

Green Entrepreneurial Leadership and Student Business Sustainability: Examining the Mediating Role of Resilience in Higher Education

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ABSTRACT

Objective: The development of green entrepreneurship has gained growing attention in recent years, particularly in higher education. However, the transformation from entrepreneurial intention into actual sustainable entrepreneurial behavior among students remains limited. One of the main challenges lies in the lack of entrepreneurial resilience and the suboptimal role of universities in fostering green-oriented entrepreneurship through innovative learning models. This study examines the role of the Innovation Hub (I-Hub) business incubator at Sebelas Maret University as a green entrepreneurship learning platform by adopting an experiential learning approach. A total of 300 students participating in the I-Hub program were surveyed, and the data were analyzed using Structural Equation Modelling (SEM). The study investigated the effects of green entrepreneurial competence, leadership, and intention on sustainable business performance, with green entrepreneurial resilience as a mediating variable. The findings indicate that while competence, leadership, and intention contribute to entrepreneurial outcomes, they are not sufficient on their own; resilience emerges as a critical factor in enhancing sustainable entrepreneurial performance. These results highlight the importance of strengthening resilience-building strategies in entrepreneurship education. This study contributes to the development of green business practices in higher education and provides practical recommendations for incubator programs to integrate leadership, resilience, and sustainability in order to support environmental and economic goals.

INTRODUCTION

Global environmental issues such as deforestation, overexploitation of natural resources, and global warming increasingly threaten ecological stability and sustainable development (Puspani et al., 2024). In this regard, green entrepreneurship is recognized as an interdisciplinary solution (Correia et al., 2023) with the potential to address economic and environmental challenges by creating sustainable business opportunities (Malhotra & Kiran, 2024) and generating social value (Ahmat et al., 2022). Universities play a strategic role in building this ecosystem through entrepreneurship education, (Jones et al., 2021) incubation programs, and experiential learning approaches (Jusiuk, 2023). However, existing evidence shows inconsistencies (Leal et al., 2023) as students' entrepreneurial intentions often fail to translate into sustainable entrepreneurial behavior (Gieure et al., 2020).

This inconsistency raises an urgent call for a more comprehensive approach in higher education (Mony et al., 2025) as without immediate reinforcement, the gap between sustainable intentions and practices (Anwar et al., 2023) will continue to hinder young entrepreneur contributions to the ecological transition (Fadhilah., 2023). According to the theory of planned behavior (Fiernaningsih et al., 2024) intentions are a key predictor of behavior, but research emphasizes that intentions alone (Galvão et al., 2024) are insufficient without resilience (Kinmene et al., 2023), competence, and leadership

(Mondal et al., 2023). In the Indonesian higher education context, sustainable entrepreneurship initiatives still face structural and theoretical limitations (Salim et al., 2024) such as incomplete program practices, weak integration of entrepreneurship theory, and limited sustainability of student business projects (Liang & Cao, 2021).

Although Startup Programs have emerged as a significant shift from conventional university-based entrepreneurship schemes, their effectiveness remains questionable, as many student startups fail to survive beyond the incubation period and fail to embed green values into their business models (Wang & Shao, 2023). This situation highlights a critical research-practice gap in university-based entrepreneurship programs. Various studies have criticized campus incubation practices (Tritoasmoro et al., 2024) for their inability to build a sustainable climate and ensure long-term contributions to the green business ecosystem (Karahana, 2024). Furthermore, empirical studies in Southeast Asia confirm that students often struggle to maintain environmentally friendly business (Boers et al., 2024) practices due to limited access to mentoring, weak institutional support, and market intimidation. (Suwandaru et al., 2024).

The situation in Indonesia reflects similar challenges, as reported by UI Green Metric (2023) which states that only 15% of universities actively implement Green Campus programs, indicating that institutional awareness of sustainability remains largely symbolic (Marlina, 2025). Survey conducted at the Jember University also found stagnant institutional support for ecological entrepreneurship, resulting in a weak ecosystem and limited collaborative networks for student entrepreneurs. Beyond institutional barriers (Li et al., 2024) mindset has been widely identified as the most substantial challenge to the green economy. Based on CORE Indonesia (Shafia, 2023) data emphasized that many actors including green entrepreneurs still view sustainable business not as a long-term strategic orientation (Janssens et al., 2025) but rather as an alternative or idealistic trend (Branca et al., 2025).

This limited mindset significantly weakens the resilience entrepreneurs need to adapt, survive, and thrive when faced with systemic barriers such as high production costs (Zhao & Wibowo, 2021) policy uncertainty, and inadequate consumer demand for environmentally friendly products (Fuadah et al., 2023). Therefore, resilience emerges not only as an essential individual capacity but also as a mediating capability that enables student entrepreneurs to translate green entrepreneurial competencies, leadership, and intentions into sustainable business performance (Fiernaningsih et al., 2024). However, empirical studies that explicitly examine resilience in the context of green entrepreneurship especially as a mediating factor in higher education remain limited. This scarcity highlights the urgent need for research, as without strengthening resilience, the transition to sustainable entrepreneurship in universities risks stagnation and may fail to respond to the accelerating global environmental crisis (Mustofa & Mulyono, 2024).

This study addresses this gap by analyzing the role of resilience in the Innovation Hub (I-Hub) at Sebelas Maret University, a leading institution ranked 6th in the UI Green Metric. Specifically, it investigates the influence of green entrepreneurial competencies, leadership, and entrepreneurial intensity on student business performance, with resilience positioned as a mediating construct. Another novelty is the contextualization of the research within the UNS Innovation Center Program, a university-based startup platform widely recognized as a progressive initiative in developing entrepreneurship in higher education. Thus, this research not only contributes to theoretical developments in

the entrepreneurship literature but also offers practical implications for strengthening the green entrepreneurship ecosystem in higher education.

RESEARCH METHOD

This study employed a quantitative research design with a survey approach (Sugiyono, 2020). The population consisted of student participants in the Innovation Hub (I-Hub) program at Sebelas Maret University, while the sample comprised 170 respondents selected using purposive sampling, as they were directly involved in entrepreneurial activities facilitated by the I-Hub. Data collection was conducted through an online questionnaire distributed via Google Forms. The research instrument consisted of five latent constructs Green Entrepreneurial Competence (GEC), Green Entrepreneurial Leadership (GEL), Green Entrepreneurial Intention (GEI), Green Entrepreneurial Resilience (GER), and Sustainable Business Performance (SBP) measured by 51 indicators below:

Table 1. Indicator Variables

Nu	Variable	Indicators of Variable
1	Green Entrepreneurial Competencies	Identify business opportunities from environmental issues Create a green and sustainable business plan Analyze eco-friendly market trends Take initiative reduce waste and emissions Joined green business community or program Understand eco-friendly production method
2	Green Entrepreneurial Intention	Desire and commitment to build a green business Plan to run a green business Choose a green business as a career path Green business innovations and trends Influence youth generation for environment
3	Green Entrepreneurial Resilience	Recovery from failure or rejection Confidence in trying new green business approaches Green alternative character and motivation strategies Stress and pressure management Self-evaluation and introspection Seeing the positive side of green business obstacles Actively seeking green business funding/training Post-incubation green business enthusiasm
4	Green Entrepreneurial Leadership	Team idea development and environmental awareness inspiration Ready to take risks with the team Calm and rational in green leadership Right decision making Consistent in green leadership words and actions Uphold green business ethnics firmly As role model in protecting environment Grow and innovate green business Giving space as a leader
5	Sustainable Business Perform	Increased revenue and environmental benefits Sustainability in business operations Implementation of green business principles Resource use allocation Long-term business resilience Regular environmental impact evaluation Commitment to improving green performance Active in stakeholder green campaigns

Source: (Fiernaningsih et al., 2024)

Each item was adapted from established scales in previous research on entrepreneurship, leadership, and resilience and assessed using a five-point Likert scale ranging from 1 =

strongly disagree to 5 = strongly agree. (Magno et al., 2024). Content validity was ensured through expert review by three academics specializing in entrepreneurship and management, while construct validity and reliability were empirically tested through convergent validity (outer loadings and Average Variance Extracted/ AVE), discriminant validity (Fornelli-Larcker criterion and HTMT ratio), and internal consistency reliability (Cronbach's alpha and Composite Reliability). (Singh et al., 2025). Data analysis was conducted using Structural Equation Modelling-Partial Least Squares (SEM-PLS) with the assistance of SmartPLS 4.0 software (Ghozali & Latan, 2020).

The analytical procedure consisted of two main stages: measurement model assessment (outer model), which involved testing indicator reliability and construct validity, and structural model evaluation (inner model), which included hypothesis testing, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and model fit assessment (SRMR, NFI, RMS_theta). (Rahayu, 2024). Bootstrapping procedure with 5,000 resamples was performed to test the significance of the path coefficients, and Variance Inflation Factor (VIF) values were examined to ensure the absence of multicollinearity. Furthermore, mediation analysis was conducted to examine the role of Green Entrepreneurial Resilience (GER) as a mediating variable in the relationship between Green Entrepreneurial Competencies (GEC), Green Entrepreneurial Leadership (GEL), and Green Entrepreneurial Intention (GEI), on Sustainable Business Performance (SBP).

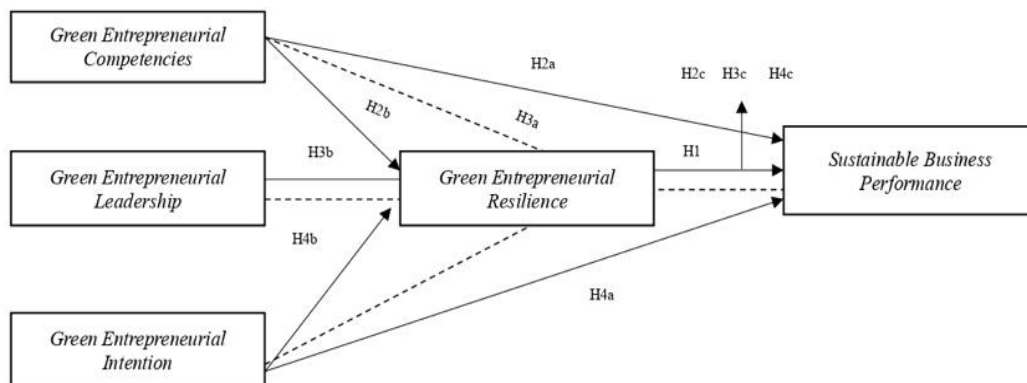


Figure 1. Research Framework

The conceptual framework of this study was adapted from previous models of entrepreneurial intention and behaviour, with the addition of GER as a mediating factor (Endarwati, 2025). This framework positions competence, leadership, and intention as key antecedents of sustainable business performance, emphasizing the role of resilience in strengthening the sustainability of student entrepreneurship in higher education. In evaluating the measurement model, indicator reliability was considered adequate if outer loading values exceeded 0.70, the Average Variance Extracted (AVE) was above 0.50, and the Composite Reliability (CR) was above 0.70. Discriminant validity was assessed based on the Fornell-Larcker criterion and the HTMT ratio (threshold < 0.90). For the structural model, R^2 values of 0.75, 0.50, and 0.25 were interpreted as substantial, moderate, and weak, respectively, while f^2 values of 0.35, 0.15, and 0.02 indicated large, medium, and small effect sizes. Path coefficients were considered statistically significant if the t-statistic exceeded 1.65, 1.96, and 2.58 at the 10%, 5%, and 1% significance levels, respectively.

RESULTS AND DISCUSSION

Measurement Model Evaluation Results (Outer Model)

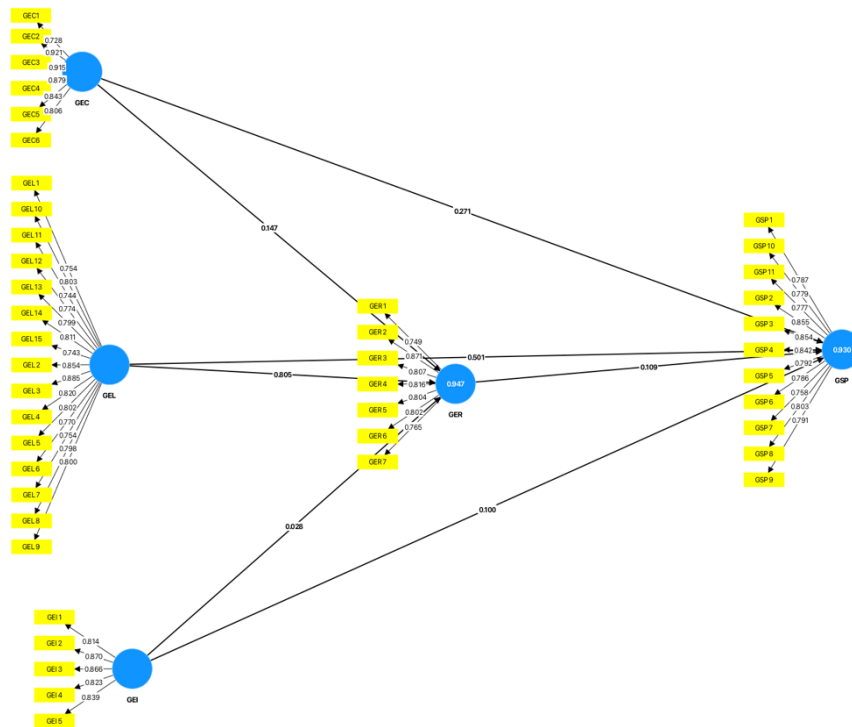


Figure 2. Outer Model Result

Source: Processed Primary Data on 2025

The displayed image shows that all indicators of each variable have valid values, as evidenced by the results of the validity test which shows a value above 0.7. The next stage is to continue the validity test using the loading factor parameters as explained below:

Table 2. Convergent Validities

Variable	Indicators	Correlation	Detail
Green Entrepreneurial Competencies	GEC 1	0.728	Valid
	GEC 2	0.921	Valid
	GEC 3	0.915	Valid
	GEC 4	0.879	Valid
	GEC 5	0.843	Valid
	GEC 6	0.806	Valid
Green Entrepreneurial Intention	GEI 1	0.814	Valid
	GEI 2	0.870	Valid
	GEI 3	0.866	Valid
	GEI 4	0.823	Valid
	GEI 5	0.839	Valid
Green Entrepreneurial Leadership	GEL 1	0.754	Valid
	GEL 2	0.854	Valid
	GEL 3	0.885	Valid
	GEL 4	0.820	Valid
	GEL 5	0.802	Valid
	GEL 6	0.770	Valid
	GEL 7	0.754	Valid
	GEL 8	0.798	Valid
	GEL 9	0.800	Valid



Green Resilience	Entrepreneurial	GEL 10	0.803	Valid
		GEL 11	0.744	Valid
		GEL 12	0.774	Valid
		GEL 13	0.799	Valid
		GEL 14	0.811	Valid
		GEL 15	0.743	Valid
		GER 1	0.749	Valid
		GER 2	0.871	Valid
		GER 3	0.807	Valid
		GER 4	0.816	Valid
		GER 5	0.804	Valid
		GER 6	0.802	Valid
		GER 7	0.765	Valid
		SBP 1	0.787	Valid
		SBP 2	0.855	Valid
Sustainable Performance	Business	SBP 3	0.854	Valid
		SBP 4	0.842	Valid
		SBP 5	0.792	Valid
		SBP 6	0.786	Valid
		SBP 7	0.758	Valid
		SBP 8	0.803	Valid
		SBP 9	0.791	Valid
		SBP 10	0.779	Valid
		SBP 11	0.777	Valid

Source: Processed Primary Data on 2025

Based on the table above, the loading factor value for all items is > 0.70 so that all statement items are considered convergently valid.

Table 3. Discriminant Validities

	GEC	GEI	GEL	GER	SPB
GEC	0.851				
GEI	0.909	0.843			
GEL	0.957	0.943	0.795		
GER	0.943	0.921	0.972	0.803	
SBP	0.943	0.918	0.960	0.943	0.803

Source: Processed Primary Data on 2025

The results of the table values above show that the AVE value of each variable $>$ correlation between other constructs, so it can be concluded that all variables are valid discriminants. The table below shows the Cronbach's Alpha and Composite Reliability values above > 0.70 so that all variables are declared valid and reliable as follows:

Table 4. Reliabilities Test

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
GEC	0.922	0.926	0.940	0.725
GEI	0.898	0.899	0.924	0.710
GEL	0.958	0.959	0.963	0.632
GER	0.908	0.910	0.927	0.644
SBP	0.945	0.945	0.952	0.644

Source: Processed Primary Data on 2025

Structural Model Evaluation Result (Inner Model)

Table 5. Inner Model

	R-square	R-square adjusted
GER	0.947	0.946
SBP	0.930	0.929

Source : Processed Primary Data on 2025

The value of the customized R-square of the Green Entrepreneurial Resilience variable is 0.947 and indicates that the variable is worth 94.7% (strong). While the value of Sustainable Business Performance is 0.930 which indicates that the variable is worth 9.3% (strong).

Table 6. Effect Size

	GEC	GEI	GEL	GER	SPB
GEC				0.034	0.084
GEI				0.002	0.016
GEL				0.651	0.115
GER					0.09
SBP					

Source: Processed Primary Data on 2025

The following is an explanation of the calculation results of the table above:

- The Influence of Green Entrepreneur Competence on Green Entrepreneur Resilience of 0.034 is classified as low.
- The Influence of Green Entrepreneur Competence on Sustainable Business Performance of 0.084 is classified as low.
- The Influence of Green Entrepreneur Intention on Green Entrepreneur Resilience of 0.002 is classified as low.
- The Influence of Green Entrepreneur Intention on Sustainable Business Performance of 0.116 is classified as low.
- The Influence of Green Entrepreneur Leadership on Green Entrepreneur Resilience of 0.651 is classified as high.
- The Influence of Green Entrepreneur Leadership on Sustainable Business Performance of 0.115 is classified as low.
- The Influence of Green Entrepreneur Resilience on Sustainable Business Performance of 0.09 is classified as low.

Based on the calculations, most of the inter-variable influences in this research model are categorized as low. Green Entrepreneurial Competence (GEC) only contributes very little to Green Entrepreneurial Resilience (GER) at 0.034 and to Sustainable Business Performance (SBP) at 0.084. The same is true for Green Entrepreneurial Intention (GEI), which also has a very low influence on both GER (0.002) and SBP (0.016).

Conversely, the most striking finding is Green Entrepreneurial Leadership (GEL), which has a significant influence on GER with a value of 0.651, making it categorized as high. However, the influence of GEL on SBP remains low (0.115). Meanwhile, GER on SBP only has an influence of 0.090, also considered low.

Table 7. Hypothesis Testing

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
GEC -> GER	0.147	0.149	0.107	1.376	0.169
GEC -> SBP	0.271	0.271	0.147	1.843	0.065
GEI -> GER	0.028	0.037	0.074	0.369	0.712
GEI -> SBP	0.100	0.102	0.077	1.292	0.196
GEL -> GER	0.805	0.794	0.107	7.497	0.000
GEL -> SBP	0.501	0.498	0.157	3.194	0.001
GER -> SBP	0.109	0.109	0.086	1.424	0.154

Source: Processed Primary Data on 2025

Based on the hypothesis test below as follows:

- Green Entrepreneurial Competencies towards Green Entrepreneurial Resilience obtained with p values $0.169 > 0.05$ then H1 is rejected and has no effect on Green Entrepreneurial Resilience.
- Green Entrepreneurial Competencies towards Sustainable Business Performance obtained with p values $0.065 > 0.05$ then H2 is rejected and has no effect on Sustainable Business Performance.
- Green Entrepreneurial Intention towards Green Entrepreneurial Resilience obtained with p value $0.712 > 0.05$ then H3 is rejected and has no effect on Green Entrepreneurial Resilience.
- Green Entrepreneurial Intention towards Sustainable Business Performance obtained with p value $0.196 > 0.05$ then H4 is rejected and has no effect on Sustainable Business Performance.
- Green Entrepreneurial Leadership towards Green Entrepreneurial Resilience is obtained with a p value of $0.000 < 0.05$, then H5 is accepted and influences Green Entrepreneurial Resilience.
- Green Entrepreneurial Leadership towards Sustainable Business Performance is obtained with a p value of $0.001 < 0.05$, then H6 is accepted and influences Green Entrepreneurial Resilience.
- Green Entrepreneurial Resilience towards Sustainable Business Performance is obtained with a p value of $0.154 > 0.05$, then H7 is rejected and has no effect on Sustainable Business Performance.

Table 8. Average Variance Extracted (AVE)

	Average variance extracted (AVE)	R Square
GEC	0.503	
GEI	0.493	
GEL	0.438	
GER	0.447	0.657
SPB	0.447	0.645
TOTAL	0.465	0.651

Source : Processed Primary Data on 2025

$$\text{GOF Value} = \sqrt{\text{AVE Average} \times \text{RSquare Average}} = \sqrt{0.465 \times 0.651} = 0.551$$

Discussion

The results of this study indicate that in the UNS Innovation Hub program, three main variables were tested (Green Entrepreneurial Competence, Green Entrepreneurial Intention, and Green Entrepreneurial Leadership), but only Green Entrepreneurial Leadership (GEL) was shown to have a significant impact on Green Entrepreneurial Resilience (GER) and Sustainable Business Performance (SBP). This finding confirms that leadership is a dominant factor capable of strengthening the resilience of green entrepreneurship students while simultaneously improving business sustainability performance at the UNS I-Hub. This finding is relevant to the results of a previous study by Mondal et al. (2023) and is also reinforced by research by (Boers et al., 2024) which emphasized that environmental values-based leadership provides a clearer direction for students to develop sustainable green entrepreneurship.

Effective leadership is reflected in the ability to inspire, make rational decisions, and exemplify environmental ethics, enabling students to face market dynamics and green business challenges with greater resilience. These results align with the research of (Mondal et al., 2023) and (Zwagery et al., 2023) which emphasizes the importance of environmental values-based leadership as a collective motivator and a guarantee of the desire to practice green entrepreneurship. Furthermore, research by (Mawardi et al., 2025) also confirms that student leadership is not limited to business management capacity but also functions to develop resilient character to withstand unstable market pressures. Conversely, Green Entrepreneurial Competence (GEC) and Green Entrepreneurial Intention (GEI) did not significantly influence GER or SBP.

This indicates that students' knowledge, skills, or intentions do not automatically contribute to actual performance. In other words, cognitive aspects only reach potential levels but fail to become a determinant of success if not accompanied by strong leadership and practical entrepreneurial experience. This finding contrasts with research by (Mawardi et al., 2025) which places competence and intensity as the primary determinants of success. These contradictory results reinforce the research gap, as also alluded to in the study by (Gieure et al., 2020), which highlighted that the gap between intention and behavior remains a major challenge in literary entrepreneurship, particularly in the context of higher education in Indonesia (Gieure et al., 2020). Furthermore, Green Entrepreneurial Resilience (GER), hypothesized as a mediator, also did not significantly influence SBP.

This finding is interesting because resilience is theoretically viewed as a crucial factor in bridging competence, intensity, and leadership towards sustainable business performance (Liang & Cao, 2021). However, in the context of I-Hub students, resilience appears insufficient to guarantee green business success. This situation may be explained by the limited off-campus support ecosystem, such as access to financing, ongoing mentoring, and broader market networks. This finding aligns with (Karahan, 2024) critique, which highlights the weak integration of campus incubation programs with sustainable external support systems and is reinforced by (Raghavan et al., 2024) finding that post-incubation business students' intentions remain low due to the lack of follow-up mentoring.

This research's contribution positions leadership as the most influential factor, while providing empirical evidence that student leadership skills are more crucial to green business aspirations than mere intentions and competencies. Further findings suggest

that student resilience cannot operate effectively without ecosystem support, offering a new perspective that individuals alone are insufficient to ensure green business success. This also extends previous literature that overemphasizes intentions as the primary factor (Klofsten et al., 2024) by presenting evidence that external ecosystem factors play an equally important role. Furthermore, this research critiques the approach to entrepreneurship education in higher education, which tends to emphasize cognitive aspects without adequately providing space for leadership development, character development, and practical experience based on experiential learning. Practically, these findings imply that incubation programs like I-Hub UNS need to expand their curriculum orientation from mere knowledge to developing leadership, environmental ethical integrity, and resilience in the face of business threats. Through a collaborative and experiential learning approach, students are not only able to technically design green businesses but also lead teams, develop networks, and build sustainable businesses.

Recommendation

Based on the research findings, which indicate that only Green Entrepreneurial Leadership (GEL) has a significant effect on Green Entrepreneurial Resilience (GER) and Sustainable Business Performance (SBP), several recommendations can be proposed, covering higher education policy, business incubation program design, and directions for future research. First, campus-based business incubators such as the Innovation Hub at Sebelas Maret University should reformulate their green entrepreneurship training curriculum with a stronger emphasis on cultivating students' leadership character. Training programs should not only provide technical knowledge and green business skills but also incorporate experiential learning activities that foster decision-making capacity, environmental ethical integrity, and students' ability to serve as role models within entrepreneurial teams.

This recommendation is consistent with the findings of (Mondal et al., 2023) who highlight the central role of value-based leadership in driving sustainable entrepreneurial practices (Zwagery et al., 2023). So considering the limited influence of competence (GEC) and intention (GEI) on sustainable business performance, entrepreneurship education should be more closely integrated with real-world practice. Students should be actively engaged in challenging business simulations, cross-disciplinary collaborations, and direct partnerships with green business actors so that learning extends beyond cognitive knowledge to include affective, character, and leadership development. This recommendation also responds to the critiques of (Mawardi et al., 2025) regarding the limited long-term sustainability of student ventures after participation in campus incubation programs (Karahan et al., 2022). The findings reveal that green entrepreneurial resilience is not a sufficiently strong mediator between the independent variables and business performance. Accordingly, post-incubation support must be enhanced through ongoing mentoring, access to green financing networks, and alumni forums that provide both knowledge sharing and moral encouragement. This aligns with (Rajpal & Singh, 2024) who observed that students' commitment to pursuing entrepreneurial ventures often declines after incubation due to the absence of a robust support ecosystem.

Finally, future research should adopt a longitudinal design to more accurately capture the dynamic changes in student entrepreneurial performance over time. Moreover, external factors such as ecosystem support, environmental regulatory

frameworks, and local community participation should be incorporated as potential determinants of students' green entrepreneurial success. Such an approach would provide a more comprehensive understanding of how internal and external factors interact in shaping sustainable business performance. By implementing these recommendations, universities can assume a more strategic role in nurturing a green entrepreneurship ecosystem that goes beyond short-term achievements and contributes to long-term social, economic, and environmental sustainability. This study may also serve as a foundation for redefining student needs and updating entrepreneurship education curricula toward a sustainability-oriented framework.

CONCLUSION

This study aims to examine the role of Green Entrepreneurial Competence (GEC), Green Entrepreneurial Intention (GEI), and Green Entrepreneurial Leadership (GEL) in influencing Sustainable Business Performance (SBP), with Green Entrepreneurial Resilience (GER) as a mediating variable, in the context of the Innovation Hub (I-Hub) program at Sebelas Maret University. The study findings indicate that only GEL exhibits a significant influence on GER and SBP, underscoring the centrality of leadership in enhancing student entrepreneurial resilience and ensuring sustainable business outcomes. In contrast, GEC and GEI do not significantly influence GER or SBP, highlighting the limitations of competency and intention without strong leadership and practical experience. Furthermore, GER was not found to be a significant mediator, suggesting that resilience alone may be insufficient without broader ecosystem support, such as post-incubation mentoring, access to funding, and networking opportunities.

Theoretically, this study contributes to the entrepreneurship literature by emphasizing the crucial role of leadership over cognitive factors such as competency and intention, and by questioning the effectiveness of resilience as an isolated predictor of business sustainability in higher education settings. Practically, this study provides critical insights for improving campus-based entrepreneurship programs. The results suggest that universities should strengthen their curricula by embedding experiential and character-based learning that fosters leadership, resilience, and ethical responsibility, while also encouraging collaboration with external stakeholders to build a more supportive entrepreneurial ecosystem. Overall, this study advances understanding of how leadership and ecosystem support serve as key drivers of sustainable student entrepreneurship. It offers conceptual refinements and practical recommendations that can guide higher education institutions in designing incubation programs aligned with green technology, environmental stewardship, and long-term sustainability goals.

These findings critique approaches to entrepreneurship in higher education that still overemphasize cognitive aspects, while under-equipping students with strong affective and leadership skills. Furthermore, the entrepreneurial resilience variable did not function as a strong mediator in the relationship between competency, intensity, and leadership on business performance, indicating the need for interventions beyond student personal aspects, such as training ecosystem support and post-incubation follow-up. Theoretically, this study contributes to the growing literature on green entrepreneurship in higher education, particularly in the context of campus business incubation. Practically, these findings form the basis for curriculum reform and the design of entrepreneurship development programs in higher education, with an

emphasis on strengthening leadership character, experiential learning, and post-incubation business aspirations.

Thus, higher education institutions become not only technical facilitators but also agents in shaping the character of resilient and environmentally conscious young leaders. This study has limitations in that it covers a cross-sectoral timeframe and includes participants limited to a single institution. Therefore, further research is recommended to be conducted longitudinally and expand on external variables such as policy support, industry involvement, and socio-environmental dynamics that also influence the success of green student entrepreneurs.

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