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University entrepreneurial support and green entrepreneurial behavior: a quantitative serial mediation

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Abstract

This study aims to delineate the influence of university support for entrepreneurship on fostering green entrepreneurial behaviours, specifically examining the roles of entrepreneurial self-efficacy and green entrepreneurial intention as sequential mediators in this relationship. Employing a quantitative methodology, data from 338 Thai entrepreneurs were collected through a structured survey using convenience sampling techniques. The analysis reveals that university support positively influences green entrepreneurial behaviors. Specifically, university support positively increases entrepreneurial self-efficacy, which, in turn, positively influences green entrepreneurial intentions. This sequential mediation demonstrates that the positive relationship between university support and green entrepreneurial behaviors is enhanced by the mediating roles of entrepreneurial self-efficacy and green entrepreneurial intentions. This underscores the critical role of universities in boosting self-efficacy among budding entrepreneurs and cultivating their green intentions, which are essential for sustainable entrepreneurial practices. This study is an exploratory step in understanding university support and green entrepreneurship dynamics. Future research could incorporate longitudinal data collection to establish causality more definitively and include industry-specific factors (e.g., regulatory frameworks, market demand for green products) and the economic climate (e.g., access to green financing, government incentives) to provide a more nuanced understanding of this relationship. Furthermore, future studies should employ probability sampling methods, such as stratified random sampling, to enhance the generalizability of the findings to a broader population of entrepreneurs. This research pioneers in illustrating the interconnected pathways through which university support can translate into green entrepreneurial actions. By integrating serial mediation analysis, this study offers new insights into the sequential impacts of university support on entrepreneurial self-efficacy and intention, highlighting their importance in fostering sustainable entrepreneurial outcomes.

Keywords: Entrepreneurial behavior, University entrepreneurial support, Green entrepreneurial behavior, Serial mediation

Introduction

Environmental conservation has become a global priority, driving scholars to explore green entrepreneurship as a crucial approach to addressing environmental degradation and promoting sustainable societal development (Demirel et al., 2019; Hall et al., 2010; Shepherd et al., 2011). Green entrepreneurship, focused on preserving ecosystems, reducing deforestation, and enhancing overall environmental quality, is increasingly recognized as a vital component of a sustainable future. Universities play a pivotal role in fostering these initiatives as centers of knowledge creation, innovation, and talent development (Odei & Anderson, 2021). Odei and Anderson (2021) highlight the increasing expectations for universities to contribute to societal challenges, including sustainability, through their "third mission" activities, such as fostering entrepreneurship. This role is crucial, because universities can provide aspiring entrepreneurs with the necessary resources, knowledge, and networks to launch and grow green ventures.

Several studies have highlighted the importance of university support for entrepreneurship in general (Yi, 2021), but fewer have specifically focused on the green dimension. For example, some studies have explored the impact of university incubators and accelerators on startup success (Bogatyreva et al., 2019; Grinevich et al., 2019), but these often lack a specific focus on environmental sustainability. This gap is significant, because green entrepreneurship requires a unique set of skills, knowledge, and resources related to environmental science, policy, and sustainable business practices. Therefore, understanding how universities can effectively cultivate green entrepreneurial mindsets and behaviors is crucial. This study addresses this gap by examining the interaction between university-supported entrepreneurial initiatives and green entrepreneurial activities among university students in Thailand, focusing on the mediating roles of entrepreneurial self-efficacy and green entrepreneurial intentions.

This focus on Thailand is justified by the country's growing emphasis on sustainable development and the potential for university students to contribute to the nation's green economy. While Thailand has made strides in promoting entrepreneurship, there is a need to further integrate sustainability principles into these efforts. Studying Thai universities provides valuable insights into how emerging economies can leverage their educational institutions to drive green innovation and entrepreneurship.

Examples from other countries, such as China's Internet + initiative, demonstrate the potential impact of supportive policies on student-led green business proposals in sectors, such as renewable energy and sustainable manufacturing (Gao, 2017). These initiatives underscore the importance of understanding the factors that drive green entrepreneurial ambitions, especially the transition from intention to action. This transition is often hindered by a persistent gap between intention and actual behavior (Kautonen et al., 2013; Krueger et al., 2000a, 2000b; Van Gelderen et al., 2015).

To address this intention–behavior gap, this research integrates resource-based theory (Timmons et al., 2004) and flow theory to analyze the determinants of green entrepreneurial behavior among university students. Resource-based theory suggests that access to and effective utilization of resources are critical for venture success, while flow theory explains the intrinsic motivation and engagement that drive individuals toward specific behaviors. Specifically, universities deploy various resources to support eco-conscious ventures, including specialized training programs, access

to green technology incubators, mentorship from sustainability experts, and funding opportunities for green startups. A wealth of empirical studies corroborates the positive correlation between access to resources and entrepreneurial success (e.g., Shane & Venkataraman, 2000; Alvarez & Busenitz, 2001; Zahra & George, 2002). This study introduces the Green Entrepreneurial Behavior (GEB) model, merging resource allocation perspectives with individual predispositions toward green entrepreneurship.

Research objectives and questions

This research aims to clarify the impact of university entrepreneurial support on green entrepreneurial intentions and their subsequent influence on nascent green entrepreneurial endeavors, contributing to the enduring growth and sustainability in the sector (Timmons et al., 2004). This aim is addressed through the following research questions:

1. How does university entrepreneurial support influence green entrepreneurial behaviors among students?
2. How does university entrepreneurial support influence entrepreneurial self-efficacy in students?
3. How does university entrepreneurial support influence green entrepreneurial intentions among students?
4. Does entrepreneurial self-efficacy mediate the relationship between university entrepreneurial support and green entrepreneurial behaviors?
5. Does green entrepreneurial intention mediate the relationship between university entrepreneurial support and green entrepreneurial behaviors?
6. Do entrepreneurial self-efficacy and green entrepreneurial intentions jointly mediate the relationship between university entrepreneurial support and green entrepreneurial behaviors?

This study contributes to theory by examining the mediating roles of entrepreneurial self-efficacy and green entrepreneurial intentions. Entrepreneurial self-efficacy, defined as an individual's belief in their ability to successfully perform entrepreneurial tasks, is expected to act as a mediator, because individuals with higher self-efficacy are more likely to pursue and persist in entrepreneurial endeavors, especially in the face of challenges. This is consistent with social cognitive theory (Bandura, 1986). Similarly, green entrepreneurial intentions, reflecting an individual's conscious desire to start a green business, are expected to mediate the relationship, because intentions are a strong predictor of future behavior, as established in the theory of planned behavior (Ajzen, 1991).

The paper unfolds The subsequent section roots the study in its theoretical scaffold, postulating hypotheses grounded in the pertinent literature. A detailed exposition of the research methodology, encapsulating sample demographics, variable definitions, and measurement techniques, succeeds. Section four elucidates the empirical findings. Conclusions drawn from these findings are discussed in the fifth segment, intertwined with the broader implications of this study. The second-to-last section investigates the research's limitations, paving the way for future inquiries.

Theoretical framework and hypothesis integration

Resource-based view theory (RBV) and flow theory

This research interweaves two primary theoretical constructs, flow theory and resource-based view theory (RBV), to understand their intertwined effects on green entrepreneurial behaviour. The resource-based view (RBV) paradigm underscores the role of resource management and utilisation as foundational to universities' support for green entrepreneurship. Concurrently, Flow Theory offers a deep insight into entrepreneurial motivation.

Resource-based view theory

Instead of pinpointing factors that drive a firm's expansion, this study addresses a nuanced question: given the growth potential of particular firms, what underlying principles dictate the magnitude, rate, and sustainability of their growth? Penrose's seminal work on RBV, as Barney (1991) highlighted, underscores the pivotal role that internal resources play in fostering business expansion. Fundamentally, a resource crunch can hamper a company's growth trajectory. Proponents of the resource-based view (RBV) strategically leverage their firm's unique internal resources to establish a sustainable competitive advantage.

In the RBV framework, "resources" encompass many elements that influence a firm's operational efficacy and market competitiveness. These resources, ranging from tangible to intangible, become intertwined with the firm's identity, covering aspects, such as technological expertise, brand equity, human capital, operational processes, financial reservoirs, and industry linkages (Wernerfelt, 1984). Such resources foster value-centric strategies, including assets, capabilities, knowledge, and organisational attributes. The literature highlights three key dimensions: physical, human, and organisational capital resources (Fichter & Tiemann, 2018).

Universities, as institutional bastions, have shown a profound commitment to green entrepreneurial pursuits, engaging stakeholders, crafting conducive institutional frameworks, and channelling resources toward these endeavours. This confluence of support mechanisms (Wernerfelt, 1984) aligns with entrepreneurial theories, such as those posited by Alvarez and Busenitz (2001). Yi (2021) further buttresses this argument by emphasising the importance of "green university entrepreneurial assistance." This support becomes crucial in the nascent stages of businesses. Success hinges on astute resource utilisation, including financial underpinnings for acquiring infrastructure, technology, market insights, and trending knowledge. Recognising this, universities often offer incubation hubs, enabling nascent entrepreneurs to thrive, as shown in the study by Hameed et al. (2016). These hubs typically offer foundational services, such as office spaces, connectivity solutions, industry linkages, and seed funding (Hameed & Irfan, 2019).

In the current research landscape, there is a pressing need to understand the interaction between RBV and sustainable entrepreneurial pursuits. Specifically, the extent to which resource-based support universities extend to budding green entrepreneurs is of paramount interest. Within this study's ambit, "university green entrepreneurial support" denotes resource deployment toward fostering eco-conscious business ventures.

Flow theory

Propounded by Csikszentmihalyi (1975), Flow Theory investigates a unique psychological state, where individuals are deeply engrossed in an activity, rendering external influences almost inconsequential. This heightened intrinsic enjoyment can often motivate individuals to engage in the activity for its own sake, disregarding external rewards.

Flow Theory offers a holistic lens to grasp the dynamics of motivation. At its core, Flow Theory posits an alignment of motivation, personality, and subjective experiences to achieve desired outcomes (Csikszentmihalyi, 1990). When individuals are engrossed in optimally challenging activities, they are more poised to accomplish their objectives. Intrinsic motivation, stemming from personal gratification, is a linchpin in this construct, juxtaposed against extrinsic motivation driven by external rewards (Davis et al., 1992). The "flow experience," rich in intrinsic interest, perceived control, curiosity, and focused attention, emerges as a cornerstone in this discourse. Studies have shed light on the profound impact of these flow components on user engagement and satisfaction across varied domains.

Recent research has also probed the nexus between Flow Theory and the academic milieu, highlighting the significance of intrinsic motivators, such as the flow state, in driving self-directed learning (Liao, 2006). Mustafa et al. (2016) posited that environmentally conscious students proactively establish eco-centric ventures. Furthermore, universities serving as knowledge hubs equip students with skills to navigate entrepreneurial pathways, as corroborated by Waris et al. (2021).

This study aspires to expand the realms of Flow Theory by examining its applicability to green entrepreneurial pursuits. The research investigates green businesses' intrinsic allure and influence on individuals' proclivity toward green entrepreneurial ventures. The surging emphasis on ecological sustainability has catalysed a burgeoning interest in "green entrepreneurial activities"—ventures rooted in environmental stewardship and minimising ecological footprints.

University entrepreneurial support (UES): an exploration into green entrepreneurship

Recent studies highlight a growing trend among universities: integrating ecological principles into their entrepreneurial support structures. These academic institutions champion eco-conscious entrepreneurial endeavours, emphasising that while possessing entrepreneurial desires strongly predicts engagement in entrepreneurial activities, intention alone does not guarantee action.

Building on insights from Shirokova et al. (2016) and Shinnar et al. (2018), it becomes clear that multiple determinants influence the intention–behavior continuum in entrepreneurship. The resource-based theory underscores the significance of entrepreneurial resources in facilitating the progressive growth of startups (Timmons et al., 2004). As Xie and Lv (2018) exemplified, contemporary discussions further investigate how different resources shape the nexus between entrepreneurial intention and realised behaviour.

Informed by the theoretical frameworks of Alvarez and Busenitz (2001) on entrepreneurship and Fichter and Tiemann (2018) on university support mechanisms, this research aims to decipher the complex interplay between university entrepreneurial support systems and green entrepreneurial intentions and behaviours. To achieve this,

reflecting upon the critical stakeholders within academic environments, the overarching institutional frameworks, and the available resources is imperative.

Rothaermel et al. (2007), in their seminal work, identified two core arenas of university-backed initiatives fostering their entrepreneurial roles:

1. *Operational Facets* Termed "green entrepreneurial platforms", these comprise infrastructures such as science and technology parks, innovation hubs, and incubation centres tailored for university students.
2. *Pedagogical Endeavors* This focuses on education-centric efforts for budding entrepreneurs, emphasising entrepreneurial education rooted in eco-centric principles.

Supporting the educational emphasis, Ginanjar's case study (2016) underscores the pivotal role of education in nurturing entrepreneurial spirits within higher education realms. Furthermore, university-led entrepreneurship curriculums, especially those emphasising experiential learning, correlate positively with students' entrepreneurial actions. As validated by Ho, Low, and Wong (2014), such immersive programs substantially shape students' entrepreneurial trajectories, spurring the inception of novel businesses within educational confines. Li et al. (2016) reinforce this perspective, emphasising that green entrepreneurial education has the potential to recalibrate students' intentions and actions toward environmentally sustainable growth.

With this background, our investigation delineates four cardinal pillars of university entrepreneurial support, instrumental in catalysing green entrepreneurial activities within academia:

1. *Educational frameworks* Curriculum emphasising entrepreneurship through an environmental sustainability lens.
2. *Infrastructure and strategy* Establishing and implementing infrastructures, strategies, and funding mechanisms catering to green entrepreneurial ventures.
3. *Policy formulation* Drafting and enforcing regulations and policies propelling green entrepreneurial initiatives.
4. *Cultural cultivation* Fostering a university culture prioritising and celebrating green entrepreneurial pursuits.

The crux of our inquiry lies in understanding the transformative role of university-backed initiatives in metamorphosing students' eco-entrepreneurial aspirations into tangible green entrepreneurial endeavours.

Entrepreneurial self-efficacy (ESE) and its influence on green entrepreneurial behavior

Confidence in personal competencies is central to an individual's drive and behaviour, widely recognised as self-efficacy. As Bandura (2007) and Krueger (2000) articulated, self-efficacy captures an individual's belief in their capacity to execute particular tasks and their agility in adopting new behaviours. Exploring the entrepreneurial realm, entrepreneurial self-efficacy (ESE) crystallises as the internal conviction one holds about one's capabilities to initiate and sustain a successful business venture (Newman, 2019; Shahab et al., 2019).

Many empirical studies corroborate the positive correlation between ESE and the drive to chase entrepreneurial aspirations. Both Asimakopoulos (2019) and Mei (2017) underscore the notion that individuals endowed with a heightened level of ESE naturally exhibit a stronger propensity to explore entrepreneurial realms, underscoring the pivotal role of self-confidence in moulding entrepreneurial terrains.

This underlying principle, while universally applicable to traditional business endeavours, assumes paramount importance in the context of green entrepreneurship—a realm gaining significant traction in contemporary times. Several scholarly discourses, including those by Osiri et al. (2019) and Tsai et al., (2016a, 2016b), have highlighted the compelling nexus between entrepreneurial intentions and ESE.

Positioning this within the framework of our current investigation, we pivot our focus toward understanding ESE in the light of green entrepreneurial behaviour. Specifically, we aim to gauge the depth of students' confidence in spearheading a business initiative that not only thrives in its entrepreneurial essence but also ardently champions the ethos of environmental sustainability.

Green entrepreneurial intentions (GEIs): a deep dive into the nexus of environmental consciousness and entrepreneurial drive

The link between intended actions and their anticipated results traverses a wide range of disciplines, consistently hinging on the strength of intentions (Ajzen, 1991; Bae et al., 2014; Krueger et al., 2000a, 2000b). In the entrepreneurial context, intention solidifies an individual's commitment to embark on a new business endeavour (Krueger, 1993). Such entrepreneurial intentions have become a fulcrum of research attention, rooted in the understanding that entrepreneurship predominantly emerges from a premeditated, intention-fueled drive (Liñán & Fayolle, 2015). Consequently, scholars argue that the actions of entrepreneurs are primarily predicated upon their ingrained intentions (Fayolle et al., 2014; Kautonen et al., 2015).

Models anchored in intentions offer insightful lenses, enabling researchers to demystify the entrepreneurial mindset, revealing the fundamental drivers pushing individuals toward entrepreneurship (Liñán & Fayolle, 2015). Ajzen's Theory of Planned Behavior is a pivotal framework in this discourse, which evolved from Ajzen and Fishbein's (1980) foundational Theory of Reasoned Action. Within this context, intention, as articulated by Krueger et al., (2000a, 2000b), signifies an individual's readiness and commitment to entrepreneurial endeavours. A body of research reinforces this perspective, emphasising the significant role of intentions in shaping entrepreneurial paths (Kautonen et al., 2015; Shinnar et al., 2018). Reinforcing this notion, Kautonen et al. (2015) highlight the inextricable relationship between an individual's entrepreneurial intentions and their eventual engagement with startups.

However, a distinctive sub-domain has burgeoned amidst this vast expanse: green entrepreneurial intentions (GEIs). This encapsulates an individual's fervour to charter environmentally attuned entrepreneurial avenues and their commitment to mobilise resources in such directions (Van Gelderen et al., 2015). Schlaegel and Koenig (2014) postulate that venturing into the verdant entrepreneurship realm is a calculated, intent-laden endeavour. Consequently, green entrepreneurship is not merely serendipitous; it is an orchestrated journey, with its genesis anchored

in robust green entrepreneurial aspirations. Bolstering this narrative, the theory of planned behaviour underscores a linear, affirmative relationship between one's proclivity toward green entrepreneurial pursuits and the vigour of their intentions (Ajzen, 1991).

Green entrepreneurial behaviors (GEB): an exploration of sustainability-driven ventures

Recently, the scholarly realm has witnessed the emergence of concepts surrounding "green entrepreneurship" and the associated behaviours (Burzyńska et al., 2018). Historians of the subject trace the marriage of entrepreneurial vigour with ecological mindfulness back to the early 1990s, as articulated by pioneers like Blue (1990) and Bennett (1991). As with any burgeoning field, "green entrepreneurship" has evolved, leading to divergent interpretations and a lack of a universally accepted definition.

Gast et al. (2017) conducted an exhaustive review of existing literature and identified various terms that resonate with green entrepreneurship. These encompass eco-entrepreneurship, environmental entrepreneurship, and sustainability-driven entrepreneurship, among others.

At its core, "green entrepreneurship" is often delineated as endeavouring to forge innovative products and solutions tailored to combat environmental challenges (Blue, 1990). Beyond the allure of profit, these ventures are birthed from a more profound ecological ethos (Jolink & Niesten, 2015). Schaltegger (2002) provided a nuanced perspective, suggesting that eco-entrepreneurship zeroes in on nascent businesses championing green products or services. On the other hand, Domańska, Żukowska, and Zajkowski (2018) proffered a more expansive definition, viewing "green entrepreneurship" as an avant-garde, market-responsive approach that seamlessly integrates eco-friendly management techniques and cleaner production paradigms, ultimately spawning enterprises deeply intertwined with nature and ecological resources.

The entrepreneurial tapestry is often woven with ideas, financial scaffolding, innovative thrust, and authorisation (Borasi & Finnigan, 2010). Despite a plethora of research on entrepreneurial behaviours, there remains a conspicuous void regarding green entrepreneurial intention and its indicator, especially among the youth in academic institutions. The crux lies in unravelling the myriad determinants shaping such behaviours. O'Neill and Gibbs (2016) posited that green entrepreneurs do not just oscillate between profit and planet; they meld economic and ecological tenets to champion environmentally harmonious offerings. Echoing this, Lotfi et al. (2018) emphasised that green entrepreneurial practices transcend traditional business modalities, reflecting an unwavering commitment to eco-centric stewardship.

This study orbits around green entrepreneurship, anchored in sustainability and driven by profound environmental principles. It underscores the confluence of economic, societal, and ecological imperatives in creating and promoting eco-conscious products and services. However, the question remains: what shapes green entrepreneurial behaviours within the academic context? Researching this query, this study seeks to illuminate the determinants of green entrepreneurial behaviours among university students, laying the foundation for fostering and expanding green entrepreneurship in upcoming generations.

Hypotheses of the study

In the quest to unravel the intricate relationships between university support, entrepreneurial self-efficacy, green intentions, and green entrepreneurial behaviours, the study posits the following hypotheses:

H1 University entrepreneurial support enhances entrepreneurial self-efficacy.

H2 University entrepreneurial support positively influences green entrepreneurial behaviours.

H3 University entrepreneurial support positively impacts green entrepreneurial intention.

H4 Higher entrepreneurial self-efficacy leads to increased green entrepreneurial behaviour.

H5 Enhanced entrepreneurial self-efficacy boosts green entrepreneurial intentions.

H6 Stronger green entrepreneurial intentions foster green entrepreneurial behaviours.

H7 Entrepreneurial self-efficacy acts as a mediator between university entrepreneurial support and green entrepreneurial intentions.

H8 Entrepreneurial self-efficacy links university entrepreneurial support to green entrepreneurial behaviours.

H9 Green entrepreneurial intentions mediate the relationship between university entrepreneurial support and green entrepreneurial behaviours.

H10 Green entrepreneurial intentions are intermediaries between entrepreneurial self-efficacy and green entrepreneurial behaviours.

H11 Both entrepreneurial self-efficacy and green entrepreneurial intentions collectively mediate the link between university entrepreneurial support and green entrepreneurial behaviours.

Research method

Sample

Data collection took place in Thailand, targeting entrepreneurial students from public universities. We adopted a convenience sampling methodology for the study. We designed and disseminated the questionnaire using Google Forms, a reputable web-based survey tool. The distribution primarily occurred via online channels, which included social media platforms, such as Facebook, Instagram, and WhatsApp, as well

as various online forums. An accompanying description briefly outlining the study's objectives was also provided to potential participants.

The data collection spanned 2 months, from January to February 2023, as summarised in Table 1. Initially, 387 respondents participated. Nevertheless, in the data screening process, 49 responses were omitted because of missing or partial data, yielding a final sample of 338 participants for the research.

Instrument

The foundation of this study is quantitative data obtained through surveys. These survey items were derived from existing literature and subsequently refined to align with our research objectives. As recommended by prior literature, we employed a five-point Likert scale with anchors ranging from 'strongly disagree' (1) to 'strongly agree' (5). Specifically, the university entrepreneurial support factor items were adapted from Yi (2021), while those addressing entrepreneurial self-efficacy were sourced from Shi et al. (2019). Qazi et al. (2021) informed the green entrepreneurial intentions scale, and items focusing on green entrepreneurial behaviours were based on Yi (2021).

University entrepreneurial support for green initiatives (Adapted from Yi, 2021)

To measure the degree of a university's backing for green entrepreneurship, we modified an instrument derived from Yi (2021) to precisely evaluate the institution's support and resources for eco-friendly business ventures. The revised items focus on the university's role in fostering green entrepreneurial mindsets, offering relevant coursework,

Table 1 Demographic profiles

Items	Frequency ($n = 338$)	Per cent
Gender		
Male	163	48.2
Female	175	51.8
Age (years)		
18–21	82	24.3
22–25	85	25.1
26–29	61	18.0
30–33	60	17.8
Above 34	50	14.8
Education		
Undergraduate	82	24.3
Graduate	256	75.7
Salary (Thai Baht)		
20,001–30,000	67	19.8
30,001–40,000	141	41.7
Above 40,000	130	38.5
Region		
Capital city (Bangkok)	70	20.8
Central	74	21.9
Northern	65	19.2
Northeastern	67	19.8
Southern	62	18.3

providing structured support schemes, and availing financial assistance for budding green businesses. The items are as follows:

1. My university actively encourages students to pursue green business ventures.
2. My university has dedicated courses on sustainable or green entrepreneurship.
3. My university has established support schemes specifically for green entrepreneurship.
4. My university offers financial support to students launching environmentally friendly businesses.

Entrepreneurial self-efficacy (Adapted from Shi et al., 2019)

Rephrase the text, and keep the terminologies. It is for the research paper. The revised items have been tailored to evaluate students' confidence in their creativity and ability to innovate new products, discern new business opportunities, and transform ideas into commercial ventures. The items are as follows:

1. I possess the confidence and creativity required for entrepreneurship.
2. I have the confidence to innovate and create new products successfully.
3. I am assured of my capacity to recognise and capitalise on new business prospects.
4. I am assured of my capacity to commercialise innovative ideas or developments.

Green entrepreneurial intentions (Adapted from Qazi et al., 2021)

We adapted an instrument from Qazi et al. (2021) to gauge "green entrepreneurial intentions" and tailored it to suit the research's objectives. The revised items assess a student's professional ambition related to green entrepreneurship during their university years, their determination to become a green entrepreneur, the conceptualisation of green enterprise ideas, and their initial considerations for implementing such entrepreneurship. The items are as follows:

1. Throughout my university education, my foremost professional aspiration was to emerge as a green entrepreneur.
2. I was determined to pursue green entrepreneurship throughout my university years.
3. During my time at university, I conceived the idea of a green enterprise for future implementation.
4. I considered pursuing green entrepreneurship, while I was studying at university.

Green entrepreneurial behaviours (Adapted from Yi, 2021)

Drawing from Yi (2021), we adapted an instrument to measure "green entrepreneurial behaviours" and modified it in line with the research's objectives. The revised items evaluate an entrepreneur's proactive steps toward establishing a green business. These steps include crafting a business plan focused on sustainability, registering the green business, seeking external financing, initiating green product or service development, and procuring the necessary resources. The items are as follows:

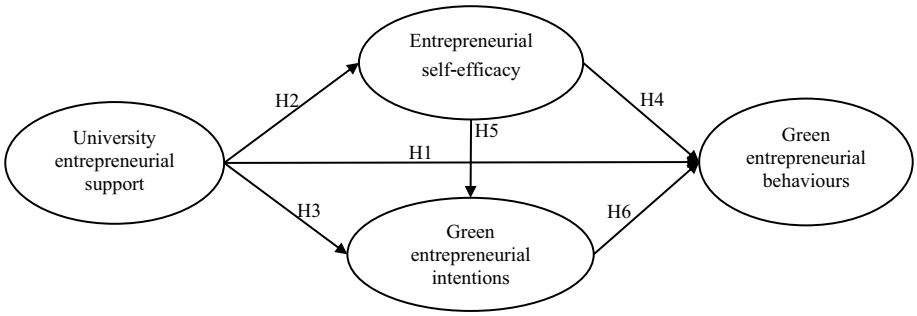

Fig. 1 Conceptual model

Table 2 KMO and Bartlett's test

Factors	Kaiser–Meyer–Olkin measure of sampling adequacy	Bartlett's test—approx. Chi-square	Bartlett's test—df	Bartlett's test—Sig
SEF	0.7	717.874	6	0
UNS	0.803	921.979	6	0
GEI	0.765	725.596	6	0
GEB	0.674	1072.265	10	0

1. I crafted a business plan centred on green entrepreneurship.
2. I officially registered my green business.
3. I sought external financing for my green venture.
4. I began the development of green products or services.
5. I procured materials, machinery, and equipment tailored for my sustainable business.

Results

Measurement model analysis

We subjected all four hypothesised components to rigorous statistical testing in assessing our measurement model. As depicted in Fig. 1, the model demonstrated a commendable fit with the empirical data, evidenced by the following fit indices: $\chi^2(111) = 334.541$, RMSEA = 0.077, SRMR = 0.044, CFI = 0.937, and TLI = 0.923. The results of KMO and Bartlett's test are given in Table 2, and it indicates that the data is generally suitable for factor analysis. While the KMO value for GEB (0.674) is slightly below the recommended 0.7 threshold, the significant Bartlett's test of sphericity ($p < 0.001$) for all factors supports the appropriateness of factor analysis.

We evaluated the internal consistency of our scale through Cronbach's alpha, which produced values between 0.84 and 0.89. These values indicate high reliability, consistent with the guidelines suggested by Nunnally (1978).

Initial data analysis further emphasized the solidity of our model. Confirmatory factor analysis (CFA) displayed factor loadings greater than 0.5, indicating their statistical relevance. Consistent with the guidelines outlined by Hair et al. (2014), each construct in our model meets the criteria for further investigation, as detailed in Table 3.

Table 3 Confirmatory factor analysis

Items	Loading	AVE	CR	α
University entrepreneurial support (adapted from Yi, 2021)		0.52	0.81	0.84
My university actively encourages students to pursue green business ventures	0.639			
My university has dedicated courses on sustainable or green entrepreneurship	0.640			
My university has established support schemes specifically for green entrepreneurship	0.661			
My university offers financial support to students launching environmentally friendly businesses	0.906			
Entrepreneurial self-efficacy (adapted from Shi et al., 2019)		0.71	0.91	0.89
I possess the confidence and creativity required for entrepreneurship	0.834			
I have the confidence to innovate and create new products successfully	0.903			
I am assured of my ability to identify and seize new business opportunities	0.845			
I am assured of my capacity to commercialise innovative ideas or developments	0.794			
Green entrepreneurial intentions (adapted from Qazi et al., 2021)		0.63	0.87	0.87
Throughout my university education, my foremost professional aspiration was to emerge as a green entrepreneur	0.634			
Throughout my university years, I was determined to pursue green entrepreneurship	0.851			
While at university, I conceived the idea of a green enterprise for future implementation	0.775			
I considered pursuing green entrepreneurship, while I was studying at university	0.884			
Green entrepreneurial behaviours (adapted from Yi, 2021)		0.55	0.86	0.87
I crafted a business plan centred on green entrepreneurship	0.522			
I officially registered my green business	0.775			
I sought external financing for my green venture	0.612			
I began the development of green products or services	0.933			
I procured materials, machinery, and equipment tailored for my sustainable business	0.808			

Table 4 Discriminant analysis

Factors	Mean	S.D	1	2	3	4
1. University entrepreneurial support	4.58	0.42	0.721			
2. Entrepreneurial self-efficacy	4.18	0.59	0.115*	0.842		
3. Green entrepreneurial intentions	4.37	0.57	0.167**	0.171**	0.793	
4. Green entrepreneurial behaviours	4.49	0.49	0.094	0.131*	0.394**	0.741

Diagonal presents the square root of AVE. * Indicates the significance level

In addition, we probed the convergent validity of our metrics by examining the Composite Reliability (C.R.) and Average Variance Extracted (AVE). Our analysis indicated C.R. values ranging from 0.81 to 0.91, surpassing the suggested threshold of 0.70. Similarly, AVE values spanned from 0.52 to 0.71, outstripping the 0.50 benchmark posited by Fornell and Larcker (1981).

We juxtaposed the square root of AVE for each construct to evaluate discriminant validity with its correlation coefficients relative to other constructs. For every construct within this study, the square root of AVE surpassed its corresponding correlation coefficients, indicating discriminant solid validity (see Table 4 for a comprehensive breakdown).

Table 5 Direct path effect

HYP#	Hypotheses	Beta	*Z* value	*P* value	Decision
H1	UES—> ESE	0.125	2.064	< 0.05	Accepted
H2	UES—> GEI	0.166	2.740	< 0.01	Accepted
H3	UES—> GEB	0.062	1.046	> 0.05	Rejected
H4	ESE—> GEI	0.170	2.910	< 0.01	Accepted
H5	ESE—> GEB	0.082	1.447	> 0.05	Rejected
H6	GEI—> GEB	0.356	6.286	< 0.001	Accepted

R^2 of green entrepreneurial behaviors = 0.20, green entrepreneurial intentions = 0.12, entrepreneurial self-efficacy = 0.12

Table 6 Mediation effect

HYP#	Mediating Paths	Mean	(STDEV)	T Statistics	P	Decision
H7	UES—> ESE—> GEI	0.06	0.03	2.40	0.02	Accepted
H8	UES—> ESE—> GEB	0.01	0.01	1.06	0.29	Rejected
H9	UES—> GEI—> GEB	0.06	0.02	2.74	0.01	Accepted
H10	ESE—> GEI—> GEB	0.06	0.03	2.36	0.02	Accepted
H11	UES—> ESE—> GEI—> GEB	0.06	0.02	2.68	0.01	Accepted

R^2 green entrepreneurial behaviors = 0.26, green entrepreneurial intentions = 0.16, entrepreneurial self-efficacy = 0.12

Model analysis

The outcomes of our hypothesis evaluations are concisely presented in Table 5. Based on the fit indices of our structural model, the data is aptly captured, demonstrating a chi-square ($\chi 2$) value of 334.541, degrees of freedom (df) standing at 111, root mean square error of approximation (RMSEA) registering 0.077, standardized root mean square residual (SRMR) measuring 0.044, comparative fit index (CFI) recording 0.937, and the Tucker–Lewis index (TLI) noting 0.923. A pivotal finding from our research is the significant and positive link between university entrepreneurial support and entrepreneurial self-efficacy, evidenced by a beta value of 0.125 and a Z-score of 2.064*. Furthermore, university entrepreneurial support was observed to significantly bolster green entrepreneurial intentions ($\beta = 0.166$; $Z = 2.740^{**}$), though it did not significantly impact green entrepreneurial behaviours ($\beta = 0.062$; $Z = 1.046$). Intriguingly, entrepreneurial self-efficacy directly impacted green entrepreneurial intentions ($\beta = 0.170$; $Z = 2.910$). However, it did not significantly influence green entrepreneurial behaviours ($\beta = 0.082$; $Z = 1.447^{**}$). A salient observation is the robust direct linkage between green entrepreneurial intentions and green entrepreneurial behaviours, emphasised by a β value of 0.356 and a Z score of 6.286^{***}.

The present study investigated the mediating dynamics proposed by Baron and Kenny (1986), as cited in Kline (2023), to examine the mediating role thoroughly. The outcomes of this investigation are depicted in Table 6, which illustrates the effects of mediation. The results of this investigation highlight a significant and statistically validated mediating influence of entrepreneurial self-efficacy in bridging university entrepreneurial support and green entrepreneurial intentions. However, this mediating influence did not establish in the relationship between entrepreneurial self-efficacy and green entrepreneurial behaviours. Notably, the mediating role of green entrepreneurial intentions was prominently observed as a robust connector between

university entrepreneurial support (UES) and green entrepreneurial behaviours (GEB).

The research results indicate a significant mediation effect of green entrepreneurial intentions on the connection between entrepreneurial self-efficacy and green entrepreneurial behaviours. In addition, the study introduced a multi-tiered mediation model. It was ascertained that support for entrepreneurship in universities plays a pivotal role in consecutively mediating green entrepreneurial behaviours. This serial mediation transpires via the combined effects of entrepreneurial self-efficacy and green entrepreneurial intentions. These findings augment our comprehension of the interrelationships among various determinants in entrepreneurial activities and elucidate the complex processes by which university-based entrepreneurial support, entrepreneurial self-efficacy, and green entrepreneurial intentions collectively steer green entrepreneurial behaviours.

Discussion

This research elucidates the multifaceted relationships among university support, entrepreneurial self-efficacy, and green entrepreneurial intentions and behaviors. Our findings highlight the critical role of university entrepreneurial support in fostering entrepreneurial self-efficacy and green entrepreneurial intentions, echoing the insights of Wright et al. (2015) on the fundamental importance of institutional backing in nurturing entrepreneurial initiatives. This aligns with resource-based theory, which posits that access to resources, such as those provided by universities (e.g., training, funding, mentorship), is crucial for entrepreneurial success.

This study demonstrates that university support significantly boosts entrepreneurial self-efficacy, aligning with the observations by Saeed et al. (2015), who found that perceived educational and concept development support from universities substantially influences students' entrepreneurial self-efficacy, which in turn significantly impacts their entrepreneurial intentions. This enhancement in self-efficacy is crucial as it not only boosts the confidence and capabilities of budding entrepreneurs but also steers them toward green entrepreneurial pathways, potentially leading to more sustainable business practices. This finding supports flow theory, as increased self-efficacy can lead to a state of flow, characterized by deep engagement and intrinsic motivation, which is essential for pursuing challenging endeavors like green entrepreneurship.

However, our findings reveal a more complex scenario, where university support does not *directly* translate into green entrepreneurial behaviors. This divergence from expectations suggests the presence of additional intervening variables that moderate the transition from entrepreneurial intention to action. This observation aligns with the findings by Alvarez-Risco et al., (2021a, 2021b), who noted the positive impact of educational and institutional support on entrepreneurial self-efficacy yet pointed out the necessity of further support mechanisms to bridge the gap to actual entrepreneurial behaviors. One possible reason for this is that while universities can foster intentions and self-efficacy, they may have less influence over external factors, such as market access, funding availability for green ventures, or regulatory hurdles. This indicates a crucial need for reevaluating the existing theoretical frameworks surrounding green entrepreneurship and suggests a more holistic approach that includes both internal (e.g., self-efficacy,

intentions) and external variables (e.g., market conditions, environmental factors, government policies).

Furthermore, our analysis supports the role of entrepreneurial self-efficacy as a significant driver of green entrepreneurial intentions, corroborating the research by Zhao et al., (2005), who highlighted the mediating role of self-efficacy in developing entrepreneurial intentions. This finding is consistent with the theory of planned behavior, which suggests that self-efficacy influences intentions. However, the direct impact of self-efficacy on green entrepreneurial behaviors was not evident, underscoring the complexities involved, as noted by Krueger et al., (2000a, 2000b). This lack of a direct pathway suggests the influence of additional external factors, which may include market readiness for green products and societal support for green initiatives, which were not accounted for in this study.

By integrating insights from these studies, our research contributes significantly to the literature by highlighting the nuanced roles that university support and self-efficacy play in fostering green entrepreneurial intentions and behaviors. While educational institutions can be pivotal in shaping eco-conscious entrepreneurial mindsets, actualizing these intentions into behaviors requires a conducive external environment and additional support mechanisms.

Conclusions

This research significantly advances our understanding of entrepreneurship, specifically in green ventures, by uncovering the intricate connections among university support, entrepreneurial self-efficacy, and green entrepreneurial intentions and behaviors. By demonstrating the pivotal role of academic institutions in nurturing and molding green entrepreneurial mindsets, our findings emphasize the importance of targeted educational and financial backing in bolstering entrepreneurial self-belief and intentions.

This study contributes to resource-based theory by demonstrating how universities act as crucial resource providers for aspiring green entrepreneurs. We show that access to university resources enhances self-efficacy and intentions, which are key internal resources for entrepreneurial success. This research also contributes to flow theory by highlighting the link between university support, enhanced self-efficacy, and the potential for students to experience flow in their pursuit of green ventures. By fostering self-efficacy, universities contribute to the intrinsic motivation and engagement necessary for sustained entrepreneurial effort.

Specifically, universities can learn from our results that focusing on programs that enhance entrepreneurial self-efficacy and foster green entrepreneurial intentions is crucial. This can be achieved through targeted workshops, mentorship programs with experienced green entrepreneurs, access to green technology incubators, and seed funding specifically for green ventures. Graduates and students can benefit by actively seeking out these university resources and engaging in activities that build their self-efficacy and clarify their green entrepreneurial intentions.

This research also highlights the need for universities to go beyond internal support and advocate for policies that create a more favorable external environment for green ventures, such as advocating for government incentives, fostering connections with green investors, and promoting consumer awareness of green products and services.

Limitations and future research directions

Limitations

1. *Generalizability* Our focus on undergraduate students in Thailand limits the generalizability of our findings. Future studies should explore a more diverse participant pool, including graduate students, alumni, and entrepreneurs from different demographic backgrounds and geographic locations, to verify whether these findings hold across different contexts.
2. *Research Design* The cross-sectional nature of this study provides only a snapshot in time, which may not accurately reflect the dynamic interplay of factors influencing green entrepreneurship over time. Future research should employ longitudinal designs to track changes in self-efficacy, intentions, and behaviors, allowing for a more robust understanding of causal relationships.
3. *Data Integrity* The reliance on self-reported data introduces the potential for response bias. Future studies could incorporate objective measures of entrepreneurial behavior, such as participation in business plan competitions, startup creation, or revenue generation, to complement self-reported data.
4. *External Factors* Our research primarily focused on individual-level determinants and did not explicitly account for macro-environmental factors, such as economic conditions, regulatory frameworks, or industry-specific dynamics. Future research should incorporate these external influences to provide a more comprehensive understanding of the drivers and barriers to green entrepreneurship.
5. *Lack of Predictive Analysis* This study focused on establishing the relationships between constructs based on existing theory and did not assess the predictive validity or out-of-sample prediction of the model. This limits our ability to determine how well the model can predict future green entrepreneurial behavior.

Future research directions

1. *Predictive analysis* Future studies should investigate the predictive validity of the proposed model using techniques such as holdout sample validation, k-fold cross-validation, or by assessing predictive accuracy metrics like Q^2 (Stone–Geisser Q-squared) in PLS–SEM or other relevant metrics in covariance-based SEM. This would provide valuable insights into the model's ability to predict future green entrepreneurial behavior.
2. *Exploring mediators and moderators* Future research could investigate other potential mediators, such as access to networks, social support, or specific entrepreneurial skills, and moderators, such as environmental awareness or risk aversion, to further refine our understanding of the relationships between university support, self-efficacy, intentions, and behaviors.
3. *Cross-cultural comparisons* Expanding the research to include various cultural contexts can help determine how cultural differences impact green entrepreneurship and identify best practices for supporting green entrepreneurs in different regions.

4. *Temporal dynamics* Longitudinal studies are crucial for understanding the long-term impact of university support on green entrepreneurial careers and the evolution of green ventures over time.
5. *Methodological diversity* Employing mixed-methods approaches, combining quantitative surveys with qualitative interviews or case studies, can provide richer insights into the lived experiences of green entrepreneurs and the nuances of their interactions with university support systems.
6. *Impact measurement* Future research should focus on developing robust metrics for measuring the impact of green ventures, considering not only financial performance but also environmental and social impact. This could include measures of carbon footprint reduction, resource efficiency, and social responsibility.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s13731-025-00494-9.

Additional file 1.

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Generative AI and AI-assisted technologies in the writing process
While preparing this work, the author(s) used Microsoft Word AI to check grammar and spelling. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the publication's content.

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Nimit Soonsan: conceptualization, methodology, visualization, and writing—review and editing. Hiran Prasankarn: project administration, methodology, and formal analysis. Piangjit Tanticharatwarodom: conceptualization, investigation, and funding acquisition. Jiraporn Prasankarn: writing—original draft, writing—review and editing, and supervision. Zulfiqar Ali Jumani: writing—original draft, and writing—review and editing.

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Availability of data and materials
The collected data will be shared at the request of the editor.

Declarations

Informed consent
This study did not include any human physically and did not ask for any physical touch.

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References

Ajzen, I. (1991). The theory of planned behaviour. *Organisational Behaviour and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-t
Ajzen, I., & Fishbein, M. (1980). *I am understanding attitudes and predicting social behaviour (Pbk)*. New Jersey: Prentice-Hall.
Alvarez, S. A., & Busenitz, L. W. (2001). The entrepreneurship of resource-based theory. *Journal of Management, 27*(6), 755–775. https://doi.org/10.1177/014920630102700609
Alvarez-Risco, A., Mlodzianowska, S., García-Ibarra, V., Rosen, M. A., & Del-Aguila-Arcentales, S. (2021a). Factors affecting green entrepreneurship intentions in business university students in COVID-19 pandemic times: Case of Ecuador. *Sustainability, 13*(11), 6447.

Alvarez-Risco, A., Mlodzianowska, S., Zamora-Ramos, U., & Del-Aguila-Arcentales, S. (2021b). Green entrepreneurship intention in university students: The case of Peru. *Entrepreneurial Business and Economics Review*. https://doi.org/10.15678/eber.2021.090406

Asimakopoulos, G., Hernández, V., & Peña Miguel, J. (2019). Entrepreneurial intention of engineering students: The role of social norms and entrepreneurial self-efficacy. *Sustainability, 11*(16), 4314. https://doi.org/10.3390/su11164314

Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The relationship between entrepreneurship education and entrepreneurial intentions: A meta–analytic review. *Entrepreneurship Theory and Practice, 38*(2), 217–254. https://doi.org/10.1111/etap.12095

Bandura, A. (2007). Self-efficacy in health functioning. *Cambridge Handbook of Psychology, Health & Medicine, 2*, 289–315.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research:Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173.

Bennett, S. J. (1991). *Ecopreneuring: The complete guide to small business opportunities from the environmental revolution*. New York: Wiley.

Blue, J. (1990). *Ecopreneuring: Managing for results*. London: Scott Foresman.

Bogatyreva, K., Edelman, L. F., Manolova, T. S., Osiyevskyy, O., & Shirokova, G. (2019). When do entrepreneurial intentions lead to actions? The role of national culture. *Journal of Business Research, 96*, 309–321. https://doi.org/10.1016/j.jbusres.2018.11.034

Borasi, R., & Finnigan, K. (2010). Entrepreneurial attitudes and behaviours that can help prepare successful change agents in education. *The New Educator, 6*(1), 1–29. https://doi.org/10.1080/1547688x.2010.10399586

Burzyńska, D., Jabłońska, M., & Dziuba, R. (2018). Opportunities and conditions for the development of green entrepreneurship in the Polish textile sector. *Fibres & Textiles in Eastern Europe, 2*(128), 13–19. https://doi.org/10.5604/01.3001.0011.5733

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety. San Francisco*. CA US: Jossey-Bass.

Csikszentmihalyi, M. (1990). *Flow: the psychology of optimal experience (First)*. New York: Harper & Row.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace 1. *Journal of Applied Social Psychology, 22*(14), 1111–1132.

Demirel, P., Li, Q. C., Rentocchini, F., & Tamvada, J. P. (2019). Born to be green: New insights into the economics and management of green entrepreneurship. *Small Business Economics, 52*(4), 759–771. https://doi.org/10.1007/s11187-017-9933-z

Domańska, A., Żukowska, B., & Zajkowski, R. (2018). Green entrepreneurship as a connector among social, environmental and economic pillars of sustainable development why are some countries more agile? *Problemy Ekorozwoju, 13*(2), 67–76.

Fayolle, A., Liñán, F., & Moriano, J. A. (2014). Beyond entrepreneurial intentions: Values and motivations in entrepreneurship. *International Entrepreneurship and Management Journal, 10*, 679–689. https://doi.org/10.1007/s11365-014-0306-7

Fichter, K., & Tiemann, I. (2018). Factors influencing university support for sustainable entrepreneurship: Insights from explorative case studies. *Journal of Cleaner Production, 175*, 512–524. https://doi.org/10.1016/j.jclepro.2017.12.031

Fornell, C., & Larcker, D. F. (1981). I am evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50.

Gao, B. (2017). Third 'nternet+' college students innovation and entrepreneurship competition, *The People's Daily*.

Gast, J., Gundolf, K., & Cesinger, B. (2017). Doing business in a green way: A systematic review of the ecological sustainability entrepreneurship literature and future research directions. *Journal of Cleaner Production, 147*, 44–56. https://doi.org/10.1016/j.jclepro.2017.01.065

Ginanjar, A. (2016). *Entrepreneurship education and entrepreneurial intention on entrepreneurship behaviour: a case study*. Paris: Atlantis Press.

Grinevich, V., Huber, F., Karataş-Özkan, M., & Yavuz, Ç. (2019). Green entrepreneurship in the sharing economy: Utilising multiplicity of institutional logics. *Small Business Economics, 52*, 859–876. https://doi.org/10.1007/s11187-017-9935-x

Hair, J. F., Jr., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review, 26*(2), 106–121.

Hall, J. K., Daneke, G. A., & Lenox, M. J. (2010). Sustainable development and entrepreneurship: Past contributions and future directions. *Journal of Business Venturing, 25*(5), 439–448. https://doi.org/10.1016/j.jbusvent.2010.01.002

Hameed, I., & Irfan, Z. (2019). Entrepreneurship education: A review of challenges, characteristics and opportunities. *Entrepreneurship Education, 2*, 135–148.

Hameed, I., Khan, M. B., Shahab, A., Hameed, I., & Qadeer, F. (2016). Science, technology and innovation through entrepreneurship education in the United Arab Emirates (UAE). *Sustainability, 8*(12), 1280.

Ho, Y. P., Low, P. C., & Wong, P. K. (2014). *Do university entrepreneurship programs influence students' entrepreneurial behaviour? An empirical analysis of university students in Singapore*. England: Emerald Group Publishing Limited.

Jolink, A., & Niesten, E. (2015). Sustainable development and business models of entrepreneurs in the organic food industry. *Business Strategy and the Environment, 24*(6), 386–401. https://doi.org/10.1002/bse.1826

Kautonen, T., Hatak, I., Kibler, E., & Wainwright, T. (2015). Emergence of entrepreneurial behaviour: The role of age-based self-image. *Journal of Economic Psychology, 50*, 41–51. https://doi.org/10.1016/j.joep.2015.07.004

Kautonen, T., Van Gelderen, M., & Tornikoski, E. T. (2013). Predicting entrepreneurial behaviour: A test of the theory of planned behaviour. *Applied Economics, 45*(6), 697–707. https://doi.org/10.1080/00036846.2011.610750

Kline, R. B. (2023). *Principles and practice of structural equation modelling*. New York: Guilford publications.

Krueger, N. (1993). The impact of prior entrepreneurial exposure on perceptions of new venture feasibility and desirability. *Entrepreneurship Theory and Practice, 18*(1), 5–21. https://doi.org/10.1177/104225879301800101

Krueger, N. F., Jr., Reilly, M. D., & Carsrud, A. L. (2000a). Competing models of entrepreneurial intentions. *Journal of Business Venturing, 15*(5–6), 411–432. https://doi.org/10.1016/s0883-9026(98)00033-0

Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000b). Competing models of entrepreneurial intentions. *Journal of Business Venturing, 15*(5–6), 411–432.

Li, H., Chen, J., Xu, X., & Zhao, Z. (2016). Research on the trend of green entrepreneurship education in colleges and universities. *China Market, 52*, 71–74.
Liao, L. F. (2006). A flow theory perspective on learner motivation and behaviour in distance education. *Distance Education, 27*(1), 45–62.
Liñán, F., & Fayolle, A. (2015). A systematic literature review on entrepreneurial intentions: Citation, thematic analyses, and research agenda. *International Entrepreneurship and Management Journal, 11*, 907–933. https://doi.org/10.1007/s11365-015-0356-5
Lotfi, M., Yousefi, A., & Jafari, S. (2018). The effect of the emerging green market on green entrepreneurship and sustainable development in knowledge-based companies. *Sustainability, 10*(7), 2308. https://doi.org/10.3390/su10072308
Mei, H., Ma, Z., Jiao, S., Chen, X., Lv, X., & Zhan, Z. (2017). The sustainable personality in entrepreneurship: The relationship between big six personality, entrepreneurial self-efficacy, and entrepreneurial intention in the chinese context. *Sustainability, 9*(9), 1649. https://doi.org/10.3390/su9091649
Mustafa, M. J., Hernandez, E., Mahon, C., & Chee, L. K. (2016). Entrepreneurial intentions of university students in an emerging economy: The influence of university support and proactive personality on students' entrepreneurial intention. *Journal of Entrepreneurship in Emerging Economies, 8*(2), 162–179.
Newman, A., Obschonka, M., Schwarz, S., Cohen, M., & Nielsen, I. (2019). Entrepreneurial self-efficacy: A systematic review of the literature on its theoretical foundations, measurement, antecedents, and outcomes, and an agenda for future research. *Journal of Vocational Behavior, 110*, 403–419. https://doi.org/10.1016/j.jvb.2018.05.012
Nunnally, J. C. (1978). *An overview of psychological measurement*. Spring: Cham.
Odei, S. A., & Anderson, H. J. (2021). Analyzing higher educational institutions' role in fulfilling their third mission. *The Region, 8*(1), 119–134.
O'Neill, K., & Gibbs, D. (2016). Rethinking green entrepreneurship–Fluid narratives of the green economy. *Environment and Planning A: Economy and Space, 48*(9), 1727-1749.
Osiri, J. K., Kungu, K., & Dilbeck, M. (2019). Predictors of entrepreneurial intentions and social entrepreneurial intentions: A look at proactive personality, self-efficacy and creativity. *Journal of Business Diversity, 19*(1), 42–52.
Qazi, W., Qureshi, J. A., Raza, S. A., Khan, K. A., & Qureshi, M. A. (2021). Impact of personality traits and university green entrepreneurial support on students' green entrepreneurial intentions: The moderating role of environmental values. *Journal of Applied Research in Higher Education, 13*(4), 1154–1180. https://doi.org/10.1108/JARHE-05-2020-0130
Rothaermel, F. T., Agung, S. D., & Jiang, L. (2007). University entrepreneurship: A taxonomy of the literature. *Industrial and Corporate Change, 16*(4), 691–791. https://doi.org/10.1093/icc/dtm023
Saeed, S., Yousafzai, S., Yani-De-Soriano, M., & Muffatto, M. (2015). The role of perceived university support in the formation of students' entrepreneurial intention. *Journal of Small Business Management, 53*, 1127–1145. https://doi.org/10.1111/jsbm.12090
Schaltegger, S. (2002). A framework for ecopreneurship: Leading bioneers and environmental managers to ecopreneurship. *Greener Management International, 38*, 45–58.
Schlaegel, C., & Koenig, M. (2014). Determinants of entrepreneurial intent: A meta–analytic test and integration of competing models. *Entrepreneurship Theory and Practice, 38*(2), 291–332. https://doi.org/10.1111/etap.12087
Shahab, Y., Chengang, Y., Arbizu, A. D., & Haider, M. J. (2019). Entrepreneurial self-efficacy and intention: Do entrepreneurial creativity and education matter? *International Journal of Entrepreneurial Behavior Research, 25*(2), 259–280. https://doi.org/10.1108/ijebr-12-2017-0522
Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy ofManagement Review, 25*(1), 217-226.
Shepherd, D. A., & Patzelt, H. (2011). The new field of sustainable entrepreneurship: Studying entrepreneurial action linking "what is to be sustained" with "what is to be developed." *Entrepreneurship Theory and Practice, 35*(1), 137–163. https://doi.org/10.1111/j.1540-6520.2010.00426.x
Shi, L., Yao, X., & Wu, W. (2019). Perceived university support, entrepreneurial self-efficacy, heterogeneous entrepreneurial intentions in entrepreneurship education: The moderating role of the Chinese sense of face. *Journal of Entrepreneurship in Emerging Economies, 12*(2), 205–230. https://doi.org/10.1108/jeee-04-2019-0040
Shinnar, R. S., Hsu, D. K., Powell, B. C., & Zhou, H. (2018). Entrepreneurial intentions and startups: Are women or men more likely to enact their intentions? *International Small Business Journal, 36*(1), 60–80. https://doi.org/10.1177/0266242617704277
Shirokova, G., Osiyevskyy, O., & Bogatyreva, K. (2016). Exploring the intention–behaviour link in student entrepreneurship: Moderating effects of individual and environmental characteristics. *European Management Journal, 34*(4), 386–399. https://doi.org/10.1016/j.emj.2015.12.007
Timmons, J. A., Spinelli, S., & Tan, Y. (2004). *New venture creation: Entrepreneurship for the 21st century*. New York: McGraw-Hill/Irwin.
Tsai, K. H., Chang, H. C., & Peng, C. Y. (2016a). Extending the link between entrepreneurial self-efficacy and intention: A moderated mediation model. *International Entrepreneurship and Management Journal, 12*, 445–463. https://doi.org/10.1007/s11365-014-0351-2
Tsai, K. H., Chang, H. C., & Peng, C. Y. (2016b). Refining the linkage between perceived capability and entrepreneurial intention: Roles of perceived opportunity, fear of failure, and gender. *International Entrepreneurship and Management Journal, 12*(4), 1127–1145. https://doi.org/10.1007/s11365-016-0383-x
Van Gelderen, M., Kautonen, T., & Fink, M. (2015). From entrepreneurial intentions to actions: Self-control and action-related doubt, fear, and aversion. *Journal of Business Venturing, 30*(5), 655–673. https://doi.org/10.1016/j.jbusvent.2015.01.003
Waris, I., Farooq, M., Hameed, I., & Shahab, A. (2021). Promoting sustainable ventures among university students in Pakistan: An empirical study based on the theory of planned behaviour. *On the Horizon, 29*(1), 1–16.
Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal, 5*(2), 171–180.
Wright, M., Hmieleski, K. M., Siegel, D. S., & Ensley, M. D. (2015). The role of human capital in technological entrepreneurship. *Entrepreneurship Theory and Practice, 39*(2), 223–243.

Xie, X., & Lv, J. (2018). Female technology entrepreneurs: resource shortages and reputation challenges–a view of institutional support. *International Entrepreneurship and Management Journal*. https://doi.org/10.1007/s11365-017-0450-y

Yi, G. (2021). From green entrepreneurial intentions to green entrepreneurial behaviours: The role of university entrepreneurial support and external institutional support. *International Entrepreneurship and Management Journal, 17*(2), 963–979. https://doi.org/10.1007/s11365-020-00649-y

Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review, 27*(2), 185–203.

Zhao, H., Seibert, S. E., & Hills, G. E. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of Applied Psychology, 90*(6), 1265.

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