Journal of Information Systems Engineering and Management
2025, 10(32s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

The Antecedents of Eco-Entrepreneurial Intentions and Eco-Entrepreneurial Behaviour: THE Moderating Role of Entrepreneurship Education

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ARTICLE INFO

Received: 24 Dec 2024

Revised: 12 Feb 2025

Accepted: 26 Feb 2025

ABSTRACT

The growing global concern regarding environmental sustainability has heightened the importance of understanding the factors that drive eco-entrepreneurial intentions and subsequent eco-entrepreneurial behaviour. This study aims to explore the antecedents of eco-entrepreneurial intentions and behaviour in the context of the United States, with a particular focus on the moderating influence of entrepreneurship education. It aligns with the United Nations' SDG 8 on Decent Work and Economic Growth, as eco-entrepreneurship promotes job creation, innovation, and sustainable economic development while ensuring environmental stewardship. Drawing on the Theory of Planned Behaviour, this research examines the role of three key antecedents—eco-entrepreneurial attitude, subjective norms, and perceived behavioural control—in shaping eco-entrepreneurial intentions and how these intentions translate into actual eco-entrepreneurial behaviour. The data for this study were drawn from a diverse sample of aspiring and existing entrepreneurs of various types in the United States. Findings suggest that eco-entrepreneurial attitude and perceived behavioural control are significant predictors of eco-entrepreneurial intentions. Furthermore, entrepreneurship education served as a crucial moderating factor in explaining the relationship between perceived behavioural control and eco-entrepreneurial intentions, amplifying their association and increasing the likelihood of intentions being transformed into actual eco-entrepreneurial behaviour. The findings provide valuable insights for policymakers and educators, suggesting that integrating eco-consciousness into entrepreneurship curricula can foster a new generation of environmentally responsible entrepreneurs.

Keywords: Eco-entrepreneurial Intentions; SDG8; Entrepreneurship Education; Environmentally Responsible Entrepreneurs; Eco-Entrepreneurial Behaviour

INTRODUCTION

Environmental pollution and ecological damage have posed a great challenge to sustainable economic development, and the living environment of mankind has continued to deteriorate (Naz et al., 2020). Many companies, in the process of development, excessively pursue economic interests and neglect ecological and environmental protection and sustainable development (Amoako et al., 2020). The business operations of a large number of companies may lead to the depletion of natural resources, damage to biodiversity, excessive use of technology, and the production of pollutants (Rasiah et al., 2023). It is generally believed that the United States, as a developed country, should attach great importance to environmental protection and a green and sustainable economy, and that American companies should also pay great attention to environmental protection and sustainable development (Propel Software,2024). However, a survey shows that 53% of companies may have exaggerated their efforts to implement sustainable development practices. A new survey conducted by OnePoll for Propel Software shows that a significant proportion of the US population is prepared to stop patronising brands that do not place an emphasis on environmental protection. The survey of 2,000 American adults shows a strong consumer shift towards sustainability, highlighting a shift in consumer buying behaviour towards environmentally friendly brands. The survey provides compelling

insights into consumer attitudes towards sustainability, with 55% of Americans saying they would stop using a brand if they found it lacked commitment to environmental sustainability. The majority of people also share this view, with 68% of adult men and 55% of adult women affirming the importance of environmentally friendly products or causes in their purchasing decisions (Otiniano et al., 2024). Therefore, start-ups should pay attention to their own ecological and environmentally friendly and sustainable economic development practices.

Eco-entrepreneurial intentions can be defined as the conscious decision and motivation to engage in entrepreneurial activities that are aimed at addressing environmental issues (M. B. Abina et al., 2015). This involves the creation of products, services, or processes that contribute to environmental sustainability, such as reducing waste, lowering carbon emissions, conserving natural resources, and promoting renewable energy (Rama et al., 2023). Unlike traditional entrepreneurial intentions that focus primarily on profit maximisation, eco-entrepreneurial intentions are characterised by a dual commitment to both economic success and ecological well-being (Abina et al., 2015). Most current research on entrepreneurial intention and entrepreneurial behaviour makes use of the theory of planned behaviour (TPB), and there is already a lot of research available (Hair et al., 2021). However, there is relatively little research on eco-entrepreneurial intention and eco-entrepreneurial behaviour (Belchior & Lyons, 2021). There have also been few studies on the moderating effect of entrepreneurship education, and the conclusions are inconsistent (Adeel et al., 2023).

Green values, also known as eco values, are essential for an eco-entrepreneurship model (Khodaei et al., 2018). To ensure long-term growth and sustainability, businesses must prioritize environmental concerns. Businesses, too, are facing increased costs and resource constraints due to environmental degradation and climate change (Qu et al., 2022). These challenges, coupled with social and economic factors, have placed significant strain on natural resources and human society. This surge in interest by businesses is driven by the pressing global issues of climate change and environmental degradation (Yang et al., 2022), which threaten sustainable development.

While the world has witnessed significant economic progress, it continues to face pressing social and environmental challenges. As a result, there is a growing demand for responsible business models that prioritize sustainability. Green businesses, with their innovative and eco-friendly approaches, have the potential to drive economic growth and positively impact society (Sharma & Singh, 2023). However, it is crucial to critically examine the true environmental and social impact of these businesses to ensure that they are not merely greenwashing their operations.

This paper explores the impact of entrepreneurial attitudes, subjective norms, and perceived behavioural control on eco-entrepreneurial intention and eco-entrepreneurial behaviour based on the theory of planned behaviour (TPB), while also discussing the moderating role of entrepreneurship education.

LITERATURE REVIEW

The theory of planned behaviour (TPB), proposed by Ajzen (1991), posits that three key antecedents shape behavioural intention: attitude toward the behaviour, subjective norms, and perceived behavioural control (Ajzen, 1991). Subjective norms, in particular, are recognized as a critical factor influencing intentions within the context of entrepreneurship (Utami, 2017). Research has yielded mixed results regarding the relationship between subjective norms and the intention to engage in eco-entrepreneurship. Some studies indicate a significant correlation, suggesting that positive perceptions from social reference groups enhance entrepreneurial intentions (Cassol et al., 2022), while others find no statistically significant relationship (Anderson, 2023; Utami, 2017).

1) Research on the Connotation of Eco-Entrepreneurship

In recent years, eco-entrepreneurship has become a key focus of academic and practical exploration. The definition and evolution of its connotation form the foundation of related studies. eco-entrepreneurship integrates environmental protection with entrepreneurial activities, aiming to meet market demands through innovative business models while achieving environmental improvements and sustainable development. Initially proposed by Schaper (2002), this concept emphasizes balancing economic benefits with ecological goals. Ecological entrepreneurs are viewed as problem-solvers who provide eco-friendly products or services, reducing environmental burdens while promoting economic growth.

As research progresses, the connotation of eco-entrepreneurship has expanded from a single dimension to a multidimensional perspective. From an economic standpoint, it emphasizes on the sustainability and

competitiveness of innovative business models (Nuringsih, 2018). From an environmental perspective, eco-entrepreneurship focuses on minimizing resource consumption and pollution while enhancing ecosystem sustainability (Sahoo et al., 2023). Technologically, it explores how green innovations, such as renewable energy and resource recycling, mitigate environmental impact. Socially, it reflects a commitment to societal responsibilities, as highlighted by Schaltegger (2011), who noted its role in fostering green consumption and sustainability awareness (Schaltegger & Wagner, 2011). Eco-entrepreneurship's defining features are environmental-friendly innovation and sustainable practices. Porter's (1995) "green innovation hypothesis" suggests that eco-innovation can simultaneously create economic value and achieve environmental goals. This theory has been supported by practice, where optimized supply chains and technological advancements yield sustainability and competitive advantages (Porter & Zhisheng, 1995). Globally, eco-entrepreneurship exhibits regional differences. In developed nations, it emphasizes the synergy between technology and market needs. Kivimaa (2016) found that European practices often leverage policy incentives for green technology commercialization. Conversely, in developing countries, it aligns more closely with social responsibility and environmental improvement, driven significantly by external policies (Kivimaa & Kern, 2016). In China, research on eco-entrepreneurship has evolved from theoretical exploration to empirical analysis. Scholars such as Rui (2024) argue for a dual focus on policy guidance and market-driven practices to harmonize environmental and economic objectives (Rui, 2024). Leonidou er al. (2017) further highlights the roles of internal enterprise capabilities and external consumer awareness in sustainability.

The value orientation of eco-entrepreneurship has emerged as a crucial element. Hariram et al. (2023) underscored its focus on balancing environmental preservation and economic benefits, manifesting in corporate culture and decision-making. As a value proposition, it integrates ecological responsibility with market demands, offering green solutions supported by policies like green credit and tax incentives (Hariram et al., 2023). Technologically, eco-entrepreneurship leverages innovations for sustainable operations. Franco (2023) analyzed "zero-waste" principles, emphasizing that innovation is pivotal to its success (Franco, 2023). In agriculture, manufacturing, and services, eco-entrepreneurship enhances competitiveness while fostering sustainable practices, as observed in the adoption of eco-certification and digital management in agricultural enterprises (Chi, 2024).

In conclusion, eco-entrepreneurship, as an emerging business model, has evolved from its initial single-dimensional focus on economics to a multi-dimensional development, encompassing environmental, technological, and social responsibility aspects. Globally, eco-entrepreneurship shows regional differences, with developed countries emphasizing technological innovation and market demand integration, while developing countries focus more on social responsibility and environmental protection. Domestic research has gradually shifted from theoretical exploration to empirical analysis, highlighting the impact of policy environments and consumer environmental awareness on eco-entrepreneurship. eco-entrepreneurship not only reflects corporate culture and decision-making logic but also serves as a key driver of sustainable development. As technological innovations and market mechanisms continue to improve, eco-entrepreneurship will play an increasingly significant role, becoming a critical force in driving global sustainability. In this context, policy support and market guidance will be decisive in ensuring the success and long-term development of eco-entrepreneurship.

2) Research on Eco-Entrepreneurship Models

Research on eco-entrepreneurship models is a significant focus within the field, emphasizing how businesses achieve synergy between environmental protection and economic development through innovative commercial practices. Scholars globally have analyzed these models from perspectives including classification, core elements, pathways, external support, and sustainability evaluation, establishing a systematic framework.

Regarding classification, Schaltegger and Wagner (2011) introduced widely referenced models: eco-efficiency, eco-innovation, and eco-transformation. Eco-efficiency focuses on reducing environmental impacts through improved resource use and process optimization, as noted by Stahel (2016) in applications of the circular economy (Stahel, 2016). Eco-innovation emphasizes sustainable competitive advantages through innovations like energy-saving devices or biodegradable materials. Eco-transformation involves systemic green economy changes (Kovalko et al., 2022). These typologies form theoretical foundations for distinguishing and studying various eco-entrepreneurship models.In terms of core components, researchers often utilize the business model canvas framework. Green value propositions, resource integration, and stakeholder management as key factors (Shamsuzzoha et al., 2023). For instance, some researchers analyzed Tesla, noting its technological and market leadership in electric vehicles as a benchmark for low-carbon economic initiatives (Wu et al., 2022). Additionally, resource integration stands central

to eco-entrepreneurship models. The rise of sharing economy platforms demonstrates efficient resource utilization, as Belchior (2023) highlighted the dual benefits of economic returns and environmental conservation through resource-sharing innovations. Technological innovation drives eco-entrepreneurship model success. Policy incentives and breakthroughs enable businesses to convert environmental protection into competitive advantages (Belchior, 2023). Germany's "Industry 4.0" initiative promotes eco-industrial transitions, achieving energy savings through low-carbon technologies. In China, rapid photovoltaic sector growth exemplifies the importance of renewable energy technologies in green transformation (Du et al., 2021). Moreover, digital technologies increase flexibility and efficiency; for example, blockchain improves transparency and efficiency in green supply chain management (Daghighi & Shoushtari, 2023).

The realization of eco-entrepreneurship models heavily relies on external support. The scholar identified policy support as a crucial factor, with measures such as subsidies, tax benefits, and market access creating favorable environments for eco-entrepreneurs (Ajayi-Nifise et al., 2024). The EU's "Green Deal" exemplifies such efforts through legislative and financial mechanisms supporting green technology commercialization. Similarly, China's carbon trading policies and green credit systems bolster domestic eco-entrepreneurship. However, policy stability and transparency remain vital for effectiveness (Wang & He, 2022). Sustainability evaluation is another critical research domain. The researcher proposed evaluating eco-entrepreneurship models across environmental, economic, and social dimensions. Environmental performance can be assessed using indicators like carbon footprints, energy efficiency, and resource utilization (Sharma, 2024). Economic performance involves profitability, cost savings, and market share growth, while social dimensions focus on corporate social responsibility and public environmental awareness. A study emphasized life-cycle analysis as an effective tool for quantifying environmental impacts within circular economy models (Ramos & Rouboa, 2022).

In summary, eco-entrepreneurship models have been widely discussed, with scholars categorizing them into efficiency, innovation, and transformation types, each with its unique approach to integrating environmental sustainability and economic growth. Key factors like green value propositions, resource integration, and technological innovation are central to these models. External support, particularly policy incentives, plays a significant role in their development. Sustainability assessment frameworks, considering environmental, economic, and social impacts, further enrich the evaluation of these models. As these models evolve, their successful implementation depends on both technological innovation and supportive policies, making them essential drivers of sustainable business practices.

3) Factors Influencing Entrepreneurial behaviour

The factors influencing entrepreneurial behaviour are a widely studied academic topic, spanning perspectives from psychology, sociology, and economics. Ajzen's (1991) Theory of Planned behaviour (TPB) serves as a significant framework, emphasizing entrepreneurial intention as the direct precursor to behaviour. Some studies further identified attitude, subjective norms, and perceived behavioural control as key variables shaping entrepreneurial intention (Lihua, 2022; Mishra & Singh, 2022).

Attitudes enhance intention by evaluating entrepreneurial value, subjective norms reflect social support, and perceived behavioural control depends on individual entrepreneurial self-efficacy (Wang et al., 2023). While attitudes toward entrepreneurship can positively influence entrepreneurial intention (Hussain et al., 2021), the extent to which attitudes toward sustainable entrepreneurship and perceived behavioural control shape entrepreneurial intention remains unclear (Arru, 2020). Additionally, young people's behaviours and attitudes towards environmental issues and eco-friendly practices can contribute to their eco-entrepreneurial intentions (Piscitelli & D' Uggento, 2022).

H1: Eco-entrepreneurial attitude has a positive effect on eco-entrepreneurial intention.

Subjective norms are defined as the perceived social pressure to engage in or refrain from a particular activity (Puni et al., 2018), subjective norms are shaped by inputs from family, peers, and societal expectations, collectively influencing entrepreneurial decision-making. The influence of subjective norms on entrepreneurial intentions has been extensively examined. Noor et al. (2021) emphasized that these norms serve as robust predictors of entrepreneurial intent, while Utami (2017) underscored their pivotal role in shaping students' entrepreneurial aspirations, acting as a significant factor in fostering such ambitions (Noor et al., 2021; Utami, 2017).

H2: Subjective norms have a positive effect on eco-entrepreneurial intention.

Perceived behavioural control, alongside relevant skills, has been recognized as a critical factor in driving the adoption of sustainability practices within organizational contexts (Singh et al., 2019). Defined as an individual's belief in their ability to perform a specific task (M. Abina et al., 2015), it is particularly significant among students, as those with strong perceived behavioural control are considered more likely to exhibit entrepreneurial tendencies (Bagheri & Pihie, 2015).

H3: Perceived behavioural control has a positive effect on eco-entrepreneurial intention.

H4: Eco-entrepreneurial intention has a positive effect on eco-entrepreneurial behaviour.

In recent years, scholars have focused on the role of entrepreneurial education in converting intentions into behaviour. Souitaris et al. (2007) found that entrepreneurial courses and workshops significantly boost entrepreneurial intention and the likelihood of action (Souitaris et al., 2007). Fayolle and Gailly (2015) argued that entrepreneurial education not only provides knowledge and skills but also fosters a culture that strengthens students' propensity for action (Fayolle & Gailly, 2015). In China, a study showed that university-level entrepreneurial education, through practice and university-enterprise collaboration, enhances students' entrepreneurial confidence, facilitating behaviour transformation. External environmental factors also have a profound impact on entrepreneurial behaviour (Lei, 2023). The research emphasized opportunity recognition as the starting point of entrepreneurship, with market demand, technological advancements, and policy support determining opportunity value (Hossain et al., 2024). Recent studies suggest that Recent studies suggest that government subsidies and tax incentives reduce entry barriers for entrepreneurs (Bradley et al., 2021; Darnihamedani et al., 2018). The study examined how entrepreneurial behaviour changes in different economic contexts, concluding that resource-abundant and transparent markets stimulate entrepreneurial activities (Ratten & Jones, 2021). The post-pandemic rise of digital entrepreneurship environments has further driven entrepreneurial behaviour (Yi, 2021).Cultural background is another critical factor. Cultural Dimensions Theory indicated that cultural traits shape entrepreneurial behaviour. High individualism fosters independence and innovation, while high collectivism emphasizes collaboration and resource sharing (Aguilar-Cruz & Campos-Sánchez, 2024). A study using Global Entrepreneurship Monitor data, confirmed that cultural values and risk attitudes influence entrepreneurial decision-making (Ali & Jabeen, 2022). Gender differences are increasingly recognized in entrepreneurship research. The study found that female entrepreneurs excel in areas such as social enterprises and educational entrepreneurship, while males often prefer technology-intensive industries (Rietveld & Patel, 2022). The researcher compared international data and highlighted gender inequality in resource allocation, calling for policy interventions to ensure equal opportunities for female entrepreneurs (Rotnitsky et al., 2024).

H5: Entrepreneurship education mediates the effect of eco-entrepreneurial attitude on eco-entrepreneurial intention.

H6: Entrepreneurship education mediates the effect of subjective norms on eco-entrepreneurial intention.

H7: Entrepreneurship education mediates the effect of perceived behavioural control on eco-entrepreneurial intention.

Based on the above hypotheses and discussions, this study constructed the following research model, as shown in Figure 1.

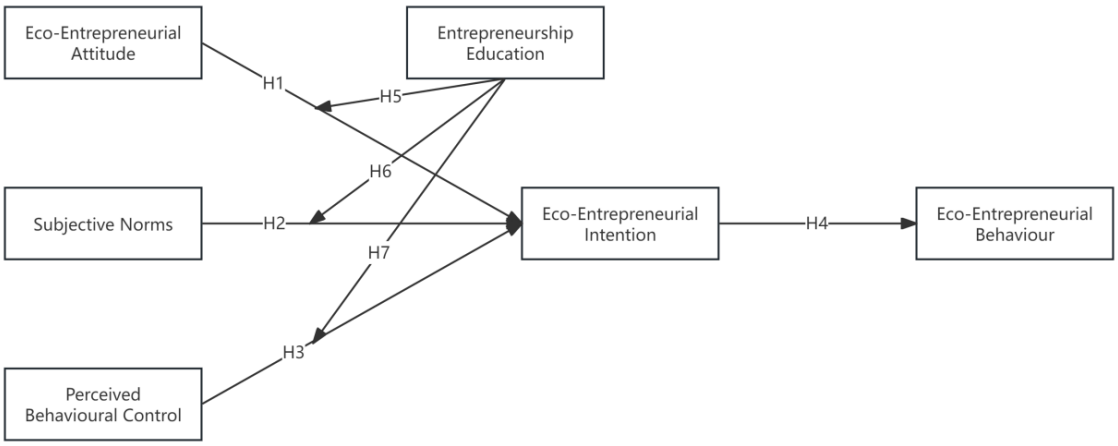

Figure 1. Research Framework

4) Summary

Eco-entrepreneurship is increasingly recognized as an innovative approach to achieving environmental protection and economic development simultaneously. By addressing market demands through innovative business models, eco-entrepreneurship fosters environmental sustainability. Since some researchers introduced this concept, it has evolved from a singular economic perspective to a multidimensional framework encompassing environmental, technological, and social responsibilities. Studies on the essence of eco-entrepreneurship emphasize its cultural and economic diversity, highlighting its role in raising consumer awareness about sustainability and enhancing societal perceptions of sustainable development.Research into eco-entrepreneurial models primarily explores how businesses balance environmental conservation with economic growth. Successful models depend on defining green value propositions, resource integration, and effective stakeholder management. Overall, eco-entrepreneurship is an interdisciplinary field, engaging aspects of environmental protection, economic development, technological innovation, and societal culture.

However, gaps in existing research remain. While a theoretical framework for eco-entrepreneurship is well-established, empirical findings often reveal inconsistencies and substantial variation. This suggests a need for further empirical investigations to clarify the components and pathways underpinning eco-entrepreneurial behaviour. Another notable challenge lies in evaluating eco-entrepreneurship through metrics encompassing environmental, economic, and social dimensions. Developing comprehensive assessment tools remains a pressing need in the field.Addressing these challenges, this study aims to explore how ecological attitudes, subjective norms, perceived behavioural control, and entrepreneurship education influence eco-entrepreneurial intentions and how these factors shape eco-entrepreneurial behaviours through such intentions. By focusing on empirical analysis, the research seeks to provide deeper insights into eco-entrepreneurship, offering guidance for policy development and practical implementation within this domain.

METHODOLOGY

1) Reliability Test

Reliability testing is an important metric for assessing the consistency of data analysis results. High reliability indicates greater consistency, reliability, and stability, while low reliability suggests the opposite. This study used the PLS algorithm in Smart PLS to obtain Cronbach's Alpha and Composite Reliability (CR) values to verify reliability. Internal consistency is commonly assessed using Cronbach's Alpha (α). According to Cronbach (1951), reliability can be classified as low when $\alpha \leq 0.35$, moderate when $0.35 < \alpha \leq 0.7$, high when $\alpha > 0.7$, and very good when $\alpha > 0.8$. In general, the closer α is to 1, the higher the internal consistency (Fornell & Larcker, 1981). Additionally, scholars typically consider α between 0.6-0.7 acceptable, while $\alpha < 0.6$ indicates poor internal reliability, and $\alpha < 0.5$ is unacceptable. Therefore, this study adopts 0.7 as the reference standard, as recommended by Nunally (1978).

The reliability analysis results of table 1 for each construct reveal Cronbach's Alpha values exceeding 0.7, indicating good internal consistency and high reliability, providing robust data support for subsequent analyses.

Table 1 Reliability Test

Dimension	n	Cronbach's alpha
EA	5	0.904
EB	10	0.984
EE	4	0.925
EI	5	0.952
PBC	6	0.906
SN	3	0.855

2) Validity Analysis

Convergent validity is a metric used to measure the similarity between different items within the same variable. The first step is to examine the standardized factor loadings between each variable and its corresponding items. The outer model loading coefficient indicates that the shared variance between the items and latent variables should be greater than the shared variance between the items and error variance (Purwanto & Sudargini, 2021). When the outer model loading coefficient exceeds 0.5, it indicates the presence of convergent validity among the items. If the loading coefficient exceeds 0.708, it reflects excellent convergent validity (Sarstedt et al., 2021). Additionally, the AVE (Average Variance Extracted) must also be examined. If the AVE value exceeds 0.5 (Bagozzi & Yi, 1988), it implies that more than half of the variance in the items can be explained, indicating that the model has good reliability and convergent validity.

The details of the outer model loadings are shown in Table 2. As observed, the loading values for EA (EA1-AT5) range from 0.711 to 0.908, for EB (EB1-EB10) range from 0.916 to 0.949, for EE (EE1-EE4) range from 0.892 to 0.913, for EI (EI1-EI5) range from 0.859 to 0.939, for PBC (PBC1-PBC6) range from 0.757 to 0.872, and for SN (SN1-SN6) range from 0.866 to 0.908. All these values exceed 0.7, indicating high data quality and good convergent validity.

Table 2 Results of External Model Loadings Analysis

Variable	External Loadings					
	EA	EB	EE	EI	PBC	SN
EA1	0.711					
EA2	0.86					
EA3	0.88					
EA4	0.908					
EA5	0.882					
EB1		0.937				
EB10		0.916				
EB2		0.937				
EB3		0.918				
EB4		0.949				
EB5		0.937				
EB6		0.932				
EB7		0.945				
EB8		0.936				
EB9		0.939				
EE1			0.909			
EE2			0.892			
EE3			0.901			
EE4			0.913			
EI1				0.859		
EI2				0.914		
EI3				0.934		
EI4				0.939		

EI5				0.93		
PBC1					0.787	
PBC2					0.864	
PBC3					0.757	
PBC4					0.872	
PBC5					0.829	
PBC6					0.834	
SN1						0.866
SN2						0.908
SN3						0.866

Table 3 presents the Average Variance Extracted (AVE) results, which assess the convergent validity of the constructs in the study. The AVE values for each variable—EA (0.724), EB (0.874), EE (0.817), EI (0.838), PBC (0.681), and SN (0.774)—are all above the threshold of 0.5, suggesting that the constructs exhibit strong convergent validity. This indicates that the indicators for each construct adequately represent their underlying theoretical concepts. A higher AVE value demonstrates a higher level of reliability and consistency in the measurement model, supporting the overall robustness of the model. The results also suggest that the variables in question are measuring distinct and relevant dimensions, with minimal measurement error. These findings contribute to the reliability and credibility of the study, enhancing the confidence in using these constructs for further analyses and practical applications.

Table 3 Results of AVE Analysis

Variable	AVE
EA	0.724
EB	0.874
EE	0.817
EI	0.838
PBC	0.681
SN	0.774

As shown in Table 4, the square root of the AVE for each latent variable (the values on the diagonal) is greater than the correlation coefficients with other latent variables (the off-diagonal values). The square root of the AVE for EA is 0.851, which is much higher than its correlation coefficients with other variables (EB, EE, EI, PBC, SN), the highest being 0.726. Similarly, the square root of the AVE for EB is 0.935, significantly greater than its correlation with other variables (the highest being 0.510). Other latent variables, such as EE (square root of AVE = 0.904), EI (0.915), PBC (0.825), and SN (0.880), also meet the same condition. Therefore, it can be confirmed that the latent variables have good discriminant validity, meaning they can effectively differentiate between distinct concepts, providing support for the theoretical validity of the measurement model, as recommended by Fornell and Larcker (1981).

Table 4. Discriminant Validity

	EA	EB	EE	EI	PBC	SN
EA	0.851					
EB	0.456	0.935				
EE	0.509	0.346	0.904			
EI	0.726	0.484	0.425	0.915		
PBC	0.630	0.510	0.304	0.808	0.825	
SN	0.577	0.275	0.401	0.392	0.405	0.880

3) Hypothesis Testing

This study uses SmartPLS 4.0 to validate the proposed model and research hypotheses. Based on previous studies, a structural equation model is constructed, including eco-entrepreneurial attitude, subjective norms, perceived behavioural control, eco-entrepreneurial intention, and eco-entrepreneurial behaviour. The hypothesis is tested by

assessing the significance of path analysis. The structural equation model used in this study is shown in Figure 2 below:

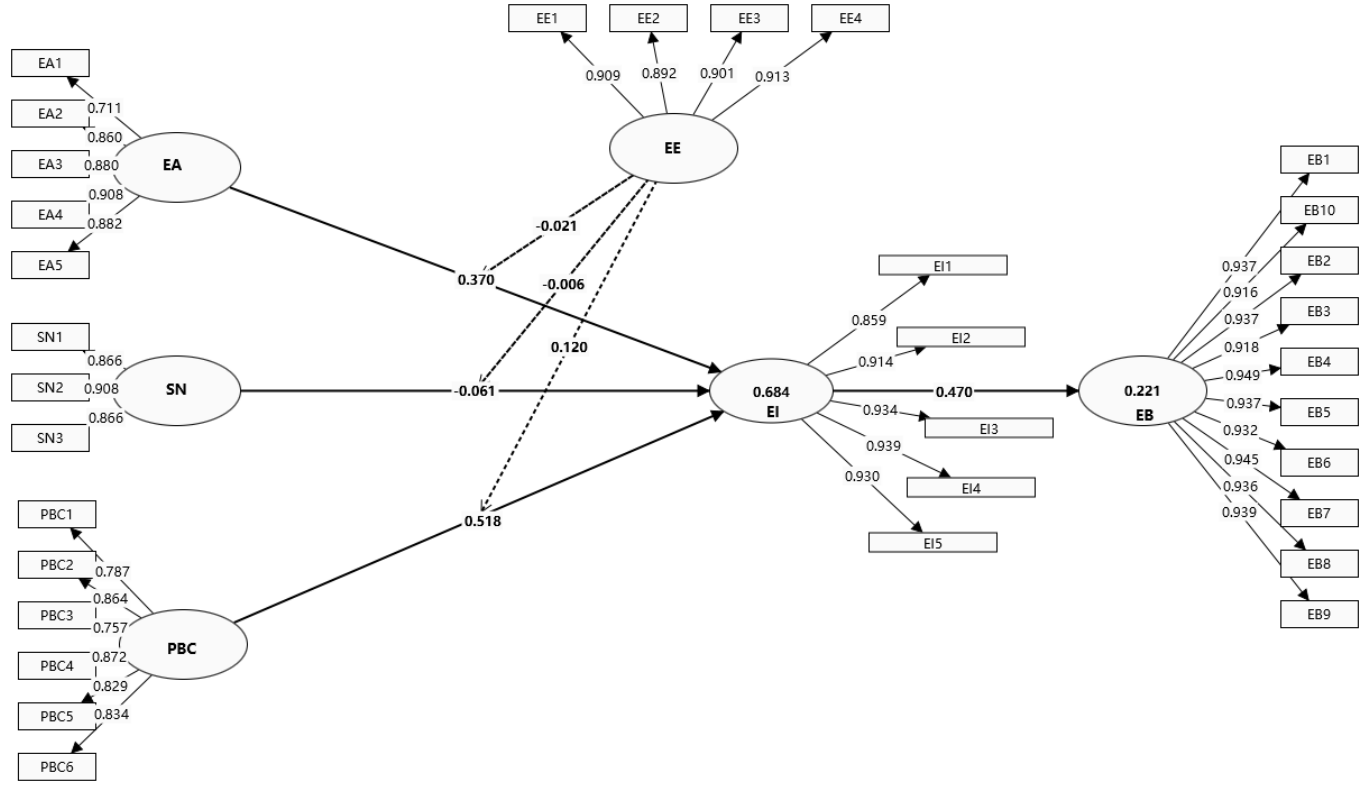

Figure 2 Smart PLS 4.0 Path Analysis Model

To validate the structural equation model, the key indicator to observe is the explanatory power of the latent variables, i.e., the adjusted R^2 value. According to Devore (2011), the R^2 value ranges between 0 and 1, with values closer to 1 indicating higher explanatory power. As shown in Table5, EB has an explanatory power of 21.9%, while EI has an explanatory power of 67.6%.

Table 5 Adjusted R^2 Analysis Results

	R-Squared	Adjusted R-Squared
EB	0.221	0.219
EI	0.684	0.676

According to the path analysis results in Table 6, it can be determined whether the hypotheses are valid.

In the path influencing eco-entrepreneurship intention (EI), perceived behavioural control (PBC) has the most significant effect, with a path coefficient of 0.518 (P-value = 0.000), indicating that an individual's confidence in their entrepreneurial abilities is the key driver of eco-entrepreneurship intention. Next, eco-entrepreneurship attitude (EA) also has a strong positive effect on intention, with a path coefficient of 0.37 (P-value = 0.000), suggesting that a positive entrepreneurial attitude is an important supportive factor in forming eco-entrepreneurship intention. In contrast, the influence of entrepreneurial education (EE) is slightly lower (0.11, P-value = 0.032), playing a more auxiliary role rather than a decisive one.

In the factors influencing eco-entrepreneurship behaviour (EB), eco-entrepreneurship intention (EI) has a significant positive effect, with a path coefficient of 0.47 (P-value = 0.000), indicating that entrepreneurial behaviour is primarily driven by intention, reflecting the key role of intention in translating into actual behaviour.

Regarding the moderating effect, the interaction between entrepreneurial education and perceived behavioural control (EE x PBC) has a significant positive moderating effect on eco-entrepreneurship intention, with a path coefficient of 0.12 (P-value = 0.008). This indicates that when the quality of entrepreneurial education improves, the

perceived behavioural control further enhances the positive influence on intention. Other interaction effects were not significant.

In summary, perceived behavioural control is the largest factor influencing eco-entrepreneurship intention, and eco-entrepreneurship intention is the core variable driving eco-entrepreneurship behaviour. Although entrepreneurial education has a direct effect on intention, it has more of an indirect influence through its interaction with perceived behavioural control.

Table 6 Hypothesis Testing

Serial Number	Path	Path Coefficient	T Value	P Value	"Supported" or "Not Supported"
H1	EA -> EI	0.37	6.958	0.000	Supported
H2	SN -> EI	-0.061	1.616	0.106	Not Supported
H3	PBC -> EI	0.518	11.288	0.000	Supported
H4	EI -> EB	0.47	9.492	0.000	Supported
H5	EE x EA -> EI	-0.021	0.518	0.604	Not Supported
H6	EE x SN -> EI	-0.006	0.188	0.851	Not Supported
H7	EE x PBC -> EI	0.12	2.673	0.008	Supported

CONCLUSION

Research Conclusion

The study shows that eco-entrepreneurship intention is primarily influenced by an individual's perceived behavioural control and eco-entrepreneurship attitude. Perceived behavioural control is the most important factor, indicating that an individual's confidence in their entrepreneurial abilities is key to forming entrepreneurial intentions, aligning with the results of Yasir et al. (2023) and Mehraj et al. (2023). Eco-entrepreneurship attitude also plays a positive role, suggesting that recognition and interest in eco-entrepreneurship promote the formation of entrepreneurial intentions, in line with the findings of Hussain et al. (2021) and Piscitelli and D'Uggento (2022). While entrepreneurial education has some effect, its impact is more evident in its interaction with perceived behavioural control, serving a moderating role between perceived control and intention. Furthermore, the research indicates that eco-entrepreneurship intention is the core driving force behind actual entrepreneurial behaviour, with the strength of intention directly influencing whether it translates into real action, concurring with the results obtained by Li et al. (2023) and Panahi et al. (2024). In conclusion, perceived behavioural control and eco-entrepreneurship attitude are the core driving forces of eco-entrepreneurship, while entrepreneurial education indirectly supports the formation of entrepreneurial intention by moderating individuals' sense of control and attitude.

Discussion

Promoting eco-entrepreneurship requires strategies that address multiple dimensions to foster both the formation of eco-entrepreneurship intentions and the realization of entrepreneurial behaviour. The study concludes that perceived behavioural control, eco-entrepreneurship attitude, and entrepreneurial education play varying roles in shaping eco-entrepreneurship intentions. Therefore, targeted measures should be taken, focusing both on individual capabilities and the broader social and policy environment, to systematically advance eco-entrepreneurship.

Perceived behavioural control has been identified as the core factor influencing eco-entrepreneurship intentions, suggesting that an individual's confidence in their entrepreneurial abilities is crucial to whether they engage in eco-entrepreneurship. Consequently, efforts should focus on enhancing this confidence, which can be achieved through entrepreneurship training, case studies, and psychological counseling. Tailored training programs should be designed for entrepreneurs at different stages, such as providing basic knowledge for beginners and more advanced training on ecological innovation for experienced entrepreneurs. Practical experience should be promoted through entrepreneurship simulation platforms or competitions, helping entrepreneurs build confidence through hands-on practice.

Eco-entrepreneurship attitude, an important factor influencing entrepreneurial intentions, should be shaped through value guidance and awareness-raising. Educational institutions and public campaigns play an essential role in this process. Schools can integrate sustainability education into their curricula, particularly at the vocational and higher education levels, encouraging students to think about entrepreneurship from the perspectives of social responsibility

and environmental protection. Moreover, government and business efforts should focus on raising awareness through eco-entrepreneurship forums, exhibitions, and practice weeks, allowing more people to experience the value of green entrepreneurship firsthand.

Entrepreneurial education plays a supplementary role in eco-entrepreneurship intentions. While its direct impact is weaker, it can significantly enhance entrepreneurial confidence by interacting with perceived behavioural control. The current entrepreneurial education system should be improved, with entrepreneurship knowledge courses in primary and secondary schools and practical entrepreneurship courses in higher education. Collaboration between governments, universities, and businesses is crucial in providing resources such as funding, technology, and mentorship to support budding entrepreneurs.

Policy support is one of the external drivers for eco-entrepreneurship. Governments should create favorable policies, including providing incentives for green startups, establishing special green entrepreneurship funds, offering tax exemptions, and low-interest loans. Additionally, an eco-entrepreneurship service network should be set up to provide one-stop services like policy interpretation, legal advice, and market connections. Optimizing the policy environment reduces entry barriers for entrepreneurs and increases their trust in government support, thereby enhancing their entrepreneurial intentions.

The social recognition and public opinion environment surrounding eco-entrepreneurship are also vital. By promoting successful entrepreneurial role models, such as those who have created business value while achieving environmental and social responsibility, more individuals can be motivated to pursue eco-entrepreneurship. Media should emphasize positive stories of eco-entrepreneurship, especially through new media platforms, and public organizations can mobilize people to engage in green entrepreneurship practices through community-based projects.

eco-entrepreneurship, being a complex and systemic activity, requires cross-sectoral cooperation. In particular, government should encourage collaboration between environmental protection, technology, education, and other sectors, creating a resource-sharing mechanism to support eco-entrepreneurship. Scientific research institutions can provide technical support, while educational institutions can supply talent, and the government can coordinate and integrate resources.

In conclusion, promoting eco-entrepreneurship requires both individual empowerment and macro-level policy and social support. By enhancing perceived behavioural control, guiding entrepreneurial attitudes positively, improving the entrepreneurial education system, and leveraging policy and social recognition, eco-entrepreneurship intentions can be fostered and eventually translated into concrete entrepreneurial actions, contributing to sustainable economic and ecological development.

Fund:

This research was funded by the research grant from the Natural Science Foundation of China (NSFC), NO.72162025;

Yunnan Talent-driven Revitalization Project（2022）：Entrepreneurial persistence: An empowering path for entrepreneurial teams.

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