets (Keling et al., 2023). According to Elia et al. (2020), entrepreneurship is the “process of identifying potential business opportunities and exploiting them through the recombination of existing resources or creation of new ones to develop and commercialise new products and services (p. 3).” This definition highlights the importance of process, innovation and creativity behind entrepreneurship. Therefore, entrepreneurship is the creative ability of an individual to recognise an opportunity and then seize it in order to create new value and achieve financial success (McDonagh et al., 2024).

It is worth noting that agricultural food system development is important to the growth of local entrepreneurship because agri-food firms have significant success potential (Chiles et al., 2020). Agripreneurship is therefore seen as a viable strategy for unlocking sustainable development, economic growth, food security, and poverty reduction (Ajekwe and Ibiame, 2020). “Agripreneurship” refers to the application of traditional entrepreneurship concepts and practices to agriculture, and it is a commonly used term to describe entrepreneurship in the context of agriculture (Wale and Chipfupa, 2021). Agripreneurship involves the efficient planning, management, and execution of all aspects of farming operations, including production, marketing, processing, and supply distribution (Agholor et al., 2024). In this paper, we examine the transformative potential of agripreneurship among university agricultural science students in Africa. By harnessing the innovative spirit and knowledge of these students, we explore how they can become catalysts for revolutionising Africa’s agri-food system and advancing sustainable development.

Africa’s agricultural sector faces a myriad of obstacles, ranging from low productivity and high post-harvest losses to restricted market access, insufficient technology development and adoption, and food insecurity (Evans et al., 2018; Balogun, 2022; Ezechi, 2023). However, central to these difficulties lie important opportunities – the agripreneurial potential of university students studying agricultural science. By empowering these students to become agripreneurs, we can not only create economic opportunities but also address pressing issues such as food insecurity and rural poverty (Chiles et al., 2020). In this paper, we explore the concept of agripreneurship and its potential to transform the agri-food system. Next, we examine the role of university agricultural science students as agents of change and

innovation. Finally, we present case studies and examples of successful agripreneurial initiatives led by students, highlighting their impact and potential for scalability.

To begin, the debate centres on the significance of agripreneurship. Notably, agripreneurship contributes two to four times more to poverty alleviation in Sub-Saharan Africa than other economic sectors (Omodanisi et al., 2020). Agriculture’s share of Gross Domestic Product (GDP) on the African continent is 18.2% (Leke et al., 2023), while the sector employs 49% of the labour force (Kuyoro et al., 2023). Agripreneurship is essential as it generates employment, income for rural communities, and provides raw materials for industry (Ikueomonisan and Akinbola, 2021). Given its growing importance in addressing food security, poverty, and inequality, agripreneurship plays a crucial role in Africa (Ajide, 2021). Economies around the world recognise the strategic value of agricultural sectors, leading to sector growth and improved agripreneurship performance (Singh et al., 2023). A focused effort to attract potential investors is warranted, given the contributions made by agripreneurial enterprises to economic development, poverty reduction, and foreign exchange (Agholor et al., 2024).

Young people are critical players in African agriculture. Thus, programmes and policies that improve access to farmland, financial resources and education can considerably contribute to food system transformation (von Braun et al., 2023). Leke et al. (2023) suggest that education and skills development are essential for enabling youth to access opportunities offered by the African food system, including entrepreneurship. Unfortunately, the number of young people pursuing occupations or careers in agriculture is steadily declining (Ray et al., 2022). Universities, with their intellectual resources, can create platforms for students to grow, demonstrate and exercise entrepreneurial leadership in agricultural-related fields for agri-food system transformation (Chiles et al., 2020). While entrepreneurship curricula provide theoretical foundations and ignite students’ entrepreneurial passions, entrepreneurship education imparts practical knowledge and shapes students’ entrepreneurial mindsets (Purwanti et al., 2024). Higher Education Institutions (HEIs) are at the forefront of this effort. HEIs are responsible for developing agricultural curricula in alignment with the African Union’s second ten-year Implementation Plan of Agenda 2063, titled

“the Decade of Acceleration,” which calls for a shift in the profile of agricultural students to embrace agripreneurship (African Union, 2024). There is a strong need for African agricultural HEIs and their partners to reconsider how they train and equip their human capital.

Unfortunately, there is limited information in the literature about the variables influencing agricultural students' desire to pursue agripreneurship in Ghana. Furthermore, to the best of our knowledge, no research has been conducted to investigate the agripreneurial tendencies of students studying agriculture at the state-owned University of Education, Winneba, since the establishment of the Department of Agricultural Science. In addition, there is a lack of research on how students perceive demographic characteristics, education, and the influence of lecturers on their aspirations to become agripreneurs. Several studies have highlighted the potential of agripreneurship among university students and the youth (Chiles et al., 2020; Liu et al., 2020; Yasin et al., 2020; Ikuemonisan and Akinbola, 2021; Ray et al., 2022; Purwanti et al., 2024). In essence, this paper argues that university students studying agricultural science possess immense agripreneurial potential that, if harnessed effectively, can drive the transformation of Africa's agricultural agri-food system and contribute significantly to its overall development. By exploring the opportunities and challenges within the agri-food system and showcasing innovative student-led initiatives, we aim to inspire policymakers, educators, and stakeholders to prioritise and invest in this promising demographic. The general objective of the study was to examine the agripreneurial potential of university agricultural science students using the General Measure of Enterprising Tendency version 2 (GET2) developed by Caird (2013). The objectives of the study were to;

1. examine the general agripreneurial tendency of university agricultural science students;
2. assess the individual agripreneurial characteristics of the university agricultural science students;
3. evaluate the differences in academic levels and sex, and agripreneurial characteristics of agricultural science students.

## THEORETICAL FRAMEWORK

The study was underpinned by Sally Caird's (2013) general measure of enterprising tendency version 2 (GET2), developed in 2013. The GET test has garnered

significant attention globally over the last 20 years due to its potential applications in higher education, research, development and training (da Silva et al., 2019). According to Caird (2013), an “enterprising tendency is defined as the propensity to start up and manage projects (p.5).” Caird further noted that individuals who are highly enterprising tend to initiate projects more often, do so in a more imaginative manner, and prioritise growth. This requires them to be resourceful and adept at managing human, technological, physical and organisational resources (Holienka et al., 2015). The enterprising individual possesses entrepreneurial traits on the basis of which they are known as entrepreneurs (Ghalwash et al., 2017). GET2 recognises that there are various categories of entrepreneurs distinguished by their growth orientation, motivation, type of business, involvement with new technology, association with business owner management, etc. (Jayapriya et al., 2019). Therefore, an enterprising individual might be an entrepreneur, or an ‘intrapreneur’ – someone who works for an organisation – or someone who manages and directs community service projects (Liu et al., 2020)

Caird (2013) notes that the fundamental tenet of GET2 is that the enterprising individual possesses the following essential entrepreneurial traits: motivation (need for achievement and autonomy), creative tendency, calculated risk-taking, and internal locus of control. Need for achievement refers to the drive or motivation to achieve great outcomes by establishing high standards and working to meet them (da Silva et al., 2019). There is a persistent focus on improving performance (Holienka et al., 2015). The strong desire for accomplishment, which manifests as a desire to take the lead, shape and complete projects, is what makes them highly motivated (Caird, 2013). Need for autonomy refers to an individual's ability to determine tasks, deadlines, and methods for carrying out business operations (Caird, 1991). Over time, entrepreneurs may experience varying degrees of autonomy (van Gelderen, 2016). The experience of autonomy is not always guaranteed for entrepreneurs; those who are driven by autonomy must work hard to achieve and preserve it (Jayapriya et al., 2019). The inclination to come up with or recognise ideas, options, or possibilities that could be helpful in solving issues is known as creative tendency (Liu et al., 2020). People must be able to see in new and varied ways to be creative (Pyune, 2015). They are able to generate new ideas for products and processes, such as new technologies,

enterprises, initiatives, organisations, comedies, and artistic outputs, thanks to their inventive nature and drive for success (Caird, 2013).

There are numerous obstacles that entrepreneurs must overcome in their ventures (Holienka et al., 2015). There ought to be several ways to tackle a problem if one arises (da Silva et al., 2019). Each solution must have its own advantages and disadvantages, so the entrepreneur needs to determine which will be most beneficial to the enterprise (Jayapriya et al., 2019). Calculated risk-taking is defined as assessing oneself and seizing the chance, both of which would typically entail some degree of risk (Caird, 2013). Internal locus of control refers to the belief that one's actions, whether positive or negative, are under their control and influenced by factors like attitude, effort and preparation (Caird, 1991). This suggests that they confidently strive to exercise control over life, rely on internal resources, and believe that their success will come from their own hard work and perseverance (Liu et al., 2020).

GET2 has been applied by scholars for assessing the enterprising tendency of students in different contexts (Fernandes Junior et al., 2020; Liu et al., 2020; Yasin et al., 2020; Trotte et al., 2021). Liu et al. (2020) used GET2 to assess the enterprising tendency of Chinese university students. Fernandes Junior et al. (2020) utilised the model to examine enterprising tendency and interpersonal communication among nursing students in a public higher education institution in the city of Sao Paulo, Brazil. Yasin et al. (2020) adopted GET2 to develop exploratory insight into enterprising characteristics of Arab female engineering students in the Sultanate of Oman. Trotte et al. (2021) compared the enterprising tendency of graduating beginner and undergraduate nursing students in Brazil. There are, however, limited studies on the enterprising tendency of agricultural science students in higher education, and their potential for agri-food systems development, especially at the University of Education, Winneba. This study sought to provide evidence to fill this knowledge gap on the agripreneurial potential of agricultural students and the opportunities for agri-food systems development.

## METHODS

### Study Participants

The study participants were agricultural science students from the Department of Agricultural Science Education

at the University of Education, Winneba. The respondents comprised students admitted to the university from the 2021/2022 academic year through the 2023/2024 academic year. The target population consisted of 88 students in Level 100, 78 students in Level 200, and 65 students in Level 300. The student population included all 231 registered agricultural science education students.

### Study design, sampling and sample size

A descriptive survey design was adopted as the research design for the study. The design was utilised to determine the level of agripreneurial tendencies of the agricultural science students at the University of Education, Winneba, at a single point in time (Kesmodel, 2018). The survey design was used to estimate the outcome of the entrepreneurial behaviour of the agricultural science education students in their natural school environment without manipulating the settings (Prince and Das-Munshi, 2020). A census of all 231 agricultural science education students was conducted to measure entrepreneurial tendencies as well as the socio-demographic characteristics of the respondents (VanderStoep and Johnston, 2009). The sampling criteria were decided to include all registered agricultural science students in Levels 100 to 300 who had not received prior entrepreneurial education at the university (Memon et al., 2020).

### Instrument and data collection

A questionnaire was used as the instrument for data collection. The questionnaire was divided into two parts. The first part elicited responses on sociodemographic characteristics of the students, including age, sex, level, willingness to establish agricultural enterprises after graduation, and area of specialisation. Part two was used to measure agricultural science education students' enterprising tendency, adopting the second-generation General Measure of Enterprising Tendency (GET 2) test by Caird (2013). GET2 comprises five dimensions: need for achievement, need for autonomy, creative tendency, calculated risk-taking and internal locus of control. The GET2 contains 54 items in total; students were asked to use a binary scale of "agree" or "disagree" to indicate their agreement with the statements. GET 2 has an equal number of positive and negative items included in the questionnaire (Caird, 2013). The questionnaire was assessed for face and content validity by two entrepreneurship experts in the Department of Agricultural Science Education, University of Education, Winneba. The

experts examined the questionnaire items for appropriateness, clarity, logical coherence, and format to determine face validity (Yusoff, 2019). They evaluated content validity by focusing on multiple elements directly related to comprehensiveness, representativeness, and relevance (Memon et al., 2023). The experts considered the theoretical underpinning when assessing content validity, ensuring that the questionnaire items were based on relevant theory and literature regarding the enterprising tendency of agricultural science students (Caird, 2013). The validated questionnaire was pre-tested with 10 Environmental Health and Sanitation students to help validate and assess the internal consistency of the instrument. International Business Machine-Statistical Package for Social Sciences (IBM-SPSS version 28) software was used to compute the Kuder-Richardson (KR-20) reliability coefficient for the dichotomous enterprising tendency (Azabache et al., 2021). The result of the Kuder-Richardson reliability coefficient of the 54 items was 0.73, implying that 73% of the items in the instrument are reliable with a low standard error (Yun et al., 2023). Copies of the questionnaire were administered to the 231 agricultural science students at the University of Education, Winneba. Before data collection, students were assured of the confidentiality of their responses and anonymity. Data collection was carried out in a friendly and peaceful manner without compulsion; students who declined participation were allowed to exit the study. After one month of data collection, 176 agricultural science students returned their questionnaires, representing a 76% response rate (Baruch and Holtom, 2008).

### Data processing and analysis

Data from the study were processed using IBM-SPSS version 28. Frequencies, percentages, means, standard deviations, and two-way multivariate analysis of variance (MANOVA) were utilised to analyse the data. Socio-demographic characteristics were analysed using frequencies, percentages, means and standard deviations. Similarly, enterprising tendency was analysed using frequencies, percentages, means, and standard deviations. All 54 items of the GET 2 were included in the analysis. Respondents were asked to indicate their agreement or disagreement with each statement. One point was awarded for each positive statement that students agreed with. Likewise, one point was awarded if the students disagreed with a negative statement (Liu et al., 2020). The total score for enterprising tendency was

calculated by summing the points awarded, providing an individual score for each of the entrepreneurial attributes (Keling et al., 2023). Differences in the linear combination of the five GET2 dimensions – need for achievement, need for autonomy, creative tendency, calculated risk-taking, and internal locus of control – in relation to students' level of study and sex were analysed using two-way MANOVA (Huang, 2020).

## RESULTS

### Demographic characteristics

Table 1 presents the demographic characteristics of the agricultural science students at the University of Education, Winneba. The majority of students (81.8%) are male, and most (81.3%) fall within the 20–29 age range. The mean age of the students is  $24.10 \pm 4.19$  years.

**Table 1.** Demographic characteristics of agricultural science students ( $n = 176$ )

| Variables                                     | Sub-groups             | Frequency | Percent |
|-----------------------------------------------|------------------------|-----------|---------|
| Sex                                           | Male                   | 144       | 81.8    |
|                                               | Female                 | 32        | 18.2    |
| Age (years)                                   | Less than 20           | 18        | 10.2    |
|                                               | 20–29                  | 143       | 81.3    |
|                                               | 30–39                  | 13        | 7.4     |
|                                               | 40 and above           | 2         | 1.1     |
| Level of students                             | 100                    | 66        | 37.5    |
|                                               | 200                    | 68        | 38.6    |
|                                               | 300                    | 42        | 23.9    |
| Willing to establish agricultural enterprises | Yes                    | 161       | 91.5    |
|                                               | No                     | 15        | 8.5     |
| Area to specialized                           | Livestock production   | 71        | 44.1    |
|                                               | Crop production        | 53        | 32.9    |
|                                               | Mechanisation services | 15        | 9.3     |
|                                               | Food processing        | 13        | 8.1     |
|                                               | Information delivery   | 4         | 2.5     |
|                                               | Aggregation and sales  | 3         | 1.9     |
|                                               | Input supply           | 2         | 1.2     |

Source: own elaboration.

Regarding academic levels, more than one-third of the students are in Level 100 (37.5%) and Level 200 (38.6%), while nearly one quarter (23.9%) are in Level 300. A significant majority of the respondents (91.5%) expressed willingness to establish agri-food enterprises after graduation. Among those willing to venture into agripreneurship, livestock production was the most preferred area (44.1%), followed by crop-based enterprises (32.9%). Other areas of interest included agricultural mechanisation services (9.3%), and food processing (8.1%).

### General agri-enterprising tendencies of agricultural science students

The general agri-enterprising tendencies of the Agricultural Science students are presented in Table 2. The total score of general enterprising tendency is measured with a maximum score of 54. The total score is categorised as high enterprising tendency with scores between 44 to 54, medium enterprising tendency between 27 to 43, and low enterprising tendency between 0 to 26. Of the 176 respondents, 160, representing 90.9% had medium enterprising tendency in agri-food systems. Holienka et al. (2019) studied enterprising tendency and entrepreneurial characteristics of university students in four different non-business fields (engineering, science of art, sports, and pedagogy) in four Slovakian universities and concluded that students exhibited medium enterprising

tendency. Our result is also similar to that of Liu et al. (2020), which also recorded medium enterprising tendency among Chinese university students. Keling et al. (2023) likewise found medium enterprising tendency among the majority of indigenous Dayak women entrepreneurs in Sarawak, Malaysia. According to Caird (1991), medium enterprising tendency suggests that the students may be enterprising in specific situations and environments because they possess some enterprising traits. The score indicates that the majority of students would be better served by being employed as intrapreneurs within an enterprise as opposed to starting a new enterprise (Caird, 2013). Our results also showed that a total of 15 (8.5%) respondents had low enterprising tendency, while only one student (0.6%) was ranked with high enterprising tendency in agri-food systems. The category of students with low enterprising tendency, according to the GET2, does not seem to be very entrepreneurial in what they do now (Caird, 2013). This implies that they are more likely to be employed or follow the lead rather than take the initiative (Holienka et al., 2015). On the other hand, the student with high enterprising tendency has a high propensity for entrepreneurship. This indicates that the student is inclined to initiate and oversee agri-food projects, whether in their own community, within an employing organisation, or through their own business (Yasin and Khansari, 2021).

**Table 2.** General Enterprising tendencies scores of agricultural science education students ( $n = 176$ )

| Entrepreneurial characteristics | Low<br>(f%) | Medium<br>(f%) | High<br>(f%) | Mean<br>(M ±SD) | Interpretation |
|---------------------------------|-------------|----------------|--------------|-----------------|----------------|
| Need for Achievement            | 41<br>23.3  | 91<br>51.7     | 44<br>25.0   | 8.05 ±1.81      | Medium         |
| Need for Autonomy               | 85<br>48.3  | 65<br>36.9     | 26<br>14.8   | 2.42 ±1.10      | Low            |
| Creative Tendency               | 61<br>34.7  | 103<br>58.5    | 12<br>6.8    | 7.20 ±1.49      | Medium         |
| Calculated Risk – Taking        | 48<br>27.3  | 114<br>64.8    | 14<br>8.0    | 7.36 ±1.61      | Medium         |
| Internal Locus of Control       | 84<br>47.7  | 85<br>48.3     | 7<br>4.0     | 6.80 ±1.51      | Medium         |
| Overall GET                     | 15<br>8.5   | 160<br>90.9    | 1<br>0.6     | 31.82 ±4.25     | Medium         |

Source: own elaboration.

### Individual agri-enterprising characteristics of agricultural science students

When the mean scores of the individual entrepreneurial characteristics of the agricultural science students were assessed, the results showed that apart from the need for autonomy (which students scored low:  $2.42 \pm 1.10$ ), need for achievement ( $8.05 \pm 1.81$ ), creative tendency ( $7.20 \pm 1.49$ ), calculated risking-taking ( $7.36 \pm 1.61$ ), and internal locus of control ( $6.80 \pm 1.51$ ) were rated as medium. The results are consistent with the findings of Yasin et al. (2020), who examined the enterprising tendencies of Arab female undergraduate engineering students in the Sultanate of Oman and found that students showed medium risking taking abilities, followed by creativity, internal locus of control, need for achievement, and low need for autonomy. The results are also similar to the findings of Fernandes Junior et al. (2020) on the enterprising tendencies of nursing students in higher education institutions in São Paulo, Brazil.

Results of need for achievement revealed that 23.3% of the students had low achievement, more than half (51.7%) had medium, and one-fourth (25.0%) had high achievement. This implies that students with high need for achievement have a future orientation towards establishing agri-food enterprises, as they have confidence in their abilities, are optimistic rather than pessimistic, task-oriented, manage time effectively, and are results-driven (Caird, 2013). On the other hand, students with medium need for achievement may prefer working with well-established agri-food enterprises that fit their lifestyles rather than setting up their own agri-food enterprises. Those with low need for achievement may perceive establishing and operating an agri-food enterprise as requiring excessive effort and commitment and may favour taking life at a more even pace (Holienka et al., 2015). Students' need for achievement reflects their aspiration to attain excellence in agri-food systems development by setting high standards and striving to meet them (Jayapriya et al., 2019).

The second entrepreneurial characteristic, need for autonomy, showed that close to half (48.3%) of the respondents had low need for autonomy, more than one-third (36.8%) had medium, while 14.8% were categorised as high. The result mirrors the findings of Fernandes Junior et al. (2020), which examined the enterprising tendency of nursing students and reported that students possessed low need for autonomy. Entrepreneurial autonomy refers to an individual's ability to

determine tasks, set deadlines, and choose methods for carrying out business operations (Caird, 2013). Over time, entrepreneurs may experience varying degrees of autonomy (van Gelderen, 2016). The experience of autonomy is not always guaranteed for entrepreneurs; therefore, those who are driven by autonomy must work hard to achieve and preserve it (Jayapriya et al., 2019). The low need for autonomy reported by the respondents indicates that students are unlikely to appreciate being in control of an agri-food organisation and would prefer to receive guidance on managing it. Da Silva et al. (2019) support this view, noting that a low level of autonomy reflects a preference for working for others rather than for oneself.

In terms of the creative tendency of the respondents, more than one-third (34.7%) had low, close to six in ten (58.5%) had medium, and a few (6.8) had high creative tendency. Our results are similar to those of Liu et al. (2020) and Keling et al. (2023), who both recorded medium creative tendency in entrepreneurial tendency in Asia. It is widely believed among scholars that one of the key traits of an entrepreneur is creativity (da Silva et al., 2019; Yasin et al., 2020). Jayapriya et al. (2019) note that the inclination to come up with or recognise concepts, options or possibilities that could help solve problems is known as creativity. Thus, agricultural science students who are creative must be able to see things in a novel way (Pyune, 2015). However, the respondents in this study with medium creativity are most likely to work on tried and tested agri-food business concepts that are easier to execute, and match their lifestyles (Caird, 2013). Therefore, with appropriate instruction, courses and training, agricultural science students' creative abilities can be enhanced, helping them to recognise agri-food system opportunities often hidden in social interactions (da Silva et al., 2019).

The fourth entrepreneurial characteristic, the ability of the students to take calculated risks, revealed that more than a quarter (27.3%) had low ability, more than six in ten (64.8%) had medium ability, while a few (8.0%) demonstrated high ability. The results indicate that the majority of agricultural science students possess limited strength in taking calculated risks when it comes to agri-food enterprises. This suggests that agricultural science students may prefer partnering with tried and tested enterprises or agri-food business ventures where partners assume all the risks, even if it means giving up some potential rewards (Caird, 2013). Agripreneurs face numerous

challenges in their ventures (Ghalwash et al., 2017). However, an essential quality of agripreneurs is the willingness to take risks (Ajekwe and Ibiameke, 2020). There are usually multiple ways to tackle these issues if they arise (Spector and Kitsuse, 2001). Each of these solutions has its own merits and demerits, which agripreneurs must evaluate to determine the most beneficial one (Eabrasu, 2021). The process of assessing oneself and seizing an opportunity – despite inherent uncertainty – is referred to as taking a calculated risk (Jayapriya et al., 2019). The findings suggest that agricultural science students would prefer working in safer agri-food enterprises rather than engaging in risky activities (Zhao et al., 2020).

The results of the internal locus of control indicated that close to half of the respondents had low (47.7%) and medium (48.3%) internal locus of control, while a few (4.0%) had high internal locus of control. The concept of internal locus of control relates to the capacity of agricultural science students to take hold of an opportunity in an agri-food system and decide whether or not to seize it (Chiles et al., 2020). The outcome of this study indicates that students with medium internal locus of control possess some agripreneurial qualities, but to succeed in agri-food ventures, they may need to work on their self-confidence and enterprising skills (Fagioli and Viganò, 2022). To build their self-confidence, they must develop specific project management or business skills in areas where they feel improvement is needed (da Silva et al., 2019). Without sufficient self-confidence, they might rely too much on partners or clients, which could increase the risk of failure in their agri-food ventures (McDonagh et al., 2024). The group of students with low internal locus of control may have experienced setbacks that have diminished their self-confidence, leading them to question whether effort and character traits alone will enable them to fulfil their ambition of establishing agri-food enterprises (Caird, 1991). These students may hold a more fatalistic view, believing that

fate and luck determine their future more than personal effort (Caird, 2013). Although identifying opportunities demonstrates determination, a lack of initiative might cause these opportunities to fade (Collewaert et al., 2016). It can therefore be inferred that agricultural science students in the low internal locus of control category may not be inclined to make the necessary effort to establish agri-food enterprises after graduation from university (Zhao et al., 2020). This could reflect a lack of self-confidence (Agholor et al., 2024).

### Differences in agripreneurial characteristics of agricultural science students by academic level and sex

Table 3 presents the results of the two-way Multivariate Analysis of Variance (MANOVA) used to examine the differences in the linear combination of the agripreneurial characteristics with respect to the sex and academic level of the students. There were no significant violations identified in the preliminary evaluation of multicollinearity, univariate and multivariate outliers, linearity, and normality. The three-by-two-by-five MANOVA was used to examine the effect of the academic level of the students (Level 100, 200, and 300) and sex (male and female) on the five entrepreneurial characteristics being investigated. The Box's M test was performed to examine the assumption of quality of homogeneity of variance-covariance matrices. The obtained Box's M value of 130.74 indicates that covariance matrices across groups are estimated to be equal [ $F(75,2557.25) = 1.42, p = 0.011$ ]. Statistical significance was established using the Wilks' Lambda criterion. The results indicated that there was no statistical difference between level 100, 200, and 300 students [ $F(10,332.00) = 0.83, p = 0.60, \Lambda w = 0.95, \eta^2 = 0.02$ ] and the linear combination of the five entrepreneurial characteristics, specifically the need for achievement, the need for autonomy, creative tendency, calculated risk taking and internal

**Table 3.** Multivariate Test of level and sex on students' entrepreneurial characteristics ( $n = 176$ )

| Effect    | Criteria      | Value | F    | Hypothesis df | Error df | p. value | Partial $\eta^2$ |
|-----------|---------------|-------|------|---------------|----------|----------|------------------|
| Level     | Wilks' Lambda | 0.95  | 0.83 | 10.00         | 332.00   | 0.60     | 0.02             |
| Sex       | Wilks' Lambda | 0.98  | 0.62 | 5.00          | 166.00   | 0.69     | 0.02             |
| Level*Sex | Wilks' Lambda | 0.98  | 0.62 | 5.00          | 166.00   | 0.69     | 0.02             |

Source: own elaboration.

locus of control. Additionally, male and female agricultural science students did not significantly differ regarding the linear combination of the entrepreneurial characteristics [ $F(5,166.00) = 0.62$ ,  $p = 0.69$ ,  $\Delta w = 0.98$ ,  $\eta^2 = 0.02$ ]. Furthermore, there was no meaningful difference in the interaction between academic level and sex of the students regarding the linear combination of the five entrepreneurial characteristics [ $F(5,166.00) = 0.62$ ,  $p = 0.69$ ,  $\Delta w = 0.98$ ,  $\eta^2 = 0.02$ ].

The results indicate that the agricultural science education students at the University of Education, Winneba, do not differ significantly in their agripreneurial tendencies based on their academic levels, sex, and the interaction between level and sex of the students. The findings imply that the students' academic level, sex, and the interaction of these variables have no significant impact on their need for achievement, autonomy, creative tendency, calculated risk-taking, or internal locus of control. Fernandes Junior et al. (2020) argue that higher education institutions must be cognisant of the traits of prospective students and devise strategies that capitalise on the opportunity to educate more committed professionals who understand their place in society through agri-food system development. Our results, which showed that male and female students did not differ in agripreneurial tendency, align with previous research by Fragozo et al. (2020) and Wu et al. (2022), which studied university students in Portugal, Brazil and Hungary and found that male and female students in those contexts have similar entrepreneurial tendencies. The evidence is, however, inconsistent with earlier studies by Liu et al. (2020) and Franceško et al. (2022), where male students demonstrated stronger entrepreneurial orientation than their female counterparts. Davis et al. (2016) suggested that gender disparities exist in entrepreneurial inclinations and that women graduating from universities are less likely than men to launch new enterprises. Our findings, however, did not support this view, implying that male and female agricultural science students at the University of Education, Winneba, exhibit comparable agripreneurial tendencies and should therefore be treated equally when designing agripreneurial programmes for them. Our findings regarding the lack of significant difference in agripreneurial characteristics by academic level mirror those of Nguyen (2018), who found no difference in academic qualification and entrepreneurial intention among Vietnamese business students.

According to Boudreaux et al. (2022), economic development, and by extension, enterprise and entrepreneurship, are prerequisites for societal well-being. Ghana's commitment to fostering entrepreneurship is reflected in the creation of the National Employment Policy, implementation of the National Entrepreneurship and Innovation Plan (NEIP), and provisions found in the National Medium-Term Development Policy Framework (NMTDPF) 2018–2021 (Adu et al., 2020). Our findings highlight the relevance and potential for enhancing entrepreneurial education and training among undergraduate agricultural science students at the University of Education, Winneba, and across the country, which aligns with these national policies. Fragozo et al. (2020) asserted that students recognise and value entrepreneurship education. Although entrepreneurship curricula do not directly determine students' entrepreneurial intentions (Sanyal and Al Mashani, 2018), they introduce students to the entrepreneurial world and boost their interest and knowledge (Olokundun et al., 2018). These exposures increase their tendency to adopt behaviours like risk-taking, and proactivity in business creation (Adu et al., 2020). The primary aim of entrepreneurship education is to systematically build essential knowledge and conceptual understanding of entrepreneurship (Mohamed & Sheikh Ali, 2021). Students who receive such education feel more confident in their capacity to reflect and evaluate data in order to make sound decisions, owing to the knowledge base and higher-order cognitive skills they acquire (Vijayakumar et al., 2023). To cultivate behavioural control, risk-taking, and proactivity, higher education institutions in agriculture must adopt innovative agripreneurial pedagogies that provide opportunities for social persuasion and hands-on experiences in agri-food systems development (Lyu et al., 2024).

The results highlight the applicability of GET2 for assessing the agripreneurial tendency of agricultural science students. The study provided evidence of the agripreneurial potential of Agricultural Science students in higher education institutions to take advantage of the opportunities offered by agri-food systems for Africa's development. Our results give insights into the areas where higher education institutions can focus on when designing curricula for students in agripreneurial education with specialisation in livestock, crops, mechanisation and food processing agri-food systems. The study focused solely on the agripreneurial tendency of

agricultural science students at the University of Education, Winneba; hence, the findings cannot be fully generalised to the broader student population of the university, which is one of the study's limitations. The results can only be partially generalised to the agricultural science students who participated in the study. Secondly, the self-reported nature of data collection may have induced social biases and inconsistencies linked to the actual behaviour of the students. Thirdly, the small sample size presents an opportunity for extended investigation with a larger sample size that employs a mixed-methods approach to validate the results. The study can also be replicated in other public universities in Ghana that offer agricultural science programmes.

## CONCLUSIONS

This paper presents the findings of a study on agricultural students' potential for agripreneurship, and the opportunity for agri-food systems development, and offers suggestions to curriculum developers in higher education agricultural institutions. The agripreneurial potential of agricultural science students and opportunities for agri-food systems development have implications for higher education agricultural institutions that are responsible for agripreneurial education. Our findings suggest varying agripreneurial potential among agricultural science students, with most exhibiting moderate agripreneurial tendency while some showed low tendency, and only one demonstrating high tendency. At this point, most of the agricultural students are probably not going to start innovative, growth-oriented agri-food enterprises; instead, they may be able to express their agripreneurial skills through volunteer work in the community while gaining skills in school. The majority, however, are willing to initiate agri-food enterprises in livestock, crop production, mechanisation and food processing agri-food systems after graduation from university. Others are not highly entrepreneurial and may prefer seeking employment or supporting others instead of leading. The faculty of the university should develop agripreneurial curricula focusing on activities that can enhance the agripreneurial potential of agricultural science students, especially in livestock, crop production, mechanisation and food processing systems. Our findings also show that most agricultural science students possess a moderate need for achievement, creativity, risk-taking, and internal locus of control, but a low need

for autonomy. The results imply that agricultural science students would prefer 'tried and tested' enterprising ideas that are more straightforward to implement, less risky, and aligned with their knowledge and experience, and with limited necessity to exercise greater control over the advancement of ideas. Agricultural science students with low need for autonomy would favour being counselled about running agri-food enterprises and may not embrace the responsibility of taking control of an enterprise. The faculty should set up a counselling and mentorship programme to help these students build confidence to take charge of responsibilities in the future. All students should be given similar attention since our results show that agricultural science students did not differ by either sex or academic level in the agripreneurial characteristics they possess in terms of need for achievement, autonomy, creativity, risk taking and locus of control.

## REFERENCES

- Adu, I.N., Boakye, K.O., Suleman, A.-R., Bingab, B.B.B. (2020). Exploring the factors that mediate the relationship between entrepreneurial education and entrepreneurial intentions among undergraduate students in Ghana. *Asia Pac. J. Innov. Entrep.*, 14(2), 215–228. <https://doi.org/10.1108/apjie-07-2019-0052>
- African Union (2024). Decade of accelerated implementation: Special Edition for the Launch of the Second Ten-Year Implementation Plan 2024–2033. African Union. Retrieved from: [https://au.int/sites/default/files/newsevents/workingdocuments/43517-wd-Agenda\\_2063\\_Decade\\_of\\_Accelerated\\_Implementation\\_Draft6.pdf](https://au.int/sites/default/files/newsevents/workingdocuments/43517-wd-Agenda_2063_Decade_of_Accelerated_Implementation_Draft6.pdf)
- Agholor, I.A., Chowdhury, A., Olamide, E. (2024). Evaluating inspiring factors and obstacles in the start-up of owned agri-preneurial businesses: Underlying evidence from South Africa. *Admin. Sci.*, 14(3), 47. <https://doi.org/10.3390/admsci14030047>
- Ajekwe, C.C.M., Ibiamke, A. (2020). Entrepreneurship through agriculture in Nigeria. *Bus. Manag. Res.*, 9(1), 35. <https://doi.org/10.5430/bmr.v9n1p35>
- Ajide, F.M. (2021). Entrepreneurship and productivity in Africa: the role of institutions. *J. Sustain. Fin. Invest.*, 12(1), 147–168. <https://doi.org/10.1080/20430795.2021.1939645>
- Azabache, L.H., Ampuero, J.C., Contreras, C.C. (2021). Validity and reliability of a good manufacturing practices checklist for the Agro-Biological Industry. *Rev. Indust. Data*, 24(2), 175–191. <https://doi.org/10.15381/ridata.v24i2.20348>

- Balogun, E.D. (2022). Harnessing Nigeria's huge agricultural potentials for food security: A roadmap. *J. Econ. Pol. Anal.*, 7(1), 1–27. Retrieved from: <http://jepa.unilag.edu.ng/article/view/2051/1600>
- Baruch, Y., Holtom, B.C. (2008). Survey response rate levels and trends in organizational research. *Human Rel.*, 61(8), 1139–1160. <http://dx.doi.org/10.1177/0018726708094863>
- Boudreaux, C.J., Elert, N., Henrekson, M., Lucas, D.S. (2022). Entrepreneurial accessibility, eudaimonic well-being, and inequality. *Small Bus. Econ.*, 59, 1061–1079. <https://doi.org/10.1007/s11187-021-00569-3>
- Caird, S. (1991). Testing enterprising tendency in occupational groups. *Brit. J. Manag.*, 2, 177–186. <https://doi.org/10.1111/j.1467-8551.1991.tb00025.x>
- Caird, S. (2013). General measure of Enterprising Tendency test Other (pp. 1–22). The Open University. <https://doi.org/10.13140/RG.2.1.4243.7520>
- Chiles, R.M., Glenna, L., Sharma, A., Catchmark, J., Azzara, C.D., Maretzki, A. (2020). Agri-food firms, universities, and corporate social responsibility: What's in the public interest? *Renew. Agric. Food Syst.*, 35(2), 158–168. <https://doi.org/10.1017/S1742170518000376>
- Collewaert, V., Anseel, F., Crommelinck, M., De Beuckelaer, A., Vermeire, J. (2016). When passion fades: Disentangling the temporal dynamics of entrepreneurial passion for founding. *J. Manag. Stud.*, 53(6), 966–995. <https://doi.org/10.1111/joms.12193>
- da Silva, S.R., Anunciação, L.F.C., Rubio-Rodríguez, G.A., Guberovic, S.R. (2019). General enterprising tendency (Get) in brazilian taxi drivers: Alternative to unemployment or form of action? *Innovar*, 29(73), 85–98. <https://doi.org/10.15446/innovar.v29n73.78024>
- Davis, M.H., Hall, J.A., Mayer, P.S. (2016). Developing a new measure of entrepreneurial mindset: Reliability, validity, and implications for practitioners. *Consul. Psychol. J.*, 68(1), 21–48. <https://doi.org/10.1037/cpb0000045>
- Eabrasu, M. (2021). Bet against yourself: integrating insurance and entrepreneurship. *J. Instit. Econ.*, 17(6), 959–972. <https://doi.org/10.1017/S1744137421000394>
- Elia, G., Margherita, A., Passiante, G. (2020). Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process. *Technol. Forecast. Soc. Chang.*, 150 (Jan 2019), 119791. <https://doi.org/10.1016/j.techfore.2019.119791>
- Evans, A.A., Florence, N.O., Eucabeth, B.O.M. (2018). Production and marketing of rice in Kenya: Challenges and opportunities. *J. Dev. Agric. Econ.*, 10(3), 64–70. <https://doi.org/10.5897/jdae2017.0881>
- Ezechi, K.C. (2023). Transport, technology, and energy inefficiencies in West Africa's small holder farms: Implications for food security and socio-economic development. *ASRIC J. Soc. Sci. Human.*, 1, 37–53. [https://www.asric.africa/documents/Journal/Journal of Social Sciences 2022 v3-1.pdf#page=44](https://www.asric.africa/documents/Journal/Journal%20of%20Social%20Sciences%202022%20v3-1.pdf#page=44)
- Fagioli, F.F., Viganò, E. (2022). Promoting Tunisian agri-food start-up. A study on the self-efficacy of aspiring entrepreneurs. *New Medit*, 21(1), 75–88. <https://doi.org/10.30682/nm2201e>
- Fernandes Junior, R.B., Santos, J.L.G. dos, Copelli, F.H. da S., Balsanelli, A.P. (2020). Enterprising tendency and interpersonal communication of nursing students. *J. School Nurs.*, 54(e03615), 1–8. <https://doi.org/10.1590/S1980-220X2018056603615>
- Fragoso, R., Rocha-Junior, W., Xavier, A. (2020). Determinant factors of entrepreneurial intention among university students in Brazil and Portugal. *J. Small Bus. Entrep.*, 32(1), 33–57. <https://doi.org/10.1080/08276331.2018.1551459>
- Franceško, M., Nedeljković, J., Njegomir, V. (2022). Attitudes towards work, organizational values, and students' sociodemographic characteristics as predictors of entrepreneurial orientation. *Econ. Res. – Ekon. Istraz.*, 35(1), 799–818. <https://doi.org/10.1080/1331677X.2021.1935288>
- Ghalwash, S., Tolba, A., Ismail, A. (2017). What motivates social entrepreneurs to start social ventures?: An exploratory study in the context of a developing economy. *Soc. Enterp. J.*, 13(3), 268–298. <https://doi.org/10.1108/sej-05-2016-0014>
- Holienka, M., Holienkova, J., Gal, P. (2019). How enterprising are non-business students? *Innov. Manag. Entrep. Sustain. (IMES)*, 279–290. Retrieved from: [https://www.researchgate.net/profile/Marian-Holienka/publication/335773146\\_How\\_enterprising\\_are\\_non-business\\_students/links/5d7a482492851cacdb33ae24/How-enterprising-are-non-business-students.pdf](https://www.researchgate.net/profile/Marian-Holienka/publication/335773146_How_enterprising_are_non-business_students/links/5d7a482492851cacdb33ae24/How-enterprising-are-non-business-students.pdf)
- Holienka, M., Holienková, J., Gál, P. (2015). Entrepreneurial characteristics of students in different fields of study: A view from entrepreneurship education perspective. *Acta Univ. Agric. Silvicult. Mendel. Brunen.*, 63(6), 1879–1889. <https://doi.org/10.11118/actaun201563061879>
- Huang, F.L. (2020). MANOVA: A procedure whose time has passed? *Gift. Child Quart.*, 64(1), 56–60. <https://doi.org/10.1177/0016986219887200>
- Ikuemonisan, E.S., Akinbola, A.E. (2021). Agripreneurship and agricultural labour market: Agripreneurial intentions among undergraduate students in Ondo State, Nigeria. *Europ. J. Agric. Food Sci.*, 3(3), 76–85. <https://doi.org/10.24018/ejfood.2021.3.3.298>
- Jayapriya, R., Malarkodi, M., Anjugam, M. (2019). Entrepreneurial tendency of handloom weavers in the western zone of Tamil Nadu using general enterprising tendency (GET) test. *Int. J. Farm Sci.*, 9(3), 77. <https://doi.org/10.5958/2250-0499.2019.00076.4>

- Keling, W., Yap, C. S., & Ho, P. L. (2023). Enterprising tendency and entrepreneurial performance of indigenous Dayak women entrepreneurs in Sarawak, Malaysia. *J. Enterp. Commun.: People Places Glob. Econ.*, 17(4, 2023), 940–959. <https://doi.org/10.1108/JEC-02-2022-0032>
- Kesmodel, U.S. (2018). Cross-sectional studies – what are they good for? *Acta Obstet. Gynecol. Scand.*, 97(4), 388–393. <https://doi.org/10.1111/aogs.13331>
- Kuyoro, M., Leke, A., White, O., Woetzel, J., Jayaram, K., Hicks, K. (2023). Reimagining economic growth in Africa: Turning diversity into opportunity. Retrieved from: <https://www.mckinsey.com/mgi/our-research/reimagining-economic-growth-in-africa-turning-diversity-into-opportunity#/>
- Leke, A., Ooko-Ombaka, A., Mannya, K., Kassiri, O. (2023). Turning adversity into opportunity: How Africa's evolving demographics could be an asset to its food system. In: J.M. Ulimwengu, J. Njuguna, S. Maina (Eds.), *Empowering Africa's Food Systems for the Future The Alliance for a Green Revolution in Africa (AGRA)* (Iss. 11, pp. 118–128). <https://agra.org/wp-content/uploads/2023/11/AASR-2023.pdf>
- Liu, T., Walley, K., Pugh, G., Adkins, P. (2020). Entrepreneurship education in China: Evidence from a preliminary scoping study university students. *J. Entrep. Emerg. Econ.*, 12(2), 305–326. <https://doi.org/10.1108/JEEE-01-2019-0006>
- Lyu, X., Al Mamun, A., Yang, Q., Aziz, N.A. (2024). Social entrepreneurial intention among university students in China. *Sci. Rep.*, 14(1), 1–20. <https://doi.org/10.1038/s41598-024-58060-4>
- McDonagh, M., Ryan, T., Moran, A., Ryan, L. (2024). A qualitative investigation into perceived barriers experienced by European female agri-food entrepreneurs. *J. Glob. Entrep. Res.*, 14(7), 1–11. <https://doi.org/10.1007/s40497-024-00377-5>
- Memon, M.A., Ramayah, T., Cheah, J.-H., Ting, H., Chuah, F., Cham, T.-H. (2023). Addressing common method bias, operationalization, sampling, and data collection issues in quantitative research: Review and recommendations. *J. Appl. Struct. Equat. Model.*, 7(2), i–xiv. [https://doi.org/10.47263/JASEM.7\(2\)01](https://doi.org/10.47263/JASEM.7(2)01)
- Memon, M.A., Ting, H., Cheah, J.-H., Ramayah, T., Chuah, F., Cham, T.H. (2020). Sample size for survey research: Review and recommendations. *J. Appl. Struct. Equat. Model.*, 4(2), 1–20. Retrieved from: [https://jasemjournal.com/wp-content/uploads/2020/08/Memon-et-al\\_JASEM\\_Editorial\\_V4\\_Iss2\\_June2020.pdf](https://jasemjournal.com/wp-content/uploads/2020/08/Memon-et-al_JASEM_Editorial_V4_Iss2_June2020.pdf)
- Mohamed, N.A., Sheikh Ali, A.Y. (2021). Entrepreneurship education: systematic literature review and future research directions. *World J. Entrep. Manag. Sustain. Dev.*, 17(4), 644–661. <https://doi.org/10.1108/WJEMSD-07-2020-0084>
- Nguyen, C. (2018). Demographic factors, family background and prior self-employment on entrepreneurial intention-Vietnamese business students are different: why? *J. Glob. Entrep. Res.*, 8(10), 1–17. <https://doi.org/10.1186/s40497-018-0097-3>
- Olokundun, M., Moses, C.L., Iyiola, O., Ibidunni, S., Ogbari, M., Peter, F., Borishade, T. (2018). The effect of non traditional teaching methods in entrepreneurship education on students entrepreneurial interest and business start-ups: A data article. *Data Brief*, 19, 16–20. <https://doi.org/10.1016/j.dib.2018.04.142>
- Omodanisi, E.O., Egwakhe, A.J., Ajike, O.E. (2020). Smart agripreneurship: A panacea for food security in Nigeria. *IOSR J. Bus. Manag.*, 22(3), 50–59. <https://doi.org/10.1080/09709274.2009.11906228>
- Prince, M., Das-Munshi, J. (2020). Cross-sectional surveys. In: J. Das-Munshi, T. Ford, M. Hotopf, M. Prince, R. Stewart (Eds.), *Practical Psychiatric Epidemiology* (pp. 127–144). Oxford University Press. <https://doi.org/10.1093/med/9780198735564.003.0009>
- Purwanti, S., Handayani, P., Kusdiyanti, H. (2024). The effect of entrepreneurship education and curriculum on student entrepreneurial intention moderated by student entrepreneurial mindset. *Asian J. Agric. Exten. Econ. Soc.*, 42(5), 68–81. <https://doi.org/10.9734/AJAEES/2024/v42i52415>
- Pyune, J. (2015). On creativity of Asian and American Asian students. In: A. Ursyn (Ed.), *Handbook of Research on Maximizing Cognitive Learning through Knowledge Visualization* (pp. 472–486). IGI Global. <https://doi.org/10.4018/978-1-4666-8142-2.ch016>
- Ray, P., Panigrahi, R.S., Mohapatra, B.P. (2022). Prioritising Agripreneurial Skills Required for Farm Youth: A Fuzzy Analytic Hierarchy Approach. *J. Agric. Sci. Technol.*, 24(3), 567–578. Retrieved from: <https://jast.modares.ac.ir/article-23-51343-en.pdf>
- Sanyal, S., Al Mashani, A.A. (2018). Entrepreneurial intention of University Students in Sultanate of Oman-A Study. *J. Contemp. Trend. Bus. Inform. Technol.*, 5, 16–31. Retrieved from: [https://www.researchgate.net/profile/Shouvik-Sanyal/publication/331674583\\_Entrepreneurial\\_Intention\\_of\\_University\\_Students\\_in\\_Sultanate\\_of\\_Oman-A\\_Study\\_of\\_Dhofar\\_University/links/5c878d91a6fdcc88c39c32c3/Entrepreneurial-Intention-of-University-Students-in](https://www.researchgate.net/profile/Shouvik-Sanyal/publication/331674583_Entrepreneurial_Intention_of_University_Students_in_Sultanate_of_Oman-A_Study_of_Dhofar_University/links/5c878d91a6fdcc88c39c32c3/Entrepreneurial-Intention-of-University-Students-in)
- Singh, V., Faujdar, K., Garg, D.K., Singh, A. (2023). Importance of Agri-entrepreneurship in Indian economy: A Review. *Int. J. Enhanc. Res. Sci.*, 12(6), 2319–7463. Retrieved from: <https://www.researchgate.net/publication/>

- 372496634\_Importance\_of\_Agri-entrepreneurship\_in\_Indian\_economy\_A\_Review#full-text
- Spector, M., Kitsuse, J.I. (2001). *Constructing Social Problems* (1st ed.). Routledge. <https://doi.org/10.4324/9781315080512>
- Trotte, L.A.C., Santos, J.L.G. dos, Sarat, C.F.N., Mesquita, M.G. da R., Stipp, M.A.C., Souza, P. de, Duarte, Q.G. de M., Gobato, B. de C., Lima, C.F. da M. (2021). Entrepreneurial tendency of Nursing students: A comparison between graduating beginners and undergraduate students. *Rev. Lat.-Am. Enfer.*, 29(e3402), 1–9. <https://doi.org/10.1590/1518-8345.4397.3402>
- van Gelderen, M. (2016). Entrepreneurial autonomy and its dynamics. *Appl. Psychol.*, 65(3), 541–567. <https://doi.org/10.1111/apps.12066>
- VanderStoep, S.W., Johnston, D.D. (2009). *Research Methods for everyday life: Blending Qualitative and Quantitative Approaches* (1st ed.). Jossey-Bass of John Wiley & Sons, Inc. [www.josseybass.com](http://www.josseybass.com)
- Vijayakumar, S., Sheik Hameed, N., Shah, A.H., Horizan Prasanna Kumar, S., Ameen, A.S. (2023). Designing effective computerized assessments for promoting higher-order thinking skills in online environments. *Comp.-Assist. Lang. Learn. Elect. J.*, 24(2), 328–352. <https://callegj.org/index.php/journal/article/view/23/20>
- von Braun, J., Ulimwengu, J.M., Nwafor, A., Nhlengethwa, S. (2023). Empowering African food systems for the future. In J.M. Ulimwengu, J. Njuguna, S. Maina (Eds.), *Empowering Africa's Food Systems for the Future. The Alliance for a Green Revolution in Africa (AGRA)* (Iss. 11, pp. 14–26). <https://agra.org/wp-content/uploads/2023/11/AASR-2023.pdf>
- Wale, E., Chipfupa, U. (2021). Entrepreneurship concepts/theories and smallholder agriculture: insights from the literature with empirical evidence from KwaZulu-Natal, South Africa. *Trans. Royal Soc. South Afr.*, 76(1), 67–79. <https://doi.org/10.1080/0035919X.2020.1861122>
- Wu, J., Alshaabani, A., Rudnák, I. (2022). Testing the influence of self-efficacy and demographic characteristics among international students on entrepreneurial intention in the context of Hungary. *Sustainability (Switz.)*, 14(3), 1–21. <https://doi.org/10.3390/su14031069>
- Yasin, N., Khansari, Z. (2021). Evaluating the impact of social enterprise education on students' enterprising characteristics in the United Arab Emirates. *Edu. Train.*, 63(6), 872–905. <https://doi.org/10.1108/ET-04-2020-0076>
- Yasin, N., Khansari, Z., Sharif, T. (2020). Assessing the enterprising tendencies of Arab female undergraduate engineering students in the Sultanate of Oman. *Ind. Higher Edu.*, 43(6), 429–439. <https://doi.org/10.1177/0950422220903618>
- Yun, V.W.S., Ulang, N.M., Husain, S.H. (2023). Measuring the internal consistency and reliability of the hierarchy of controls in preventing infectious diseases on construction sites: The Kuder-Richardson (KR-20) and Cronbach's Alpha. *J. Adv. Res. Appl. Sci. Eng. Technol.*, 1(1), 392–405. <https://doi.org/10.37934/araset.33.1.392405>
- Yusoff, M.S.B. (2019). ABC of Response Process Validation and Face Validity Index Calculation. *Edu. Med. J.*, 11(3), 55–61. <https://doi.org/10.21315/eimj2019.11.3.6>
- Zhao, G., Liu, S., Lopez, C., Chen, H., Lu, H., Mangla, S.K., Elgue-ta, S. (2020). Risk analysis of the agri-food supply chain: A multi-method approach. *Int. J. Prod. Res.*, 58(16), 4851–4876. <https://doi.org/10.1080/00207543.2020.1725684>