EVALUATING THE IMPACT OF SUSTAINABILITY WORKSHOPS, COURSES, AND MENTORSHIP ON GRADUATES' INTENTIONS FOR SUSTAINABLE ENTREPRENEURSHIP IN KATSINA STATE

BY

Zayyana Abdulkadir Rimi & Usman Danjuma Maiwada
Department of Business Informatics, School of Management, Katsina State Institute of Technology & Management (KSITM)
Email: zayyana.abdulkadir@ksitm.edu.ng / usmandanjumamaiwada@gmail.com

Abstract

The burgeoning field of sustainable entrepreneurship has garnered significant interest, particularly in its potential to address environmental and social challenges through innovative business practices. This quantitative study investigates the impact of sustainability-focused workshops, courses, and mentorship on graduates' intentions for sustainable entrepreneurship in Katsina State, Nigeria. A stratified random sample of 367 final-year students from three universities participated in the study. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), the results show significant positive relationships between sustainability education and graduates' intentions for sustainable entrepreneurship. Specifically, participation in sustainability workshops ($\beta = 0.470$, $p = 0.000$), taking sustainability courses ($\beta = 0.121$, $p = 0.003$), and receiving sustainability mentorship ($\beta = 0.390$, $p = 0.000$) significantly influence graduates' intentions. The study's findings support the Theory of Planned Behavior (TPB), highlighting the importance of attitudes, subjective norms, and perceived behavioral control in shaping entrepreneurial intentions. The results have profound implications for practice, policy, and education, emphasizing the need for integrated sustainability education in entrepreneurship curricula, supportive ecosystems, and experiential learning opportunities. The study contributes to the literature on sustainable entrepreneurship, providing empirical evidence on the effectiveness of sustainability education in fostering entrepreneurial intentions among Nigerian graduates. The findings inform policymakers, educators, and entrepreneurs on strategies to cultivate sustainable entrepreneurship, driving innovation, environmental responsibility, and sustainable business development. Future research should build on this study by exploring longitudinal effects, comparative geographical contexts, and in-depth mechanisms to overcome limitations of geographical focus and self-reported data.

Keywords: Entrepreneurship, Sustainability, Education, Graduates & Intentions

Introduction

Entrepreneurship has been a catalyst for innovation and progress throughout history. Entrepreneurs have consistently innovated and improved existing products, services, and business models, often introducing groundbreaking ideas that transform industries. But what ignites their entrepreneurial spirit? Researchers have long been fascinated by the entrepreneurial mindset, seeking to understand what motivates individuals to take the leap and start their own businesses. The inquiry surrounding entrepreneurs focuses on their personality traits, motivations, and decision-making processes, as well as the nature of entrepreneurial endeavors and the essence of entrepreneurship itself (Betáková et al., 2020). Entrepreneurial intentions refer to an individual's conscious decision and commitment to start a new business or venture (Khaw et al., 2023`; Tomy & Pardede, 2020). It is indeed a mental state that precedes the actual startup process, involving a willingness to act, allocate resources, and assume risk to pursue an entrepreneurial opportunity. Individuals undertake entrepreneurship for a variety of complex reasons, including the pursuit of profit (Baluku, 2017; Barkema et al., 2024), personal fulfillment (Dencker et al., 2021), and independence (Osadolor et al., 2021), with many also driven by a desire to exploit potential opportunities or out of necessity (Jafari-Sadeghi, 2020; Osadolor et al., 2021).

As the world shifts towards a more sustainable and environmentally conscious future, entrepreneurs are playing a vital role in driving this transformation through innovative and impactful ventures that prioritize both profit and purpose. Sustainable entrepreneurship has emerged as a key driver of progress, with entrepreneurs increasingly motivated to create businesses that not only generate financial returns but also address pressing social and environmental challenges (Schaltegger & Wagner, 2011; Sołoducho-Pelc, 2020). This shift in entrepreneurship requires new skills and knowledge, such as impact measurement and sustainable business modeling, which can be provided through sustainability workshops, courses, and mentorship. Sustainable entrepreneurs are revolutionizing traditional business practices by replacing them with innovative social and environmental products and services, playing a vital role in transitioning towards a more sustainable future (Lüdeke-Freund, 2020). This shift in entrepreneurship requires new skills and knowledge, such as impact measurement and sustainable business modeling, to align social, economic, and ecological objectives. To support this transition, sustainability workshops, courses, and mentorship programs can provide the necessary tools and expertise for entrepreneurs to succeed in this new paradigm.

Research has shown that sustainable entrepreneurship competence significantly impacts entrepreneurial intentions (Joensuu-Salo et al., 2022), and universities play a crucial role in supporting entrepreneurial intentions toward sustainability (Betáková et al., 2020). Additionally, subconscious goals, subjective motivations, and personality traits influence sustainable entrepreneurs' behavioral intentions (Arru, 2020). Universities' partnerships with other institutions can also positively impact students' sustainable entrepreneurship intentions (Tehseen & Haider, 2021). Furthermore, perceived capability, social perception, and individual competencies affect rural women's sustainable entrepreneurial intention (Polas et al., 2022). Nevertheless, there is a gap in the literature regarding the specific impact of sustainability workshops, courses, and mentorship on graduates' perceptions and intentions for sustainable entrepreneurship, particularly in the context of Katsina State. This study therefore, aims to address this gap by evaluating the impact of sustainability workshops, courses, and mentorship programs on graduates' perceptions and intentions for sustainable entrepreneurship in Katsina State. Specifically, the study seeks to investigate the effectiveness of sustainability education and mentorship programs in promoting sustainable entrepreneurship among graduates, and to identify the key factors that influence graduates' intentions to pursue sustainable entrepreneurship. By addressing the gap in the literature, this study aims to provide insights into the role of sustainability education and mentorship in shaping the perceptions and intentions of graduates towards sustainable entrepreneurship, and to inform the development of effective sustainability education and mentorship programs in the State.

Literature Review

As the world grapples with the challenges of climate change, social inequality, and economic instability, sustainable entrepreneurship has emerged as a vital strategy for creating a more equitable and environmentally conscious economy. In Nigeria, where the demand for sustainable entrepreneurship is on the rise, this literature review aims to synthesize the existing knowledge on the effectiveness of sustainability workshops, courses, and mentorship programs in shaping graduates' perceptions and intentions for sustainable entrepreneurship.

Graduates' Perceptions and Intentions for Sustainable Entrepreneurship

Graduates' perceptions and intentions for sustainable entrepreneurship are crucial in shaping the future of sustainable development. Sustainable entrepreneurship refers to the process of creating and managing a business that prioritizes environmental sustainability, social responsibility, and economic viability (Nguyen et al., 2023; Rosário et al., 2022). It involves creating and managing businesses that prioritize economic, social, and environmental sustainability, aligning with the triple bottom line approach of balancing profit, people, and the planet. This innovative business model focuses on long-term impact, stakeholder engagement, and ethical practices, aiming to address societal and environmental challenges while achieving financial success (Kujala et al., 2022). Examples include renewable energy companies, social enterprises, and producers of eco-friendly products, all contributing to positive social impact, environmental protection, and economic resilience (Kumar et al., 2024; Sarma & Sharma,

2024). Despite challenges like initial costs and regulatory hurdles, sustainable entrepreneurship offers a competitive advantage and supports a sustainable and equitable world (Di Vaio et al., 2022). This concept has gained significant attention in recent years due to its potential to address global challenges such as climate change, poverty, and inequality. The importance of sustainable entrepreneurship cannot be overstated. It has the potential to drive innovation, create jobs, and promote sustainable development (Ghobakhloo et al., 2021). Sustainable entrepreneurship can contribute to the achievement of the United Nations' Sustainable Development Goals (SDGs) (United-Nations, 2019), particularly Goal 8, which focuses on promoting inclusive and sustainable economic growth, employment, and decent work for all. Moreover, sustainable entrepreneurship can help address pressing global challenges such as climate change, poverty, and inequality by promoting the development of sustainable products, services, and business models (Bocken, 2020; Shahid et al., 2023). By embracing sustainable entrepreneurship, graduates can become part of the solution to these global challenges, creating a positive impact on society and the environment while also generating economic value. Additionally, sustainable entrepreneurship can provide graduates with a sense of purpose and fulfillment, as they work towards creating a more sustainable and equitable future.

Despite its importance, the current state of sustainable entrepreneurship among graduates is a concern. Research has shown that many graduates lack the necessary knowledge, skills, and attitudes to engage in sustainable entrepreneurship (Ashari et al., 2021; Rosário et al., 2022). This knowledge gap is attributed to the limited inclusion of sustainability and entrepreneurship education in academic curricula (Banha et al., 2022). Furthermore, graduates often prioritize traditional career paths over sustainable entrepreneurship due to perceived barriers such as limited job opportunities, lack of support, and insufficient resources (Di Vaio et al., 2022; Mainga et al., 2022). Additionally, some graduates may not see sustainable entrepreneurship as a viable career option due to misconceptions about the field or lack of exposure to successful sustainable entrepreneurs (Burden & Sprei, 2021). Addressing these challenges is crucial to unlocking the potential of sustainable entrepreneurship among graduates and promoting a more sustainable future.

Sustainability Workshops, Courses, and Mentorship

Sustainability workshops, courses, and mentorship programs are educational initiatives that aim to promote sustainable entrepreneurship by equipping individuals with the knowledge, skills, and attitudes necessary to develop and implement sustainable business practices. These programs can be categorized into sustainability-focused entrepreneurship education, sustainable entrepreneurship training, and mentorship programs (Rosário & Raimundo, 2024). While sustainability-focused entrepreneurship education teaches students how to develop and launch sustainable businesses, sustainable entrepreneurship training provides practical skills for implementing sustainable business practices. Mentorship programs, on the other hand, pair experienced mentors with sustainable entrepreneurs, offering guidance, support, and valuable industry insights to help them navigate the challenges of starting and growing a sustainable business. Researches have consistently shown that sustainability education and mentorship programs are effective in promoting sustainable entrepreneurship (Hermann & Bossle, 2020; Hsu & Pivec, 2021). These programs can increase participants' knowledge and awareness of sustainability issues, enhance their entrepreneurial skills and attitudes, and encourage the development of sustainable business ideas (Hermann & Bossle, 2020). Moreover, mentorship programs can provide participants with valuable guidance, support, and networking opportunities, which are essential for successful sustainable entrepreneurship (Elliott et al., 2020).

Effective sustainability workshops, courses, and mentorship programs share certain key components and characteristics. These include a clear focus on sustainability, hands-on learning experiences, interdisciplinary approaches, and collaboration with industry partners (Strachan et al., 2023). Additionally, effective programs often incorporate experiential learning, case studies, and project-based learning to enhance participants' learning outcomes (Bramwell-Lalor et al., 2020; Singha & Singha, 2024). In other words, successful programs often feature expert guidance and support from experienced instructors, mentors, or coaches who can help participants navigate the challenges of sustainable entrepreneurship (Rance, 2024). Studies have consistently highlighted the significance of

program design and delivery in ensuring the effectiveness of sustainability education and mentorship programs in promoting sustainable entrepreneurship among graduates. Geesa et al. (2022), emphasize the need for programs to be tailored to meet the needs and interests of participants, while Hieker and Rushby (2020) stress the importance of regular evaluation and improvement to ensure programs remain relevant and effective. Wagner et al. (2021) found that interactive and engaging program delivery is crucial for promoting sustainable entrepreneurship, and Žalėnienė and Pereira (2021) identified the importance of program accessibility in reaching a wider audience. Hairon et al. (2020), highlighted the role of experienced instructors and mentors in ensuring program effectiveness. These studies collectively emphasize the importance of well-designed and well-delivered sustainability education and mentorship programs in promoting sustainable entrepreneurship among graduates in Katsina State. Hence, the following objectives and hypotheses in null form were formulated respectively:

Research Objectives

i. To investigate if participation in sustainability workshops significantly effects final year students' intentions for sustainable entrepreneurship.

ii. To determine if taking sustainability courses have any significant effect on final year student's intentions for sustainable entrepreneurship.

iii. To discover if receiving sustainability mentorship have any significant effect on final year student's for sustainable entrepreneurship.

Research Hypotheses

H1: Participation in sustainability workshops will have no significant effect on final year student's intentions for sustainable entrepreneurship.

H2: Taking sustainability courses will have no significant effect on final year student's intentions for sustainable entrepreneurship.

H3: Receiving sustainability mentorship will have no significant effect on final year student's intentions for sustainable entrepreneurship.

Theoretical Framework

The theoretical framework for this study is the Theory of Planned Behavior (TPB), proponent by (Ajzen, 1991). This framework is based on the idea that attitudes, subjective norms, and perceived behavioral control influence individuals' intentions and behaviors. The TPB is relevant to this study as it helps to understand graduates' intentions to engage in sustainable entrepreneurship, and how sustainability workshops, courses, and mentorship can influence their perceptions and intentions. The TPB suits this study as it provides a comprehensive understanding of the psychological factors that drive individuals' behavior, and how external factors such as education and mentorship can shape their intentions (Okagbue et al., 2022). Through TPB, this study can investigate how sustainability education and mentorship can positively influence graduates' attitudes, subjective norms, and perceived behavioral control, ultimately shaping their intentions to pursue sustainable entrepreneurship. The TPB provides a suitable basis for this study as it has been widely used in entrepreneurship and education researches, and its application in this context can provide valuable insights into the effectiveness of sustainability education and mentorship programs in promoting sustainable entrepreneurship among graduates in the state.

Research Methodology

This quantitative study investigates the impact of sustainability-focused workshops, courses, and mentorship on final-year students' perceptions and intentions towards sustainable entrepreneurship in Katsina State, 2024. A stratified random sample of 367 students was selected from three universities: Umaru Musa Yaradua University (UMYU) with 2,503 students, Federal University Dutsinma (FUDMA) with 4,530 students, and Alqalaam University with 860 students. The sample allocation was: UMYU (2,503 students, n=116), FUDMA (4,530 students, n=211), and Alqalaam University (860 students, n=40). The sample size was determined using the Rasoft calculator. The items in the constructs were adapted from related previous studies. Data was collected using a structured questionnaire with 6-point Likert scale items and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via Smart PLS version 4. The study assesses constructs' reliability, validity, effect size, and predictive relevance to examine relationships between sustainability-focused education and entrepreneurial intentions.

Data Analysis

This study surveyed 367 final-year students from three Katsina State universities, receiving 328 usable responses. The data was analyzed using Partial Least Squares Path Modeling (PLS-SEM) to test the hypothesis, a components-based Structural Equation Modeling (SEM) technique that offers advantages over ordinary least squares regression. PLS-SEM consists of a measurement model, which examines relationships between sustainability-focused education and entrepreneurial intentions between sustainability-focused education and entrepreneurial intentions (Hair et al., 2021). PLS-SEM's measurement model assessed latent variable relationships, while the structural model investigated relationships between latent variables (Hair, Sarstedt, & Ringle, 2021). Additionally, this approach is well-suited for social science research, and where data often deviate from normality, as it can effectively accommodate non-normal data, making it an ideal choice for this study (Cain et al., 2017; Hair et al., 2017; Knief & Forstmeier, 2021).

Measurement Model

PLS-SEM employs a two-stage evaluation process for the measurement model, ensuring the reliability and validity of construct measures. Initially, the reliability of measures is assessed, followed by an examination of construct validity in the second stage (Hair et al., 2021; Sarstedt et al., 2021). This rigorous two-stage approach guarantees the measurement model's accuracy and consistency, which is vital for deriving meaningful conclusions in PLS-SEM analyses.

Construct's Validity and Reliability

The internal consistency analysis reveals satisfactory reliability across all constructs, with Cronbach's Alpha (α) and Composite Reliability (ρc) values exceeding 0.7, indicating good reliability (Sarstedt et al., 2021; Sürücü & Maslakçi, 2020). Specifically, Participation in Sustainability Workshops (PSW) shows $\alpha = 0.766$ and $\rho c = 0.792$, Taking Sustainability Courses (TSC) displays $\alpha = 0.830$ and $\rho c = 0.854$, Receiving Sustainability Mentorship (RSM) exhibits $\alpha = 0.881$ and $\rho c = 0.888$, and Graduates' Intentions for Sustainable Entrepreneurship (ISE) presents $\alpha = 0.799$ and $\rho c = 0.814$. These values demonstrate high internal consistency, suggesting that the items within each construct measure the same underlying concept. Additionally, the item loadings range from 0.705 to 0.934, further supporting the constructs' reliability. This confirms that the measurement instruments are consistent and trustworthy, allowing for confident analysis and interpretation of the data.

Table 1:

Loading Internal Consistency and AVE

Items	Loadings	Cronbach's Alpha	Composite Reliability (rho_a)	Average Variance Extracted (AVE)

ISE1	0.805	0.799	0.814	0.625
ISE2	0.855			
ISE3	0.716			
ISE5	0.780			
PSW1	0.752	0.766	0.792	0.588
PSW2	0.854			
PSW3	0.736			
PSW4	0.716			
RSM2	0.911	0.881	0.888	0.809
RSM4	0.852			
RSM5	0.934			
TSC2	0.705	0.830	0.854	0.662
TSC3	0.870			
TSC5	0.821			
TSC6	0.850			

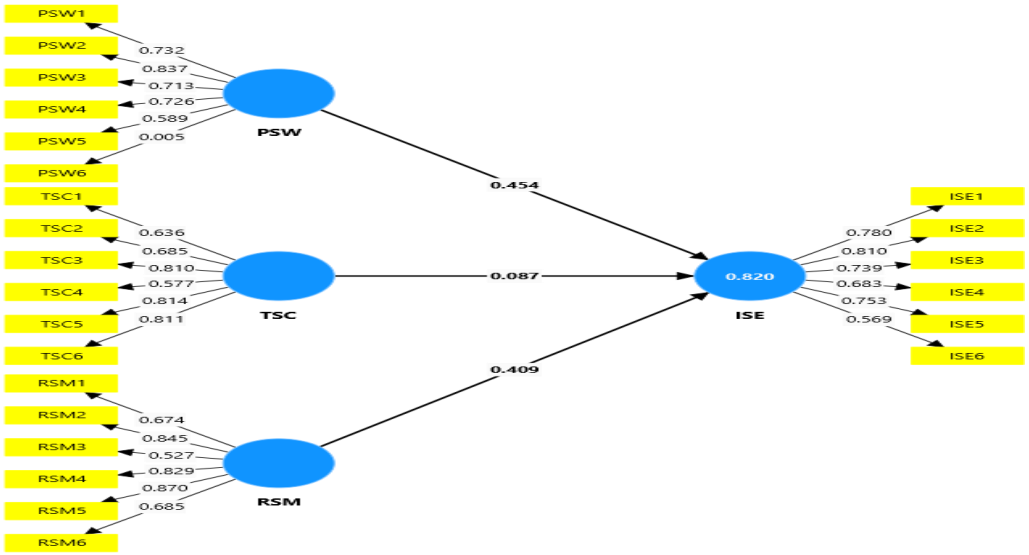

Figure 1: Initial Measurement Model

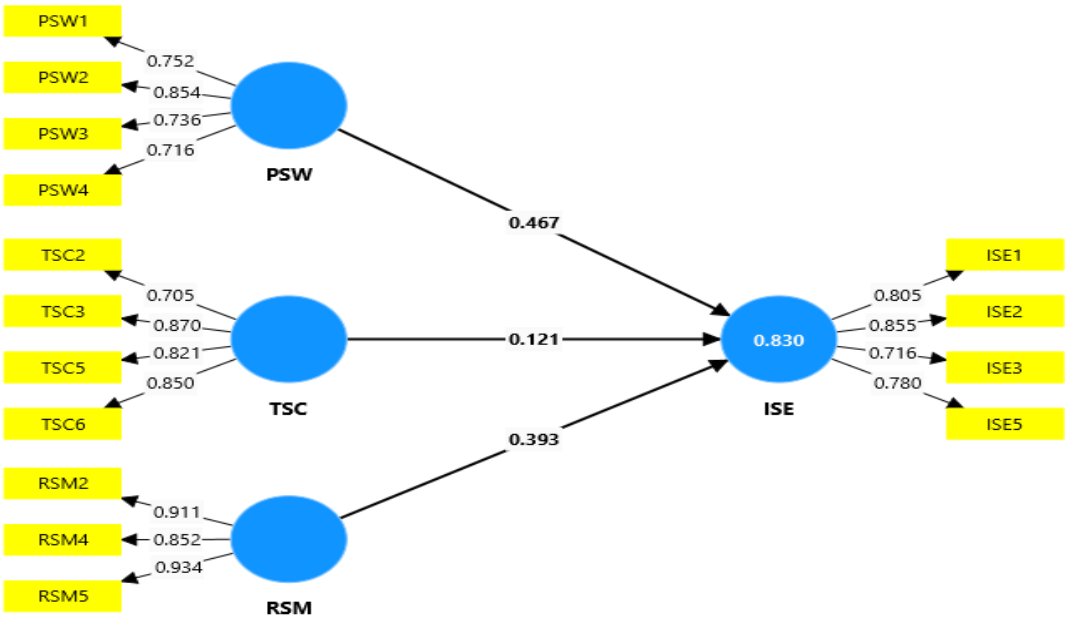

Figure 2: Revised Measurement Model

Discriminant validity

The study exhibits robust validity, demonstrating both convergence and discriminant validity. Item loadings (0.705-0.934) and Average Variance Extracted (AVE) values (0.588-0.809) in Table 1 above, surpass recommended thresholds, indicating well-defined constructs and accurate measurement. Additionally, the Fornell and Larcker (1981) criterion (Table 2) confirms discriminant validity, as the square root of AVE values (ISE: 0.790, PSW: 0.868, RSM: 0.899, TSC: 0.814) exceeds inter-construct correlations, distinguishing between sustainability-focused education's dimensions. The Heterotrait-monotrait ratio (HTMT) matrix (Table 3) shows values below the threshold of 0.90, confirming discriminant validity between constructs (Henseler et al., 2015). Overall, this suggests that each construct captures unique variance, supporting the study's measurement model and distinguishing between sustainability-focused education's dimensions: Graduates' Intentions for Sustainable Entrepreneurship (ISE), Participation in Sustainability Workshops (PSW), Receiving Sustainability Mentorship (RSM), and Taking Sustainability Courses (TSC).

Table 2:

Fornell-Larcker Criterion

	ISE	PSW	RSM	TSC
ISE	0.790			
PSW	0.868	0.767		
RSM	0.865	0.822	0.899	
TSC	0.708	0.643	0.729	0.814

Table 3:
Heterotrait-Monotrait Ratio (HTMT) – Matrix

	ISE	PSW	RSM	TSC
ISE				
PSW	0.870			
RSM	0.715	0.896		
TSC	0.836	0.774	0.825	

Structural Model

This study employed a Partial Least Squares (PLS) approach to analyze the research model, leveraging its capabilities in handling complex structures. The analysis utilized the PLS algorithm for R^2 value calculation, bootstrapping for path coefficient significance testing, Q^2 values for predictive relevance assessment, and effect size (f^2) analysis for practical significance evaluation (Chin, 1998). The PLS approach was selected due to its effectiveness in managing multiple constructs and indicators, providing reliable path coefficient and R^2 estimates (Hair et al., 2021), ensuring a rigorous and comprehensive assessment of the research model. Through combining these analytical techniques, this study ensured a comprehensive evaluation of the research model.

R^2 and Confidence Intervals

The results show a strong explanatory power of the model, with an R-square value of 0.830 and adjusted R-square of 0.829 for the endogenous latent variable, Graduates' Intentions for Sustainable Entrepreneurship (ISE). The bootstrapping analysis reveals significant positive relationships between ISE and its predictors: Participation in Sustainability Workshops (PSW) ($\beta = 0.470$, CI: 0.366-0.569), Receiving Sustainability Mentorship (RSM) ($\beta = 0.390$, CI: 0.266-0.514), and Taking Sustainability Courses (TSC) ($\beta = 0.121$, CI: 0.042-0.200). The narrow confidence intervals and minimal bias values indicate robust estimates, confirming the statistical significance and practical relevance of these relationships in predicting ISE.

Table 4:

Coefficient of Determination R2

Endogenous Latent Variable	R-square	R-square adjusted
ISE	0.830	0.829

Table 5:
Confidence Intervals

	Original sample (O)	Sample mean (M)	Bias	2.5%	97.5%
PSW -> ISE	0.470	0.468	-0.001	0.366	0.569
RSM -> ISE	0.390	0.393	0.003	0.266	0.514
TSC -> ISE	0.121	0.119	-0.002	0.042	0.200

Hypothesis Test

The Table 6 results decisively reject the study's null hypotheses raised above, confirming significant positive relationships between sustainability education and graduates' intentions for sustainable entrepreneurship. Specifically, Participation in Sustainability Workshops (PSW) ($\beta = 0.470$, $p = 0.000$), Taking Sustainability Courses (TSC) ($\beta = 0.121$, $p = 0.003$), and Receiving Sustainability Mentorship (RSM) ($\beta = 0.390$, $p = 0.000$) all demonstrate statistically significant effects on Graduates' Intentions for Sustainable Entrepreneurship (ISE), thereby refuting H1, H2, and H3. The findings of this study, reject all the null hypotheses, and resonate with existing literature emphasizing the positive impact of sustainability-focused education on graduates' intentions for

sustainable entrepreneurship. Specifically, the significant relationships between Participation in Sustainability Workshops (PSW), Taking Sustainability Courses (TSC), Receiving Sustainability Mentorship (RSM), and Graduates' Intentions for Sustainable Entrepreneurship (ISE) corroborate research highlighting the effectiveness of sustainability education in fostering entrepreneurial intentions (Agu et al., 2021). This study has consistently shown that exposure to sustainability education can enhance graduates' awareness, knowledge, and skills necessary for sustainable entrepreneurship (Betáková et al., 2020; Di Vaio et al., 2022; Shahid et al., 2023). It also highlighted that participation in sustainability workshops, for instance, provides hands-on experience and networking opportunities that cultivate entrepreneurial mindsets (DeCoito & Briona, 2023; Pacher & Glinik, 2024). Similarly, taking sustainability courses and receiving mentorship guidance can equip graduates with the necessary tools and expertise to navigate sustainable business practices (Ashari et al., 2021; Boldureanu et al., 2020).

Table 6:

Path coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
PSW -> ISE	0.470	0.468	0.052	9.059	0.000
RSM -> ISE	0.390	0.393	0.064	6.042	0.000
TSC -> ISE	0.121	0.119	0.040	2.999	0.003

Effect Size (f^2) and Predictive Relevance Q^2

The analysis reveals meaningful effect sizes and predictive relevance for the relationships between sustainability education and graduates' intentions for sustainable entrepreneurship (ISE). Specifically, PSW has a large effect size ($f^2 = 0.411$), indicating a substantial impact on ISE. While RSM exhibits a medium effect size ($f^2 = 0.233$); suggesting a moderate influence, in contrast, TSC has a small effect size ($f^2 = 0.040$), indicating a relatively limited impact. Furthermore, the predictive relevance analysis shows strong results: $Q^2 = 0.823$ and $Q^2predict = 0.425$ indicate the model's excellent predictive power for ISE. The relatively low Root Mean Square Error (RMSE = 0.311) and Mean Absolute Error (MAE) values reinforce the model's accuracy. These findings demonstrate that sustainability education, particularly workshops and mentorship, significantly contributes to fostering graduates' intentions for sustainable entrepreneurship, underscoring the importance of integrating these programs into academic curricula.

Table 7:

The Level of Effect Size (f^2)

Relationship	f-square	Decision
PSW -> ISE	0.411	Large effect
RSM -> ISE	0.233	Medium effect
TSC -> ISE	0.040	Small effect

Table 8:

Predictive Relevance Q^2

	Q^2predict	RMSE	MAE
ISE	0.823	0.425	0.311

Discussion of Findings

Building on the findings that sustainability-focused education significantly influences graduates' intentions for sustainable entrepreneurship (ISE), the study underscores the significance of sustainability-focused education in shaping graduates' intentions for sustainable entrepreneurship, aligning with the Theory of Planned Behavior (TPB). Attitudes, subjective norms, and perceived behavioral control – key TPB components – were influenced by participation in sustainability workshops (PSW), taking sustainability courses (TSC), and receiving sustainability mentorship (RSM). These educational interventions cultivated positive attitudes, fostered a supportive community, and enhanced graduates' confidence in developing sustainable business strategies. The study's findings also have profound implications for practice, necessitating a collaborative effort from both federal and state governments as policymakers, educators, and entrepreneurs to cultivate sustainable entrepreneurship. Policymakers and educators should prioritize integrating sustainability education into entrepreneurship curricula, ensuring graduates acquire practical skills and knowledge through funded workshops, courses, and mentorship programs. Institutions can establish incubators and accelerators to support sustainable ventures, while governments incentivize exemplary programs through soft loans and grants. Meanwhile, entrepreneurs should seek sustainability education, network strategically with sustainable business leaders, and integrate environmental responsibility into their operations. By adopting this comprehensive approach, practitioners can foster a new generation of sustainable entrepreneurs, driving innovation, environmental responsibility, and sustainable business development.

Recommendations:

Based on the study's findings, the following recommendations are proposed:

i. Integrate sustainability education into entrepreneurship curricula.
ii. Establish supportive ecosystems for sustainable entrepreneurship among graduates.
iii. Promote experiential learning and mentorship relationship that will foster entrepreneurial intentions.
iv. Encourage entrepreneurial networking and collaboration among Nigerian graduates.

Limitation and Direction for Future Research

The study's limitations include its geographical focus on Katsina State, Nigeria, and reliance on self-reported data, which may limit generalizability. Additionally, the study's cross-sectional design precludes causal inferences. Future research should address these limitations by exploring longitudinal effects of sustainability education on entrepreneurial outcomes, tracking graduates' progress over time; or comparative studies across diverse geographical and cultural contexts to assess the transferability of sustainability education's impact; or lastly an in-depth, qualitative investigations of sustainability education's mechanisms, examining how specific workshop, course, and mentorship components influence entrepreneurial intentions and behaviors.

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