



Entrepreneurship Education as a Catalyst for Sustainability: Linking Innovation, Intention, and Business Models

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ABSTRACT

Sustainable entrepreneurship has become an essential approach for tackling global issues associated with climate change, social injustice, and the degradation of the environment. This research intends to investigate the role of Entrepreneurship Education in influencing Sustainability Business Models through the mediating effects of Sustainability Innovation and Sustainability Intention. Using a quantitative approach, data were collected from 240 young entrepreneurs in Indonesia who have participated in sustainable entrepreneurship activities. SEM was utilized to analyze the relationships among the factors. The findings reveal that EE directly impacts SInn, SInt, and SBM. Furthermore, SInn significantly influences SInt and SBM, while SInt also positively affects SBM. Notably, EE indirectly impacts SBM through the mediators SInn and SInt, highlighting the importance of innovation and intention in translating entrepreneurial education into sustainable business practices. This research enhances the existing literature by integrating EE, SInn, SInt, and SBM into a comprehensive framework. It provides empirical evidence from a developing country context, offering insights into how education programs can foster sustainable entrepreneurship among young entrepreneurs. These findings underline the necessity of developing educational programs for entrepreneurs that prioritizes innovation and sustainability values.

Keywords: Entrepreneurship Education, Sustainability Innovation, Sustainability Intention, Sustainability Business Model.

JEL Classifications: L26, M13, Q01

1. INTRODUCTION

Sustainable development has become an increasingly pressing global issue, driven by climate change, social inequality, and threats to environmental sustainability (Claro and Esteves, 2021; Virakul and Russ-Eft, 2020). To address this challenge, an approach involving all sectors is needed, including the world of entrepreneurship. Sustainable entrepreneurship is one potential solution, because it integrates economics, environmental, and social orientations in the process of creating business value (Littlewood and Holt, 2018; Salehe et al., 2024). Amid this complexity, young entrepreneurs play a strategic role in supporting this transition, who are able to create innovations to support sustainability, considering that they are not only the driving force of the economy but also agents of social change (Soomro et al., 2020; Soomro et al., 2020).

Indonesia, with its large young population and growing entrepreneurship rate, has great potential to become a hub for sustainable innovation (Adha et al., 2022; Basuki et al., 2021). As of August 2023, it was recorded that there were approximately 52 million young entrepreneurs in Indonesia, which is equivalent to 35.21% of the total workforce in the country. This statistic even rose by one million persons from the previous year (BPS RI, 2023). However, despite the rapid growth of the entrepreneurship sector, major challenges remain, including the lack of sustainability literacy, access to quality entrepreneurship education, and limited business ecosystem support (Gozali et al., 2018; Gunawan et al., 2021; Orobia et al., 2020). Furthermore, sustainable entrepreneurship is not only beneficial for individual entrepreneurs, but can also facilitate the attainment of the Sustainable Development Goals (SDGs) (Elalfy et al., 2020).

In this regard, entrepreneurship education acts as a catalyst, connecting theoretical knowledge with real-world practices that drive innovative solutions to social and environmental problems (Lindner, 2018; Rashid, 2019). This approach aligns with Indonesia's need to reduce unemployment, increase inclusive economic growth, and conserve the environment for coming generations (Adha et al., 2024; Timan et al., 2024).

In this context, entrepreneurship education becomes a key instrument in equipping the younger generation with the skills, attitudes and knowledges needed to create businesses that contribute to sustainability (Boldureanu et al., 2020; Ndou et al., 2018). Entrepreneurship education not only helps individuals develop competencies in creating new businesses, but can also shape their intention to contribute to sustainability (Fichter and Tiemann, 2018; Khan et al., 2016; Terán-Yépez et al., 2020). In addition, this education can spur sustainability innovation, which plays a role in coming up with innovative answers to environmental and societal problems (Xie and Zhu, 2020). In the long term, this combination of intention and innovation can culminate in the formation of sustainable business models, which integrate sustainability values throughout the business process chain (Evans et al., 2017; Lüdeke-Freund, 2020).

Various research have emphasized the importance of entrepreneurship education in creating innovative and sustainability-oriented entrepreneurs. For instance, research by Shu et al. (2020) shows that entrepreneurship education can increase awareness of sustainability issues among young entrepreneurs. In addition, other research Ashari et al. (2022) found that sustainability intentions are affected by entrepreneurial learning experiences, while sustainable innovation is considered a result of the interaction between formal education and entrepreneurial practices.

However, some studies also show limitations. For example, most previous studies have focused more on developed countries (Littlewood and Holt, 2018; Nuñez and Musteen, 2020; Schaltegger et al., 2018). The applicability of these findings to the setting of developing nations, such as Indonesia, remains uncertain. In addition, the relationship between entrepreneurship education, sustainability intentions, innovation, and sustainable business model development is often studied separately without integrating these four elements into a holistic conceptual framework. This study intends to address this gap by analyzing the role of entrepreneurship education in driving innovation and sustainability intentions that ultimately contribute to the development of SBM. This study also provides an empirical contribution that focuses on young entrepreneurs in Indonesia, which is an important group in creating a sustainable entrepreneurial ecosystem.

2. LITERATURE REVIEW

2.1. Sustainability Business Model (SBM)

SBM is characterized as a business model aimed at creating, delivering, and capturing value that encompasses not just financial profit but also environmental and social advantages (Lüdeke-Freund et al., 2018; Neumeyer and Santos, 2018). According to Virakul and Russ-Eft (2020) SBM differs from conventional

business models because it focuses on long-term impacts, including ecosystem preservation, social justice, and responsible resource management. SBM prioritizes innovation that supports sustainability, whether in the form of products, processes, or management systems (Geissdoerfer et al., 2018). Prior research has demonstrated that SBM encourages companies to reconstruct the way they create value, by emphasizing a collaborative approach with stakeholders (Piscicelli et al., 2018; Schaltegger et al., 2018). For instance, Laasch (2018) highlights the importance of adapting traditional business structures to be more inclusive and transparent, where sustainability is at the heart of decision making. SBM becomes an important foundation to encourage the development of businesses that are relevant to environmental and social issues (Breuer et al., 2018; Franceschelli et al., 2018). By adopting SBM, young entrepreneurs can develop solutions that are economically viable and contribute positively to society and the environment, thereby strengthening the role of entrepreneurship in supporting the SDGs (Bocken et al., 2018; Moon, 2018; Rashid, 2019).

2.2. Entrepreneurship Education (EE)

Entrepreneurship education has long been recognized as a strategic tool for developing individuals who are not just innovative but also environmentally and socially responsible (Bauman and Lucy, 2021; Boldureanu et al., 2020). As a formal or informal learning process, entrepreneurship education (EE) aims to equip individuals with the skills, attitudes, knowledge necessary to create and manage a business (Radulescu et al., 2020; Strachan, 2018). Within the framework of sustainability, EE plays a vital role in fostering a deeper understanding of how businesses can create positive environmental, economic, and social impacts (Hameed and Irfan, 2019; Hermann and Bossle, 2020). Several studies have shown that EE not only increases sustainability awareness but also shapes the intention to participate in entrepreneurial endeavors that support sustainability goals (Fichter and Tiemann, 2018; Romero-Colmenares and Reyes-Rodríguez, 2022). In the relationship between EE and SBM, sustainability intention (SInt) plays an important mediating role. According to Ajzen (1991) through the Theory of Planned Behavior (TPB), intention is a direct predictor of a person's behavior. In this context, sustainability-oriented entrepreneurship education encourages individuals to internalize sustainability values, which ultimately motivates them to design business models that support sustainability (Del Vecchio et al., 2021; Wach and Wojciechowski, 2016). Kolb et al. (2017) showed that EE builds a positive attitude towards sustainability, which leads entrepreneurs to consider sustainability as a core element of their business activities.

Sustainability innovation refers to the development of creative solutions that support social and environmental goals while creating economic value (Satjahanuruthai and Lakkhongkha, 2023; Shu et al., 2020). Effective entrepreneurship education facilitates the emergence of this innovation by encouraging the exploration of new ideas that contribute to sustainable development. Bocken and Geradts (2020) emphasize that entrepreneurs who engage in entrepreneurship education are more likely to be able to identify innovation opportunities relevant to sustainability, such as resource efficiency, circular economy, or the creation of sustainable product. In the SBM framework, SInt acts as a bridge between EE and

SBM implementation (Gupta and Matharu, 2022; Lüdeke-Freund, 2020). Geissdoerfer et al. (2018) show that sustainability-driven innovation enables entrepreneurs to design business models that not only create economic value but also provide social and environmental benefits in a sustainable manner. This is reinforced by sustainability intention (SInt), which ensures that the innovation is implemented consistently and in line with sustainability goals (Evans et al., 2017; Vuorio et al., 2018). Thus, the influence of EE on SBM can be maximized by strengthening the mediation pathways of SInn and SInt.

2.3. Sustainability Innovation

Sustainability innovation (SInn) is characterized by the creation of products, processes, or systems that generate economic value while reducing environmental consequences and promoting social sustainability (Ben Youssef et al., 2018; Provasnek et al., 2017; Schmitz et al., 2017). In the literature, SInn is viewed not only as an outcome of business practices but also as a catalyst for forming sustainability intentions and developing sustainable business models (Belz and Binder, 2017; Haldar, 2019; Satalkina and Steiner, 2020). The relationship between SInn and SInt can be explained through a behavioral psychology perspective, which asserts that subjective norms, perceived behavioral control and attitudes all have an impact on an individual's purpose (Ajzen, 2002; Wach and Wojciechowski, 2016). In the context of sustainability, SInn serves to form positive attitudes toward sustainability by demonstrating that innovation can generate significant social and environmental impacts. Organizations engaged in sustainable innovation create an environment that supports individuals to have a strong intention to adopt and implement sustainable practices (Shahzad et al., 2022; Varadarajan, 2017). In other words, the success of SInn lies not only in the creation of new value but also in its influence in driving individual commitment to sustainability.

SInn is also directly affected to the SBM development (Breuer et al., 2018; Lüdeke-Freund, 2020). According to Bocken and Geradts (2020) SInn is a bridge that allows organizations to revamp their business structures to comply with sustainability principles. These innovations include energy efficiency, carbon emission reduction, and sustainable use of resources, which are then integrated into SBM elements such as value creation, value delivery, and value capture. Research by Evans et al. (2017) highlights that companies that successfully adopt SInn tend to be more flexible in responding to market demands for sustainable solutions, which are key elements in SBM. Therefore, SInn not only provides technical opportunities for change but also forms a commitment to realizing effective SBM. Thus, SInn plays a strategic role in building sustainability intentions (SInt) and supporting the transition towards SBM (Kickul et al., 2018; Schaltegger et al., 2018; Todeschini et al., 2017).

2.4. Sustainability Intention

Sustainability intention (SInt) is an important determinant in directing individual and organizational behavior to adopt business practices that support sustainability (Agu et al., 2021; Prabowo et al., 2022). Based on the TPB's theory developed by Ajzen (1991), intention is the main predictor of actual behavior. In the context of sustainability, SInt reflects the commitment

and motivation of entrepreneurs or organizations to take actions oriented towards economic, environmental and social sustainability. The literature shows that sustainability intention plays a essential role in supporting the development of the Sustainability Business Model (SBM), which places sustainability at the fundamental of business operations and strategy (Aljuwaiber, 2020; Cosenz et al., 2020; Vuorio et al., 2018). Research by Vuorio et al. (2018) emphasizes that individuals or organizations with high SInt tend to be more proactive in exploring business opportunities that support sustainability. For example, companies with strong sustainability intentions are more likely to adopt a circular economy approach or a low-carbon innovation-based business strategy. According to Rauter et al. (2017), SInt encourages entrepreneurs to make more inclusive decisions, taking into account the needs of local communities, ecosystems, and other stakeholders. In the context of a developing country like Indonesia, SInt serves as an important foundation for young entrepreneurs to design and operate SBM that is relevant to local challenges and market needs (Al-Ghazali and Afsar, 2021; Chams and García-Blandón, 2019; Yacob et al., 2019).

3. METHOD

3.1. Research Design

Using a quantitative research method—a cross-sectional survey and a deductive approach—sustainability innovation (SInn) and sustainability intention (SInt) were investigated as mediators of entrepreneurship education (EE) on sustainability business model (SBM). In this study, entrepreneurial education is the exogenous variable; sustainability innovation and sustainability aim is the mediating variable. Sustainable business models constitute the endogenous variable. This study aimed at reaching the research objectives using structural equation modeling (SEM), helped by the AMOS 24 application.

3.2. Participants and Data Collection

The population of this study was 400 students participating in the Independent Entrepreneurship (WMK) held at the Universitas Negeri Jakarta, who came from 32 universities from all over Indonesia. The WMK program is part of the independent campus program of the Ministry of Education, Culture, Research and Technology of Indonesia which provides opportunities for students to learn and develop themselves into entrepreneurs through activities outside of lectures, where the output of this program is that each student produces a product or has a business in groups. Inclusion criteria were used to select students who would participate as respondents. These criteria stipulate that students must have started to become owners of their own sustainable businesses, and have made a profit from the business. To uphold study ethics, participants completed the research instrument voluntarily and maintained confidentiality regarding their identity. The sample size was determined using the formula established by Cohen et al. (2018), with a confidence level of 95% and a minimum sample size of 206 individuals. Consequently, 400 surveys were distributed, yielding a response rate of 60.00%, resulting in 240 completed surveys available for data analysis.

The questionnaire items were generated through literature research and modified from existing instruments for assessing EE, SInn,

SInt, and SBM. The survey was adapted for the Indonesian language after being translated from English. The six indicators in the initial section were derived from the EE indicators suggested by Denanyoh et al. (2015). The second section was influenced by the four indicators of the SInn framework suggested by Lüdeke-Freund (2020). The third component, to assess SInt, was modified from three indicators suggested by Liñán and Chen (2009). The fourth component assessing SBM was derived from the five-indicator framework established by Yun et al. (2016). The questionnaire utilized a seven-point Likert Scale, ranging from “never” (1) to “always” (7). Table 1 illustrates some examples of items that were incorporated into in the research questionnaire.

3.3. Data Analysis

In order to evaluate the connections between the variables, data analyses were carried out with the assistance of the SPSS 24 and AMOS 24 software packages. Three stages were utilized in order to carry out the analysis and interpretation of the SEM model that was utilized in this study: Initially, an exploratory factor analysis (EFA) was carried out with the assistance of SPSS 24 program in order to successfully extract several components by the utilization of VARIMAX rotation. The second step was to conduct a confirmatory factor analysis (CFA) using the AMOS 24 software tool in order to evaluate the reliability and validity of the model. Criteria for attaining convergent validity when composite reliability (CR) >0.70 (Hair et al., 2010), average variance extracted (AVE) value >0.50 (Bagozzi and Yi, 1988), and the loading factor was >0.70 (Byrne, 2016). The discriminant validity of the AVE was validated by comparing the value of the square root of the AVE, which must be higher than the correlation coefficient between the constructs (Fornell and Larcker, 1981). For the purpose of determining whether or not the empirical framework of this study is suitable, the criteria suggested by Byrne (2016); Hu and Bentler (1999); Kline (2015) were utilized. Specifically, the goodness of fit index (GFI), tucker-lewis index (TLI) and comparative fit index (CFI), must be >0.90 . Subsequently, the root mean square residual (RMR) and index value root means squared error of approximation (RMSEA) must be <0.08 , and the $P > 0.05$, meanwhile the value CMIN/df should be <3.00 . Third, a significant rate of 5% was utilized for the purpose of testing postulated associations through the utilization of structural

equation modeling (SEM). This study also included the use of AMOS 24 for the purpose of conducting data normality testing. Furthermore, according to Byrne (2016), the data are considered to have a normal distribution if the critical ratio (CR) falls within the range of -2.58 to $+2.58$. Over the course of this research, critical ratio (CR) values for kurtosis and skewness of each indicator were found to fall within the range of -2.21 to 2.46 . Furthermore, the kurtosis value cr on the multivariate line was found to amount to 2.42 . In both the multivariate and univariate statistics, it is feasible to assert that the data adheres a normal distribution.

4. RESEARCH RESULTS

4.1. Characteristics of Sample

In this study, the demographic characteristics of the individuals who involved in the survey are shown in Table 2. The respondents in this study consisted of 240 young entrepreneurs who had been involved in sustainable entrepreneurship activities with diverse demographic distribution. Based on gender, the majority of respondents were female (61.2%), while males reached 38.8%. In terms of monthly income (turnover), the largest group of respondents was in the range of IDR10,000,000–IDR20,000,000 (36.3%), followed by those with incomes below IDR10,000,000 (27.1%) and IDR20,000,000–IDR30,000,000 (18.8%). Groups with higher incomes, such as IDR30,000,000–IDR40,000,000 and more than IDR40,000,000, accounted for 12.9% and 5.0% of the total respondents, respectively. Depending on the nature of the business operated, the food and beverage sector dominates with a percentage of 36.7%, followed by professional services (22.5%) and manufacturing and production (17.1%). Other business sectors include retail and e-commerce (13.3%), media and communications (3.3%), health and beauty (3.8%), construction and property (2.1%), and event organizers (1.3%).

4.2. Exploratory Factor Analysis

Several components were extracted through the use of exploratory factor analysis (EFA), which was done with the assistance of the SPSS 24 program. In accordance with the outcomes of the EFA performed with the VARIMAX rotation, it generates four distinct factors. The first component is which is referred to as Entrepreneurship Education (EE). Additionally, there is an element that is referred

Table 1: Item examples

Factor	Item Code	Item
Entrepreneurship Education (EE)	EE3	The available teaching materials help understand the concept of sustainable entrepreneurship.
	EE4	Lecturers have good knowledge and experience about sustainable entrepreneurship.
Sustainability Innovation (SInn)	SInn2	The innovations carried out prioritize the use of environmentally friendly resources.
	SInn4	The resulting innovations pay attention to social impact
Sustainability Intention (SInt)	SInt2	Running an environmentally friendly business is my main goal.
	SInt3	I am interested in learning more about sustainable business practices.
Sustainability Business Model (SBM)	SBM3	My product or service offers added value in terms of sustainability
	SBM4	I provide products that help customers live a sustainable lifestyle.

to as Sustainability Innovation (SI_{nn}). The Sustainability Intention (SI_{nt}) element is the third category of consideration. SBM stands for “Sustainability Business Model,” which is the fourth essential component. In order to guarantee the preservation of construct validity and internal consistency throughout the investigation, Cronbach’s alpha was implemented at a minimum acceptable level of 0.70, as per (Blunch, 2013). The findings presented in Table 1 suggest that the data set was suitable for factor analysis, as the KMO value exceeded the threshold of 0.60 (Hair et al., 2016; Tabachnick and Fidell, 2018). Bartlett’s test of sphericity yielded a P-value that was <0.005, which provides further evidence that factor analysis was suitable for the data set under analysis. Referring to Podsakoff et al. (2012) this study did not demonstrate any indication of common method bias. The first primary component accounted for 23.51% of the total variance, which is <50.0%. This was the result of four distinct components accounting for 61.13% of the total variance.

4.3. Measurement Model

Table 3 provides a summary of the findings obtained from the factor analysis (EFA and CFA). Confirmatory factor analysis (CFA)

was carried out with the AMOS 24 software in order to validate the extracted components by EFA and test the hypothesised link through structural equation modeling (SEM). As was previously described, EFA generates four distinct factors. The purpose of this analysis was to verify the aforementioned factors. As can be seen in Table 3, the measurement model possesses a high level of convergent validity. This is due to the fact that the value of AVE for each construct falls within the range of 0.63–0.70 (which is >0.50). Additionally, the CR value for each construct falls within the range of 0.84 to 0.93 (which is >0.70), and the loading value factors consist of 0.71 to 0.90 (which is >0.70).

The concept of discriminant validity refers to the idea that the correlation between the ways in which various constructs are measured should be kept to a minimum. According to the acceptable index, the value of the square root of the AVE should be exceed the value of the correlation between the latent factor and the other factors. According to Table 4, the measuring model possesses a high level of validity due to the fact that the square root value of AVE is higher than the correlation coefficient between the components. According to Table 5, the measurement model exhibits a reasonable model fit index. This is evidenced by the following values: P = 0.06 (>0.05), RMSEA = 0.06 (<0.08), RMR = 0.05 (<0.08), GFI = 0.93 (>0.90), TLI = 0.95 (>0.90), CFI = 0.96 (>0.90), and CMIN/df = 2.38 (<3.00). These results collectively indicate that the measurement model adequately captures the underlying structure of the data. The RMSEA and RMR values, being below the threshold of 0.08, suggest minimal error of approximation and a strong correlation between the model and the empirical data. Similarly, the GFI, TLI, and CFI values exceeding 0.90 demonstrate strong agreement between the model and the empirical data, reflecting good model performance. Lastly, the CMIN/df value falling below 3.00 confirms that the model is parsimonious and well-specified.

4.4. Structural Model

To evaluate the hypothesis that was proposed, the SEM technique is utilized. The methodology of SEM is referred to as a multivariate statistical analysis method. Based on the structure and the way it

Table 2: Characteristics of sample

Demographic characteristics	Total	%
Gender		
Male	93	38.8
Female	147	61.2
Omzet/per month (IDR)		
<10.000.000	65	27.1
10.000.000–20.000.000	87	36.3
20.000.000–30.000.000	45	18.8
30.000.000–40.000.000	31	12.9
>40.000.000	12	5.0
Type of business		
Food and Beverages	88	36.7
Event Organizer	3	1.3
Retail and E-commerce	32	13.3
Professional Services	54	22.5
Construction and Real Estate	5	2.1
Media and Communications	8	3.3
Health and Beauty	9	3.8
Manufacturing and Production	41	17.1
n=240		

Table 3: Results of factor analysis

Factor	Encode	Loading	Eigen value	Explained variance (%)	KMO	BTS (P)	α	AVE	CR
Entrepreneurship Education (EE)	EE1	0.81	7.48	18.69	0.84	317.24 (0.00)	0.86	0.68	0.93
	EE2	0.90							
	EE3	0.74							
	EE4	0.84							
	EE5	0.79							
	EE6	0.86							
Sustainability Innovation (SI _{nn})	SI _{nn} 1	0.76	10.25	23.51	0.85	364.36 (0.00)	0.87	0.70	0.90
	SI _{nn} 2	0.88							
	SI _{nn} 3	0.83							
	SI _{nn} 4	0.86							
Sustainability Intention (SI _{nt})	SI _{nt} 1	0.75	4.86	11.77	0.81	273.91 (0.00)	0.83	0.64	0.84
	SI _{nt} 2	0.81							
	SI _{nt} 3	0.84							
Sustainability Business Model (SBM)	SBM1	0.83	2.13	7.16	0.88	398.48 (0.00)	0.90	0.63	0.89
	SBM 2	0.87							
	SBM 3	0.80							
	SBM 4	0.71							
	SBM 5	0.76							

operates, structural equation modeling (SEM) is a combination of factor analysis, regression analysis, and route analysis. Figure 1 presents the findings of the scanning electron microscopy (SEM) examination carried out with the AMOS 24 program. According to Table 6, the findings indicated that the effect of EE on SInn was positive ($P = 0.00 < 0.05$; $\beta = 0.37$), which was the hypothesis that was received. The effect of EE on SInt was also positive ($p = 0.00 < 0.05$; $\beta = 0.30$), and it was seen that H2 was received. Furthermore, it is worth noting that the effect of EE on SBM is favorable ($P = 0.00 < 0.05$; $\beta = 0.28$), as indicated by the fact that H3 was received. A direct effect of SInn on SInt is observed ($P = 0.00 < 0.05$; $\beta = 0.33$), as indicated by the H4 Received. Furthermore, it is worth noting that both SInn and SInt have a

direct impact on SBM, with a partial effect ($P < 0.05$; $\beta = 0.32$, $\beta = 0.38$). As a result, the hypotheses H5 and H6 are accepted.

Table 6 also shows the effect of EE on SBM, mediated by SInn, and SInt (H7, H7, and H9 received). The results of the mediation analysis show that university leaders can implement various scenarios by strengthening entrepreneurship education in influencing sustainable business models among young entrepreneurs, including by strengthening innovation and intention. Meanwhile, the cumulative indirect effect of EE on SBM via SInn and SInt exhibits a β value of 0.30; when combined with the direct effect, the overall effect of EE on SBM presents a β value of 0.58.

5. DISCUSSION

The results of this study confirm that EE has a significant effect on SInn, SInt, and SBM. EE acts as a key mechanism in building individual capacity to identify opportunities, develop innovative ideas, and implement approaches that support sustainability in their business practices (Boldureanu et al., 2020; Orobica et al., 2020; Soomro et al., 2020). This finding is in line with previous studies showing that EE not only improves technical entrepreneurial skills but also encourages the development of environmentally friendly innovations and internalized sustainability values in entrepreneurial intentions (Fichter and Tiemann, 2018; Focurier and Wiek, 2019).

Entrepreneurship education provides theoretical and practical foundations for young entrepreneurs to understand the complexities

Table 4: Discriminant validity analysis

Construct	EE	SInn	SInt	SBM
Entrepreneurship Education (EE)	0.83			
Sustainability Innovation (SInn)	0.37	0.84		
Sustainability Intention (SInt)	0.52	0.41	0.80	
Sustainability Business Model (SBM)	0.16	0.29	0.36	0.79

The bold diagonal value represents the square root of AVE

Table 5: Model fit criteria

Criteria	Model fit value	Cut-off value
P-value	0.06	>0.05
CMIN/DF	2.38	<3.00
RMR	0.05	<0.08
RMSEA	0.06	<0.08
GFI	0.93	>0.90
CFI	0.96	>0.90
TLI	0.95	>0.90

Figure 1: Structural equation modeling results

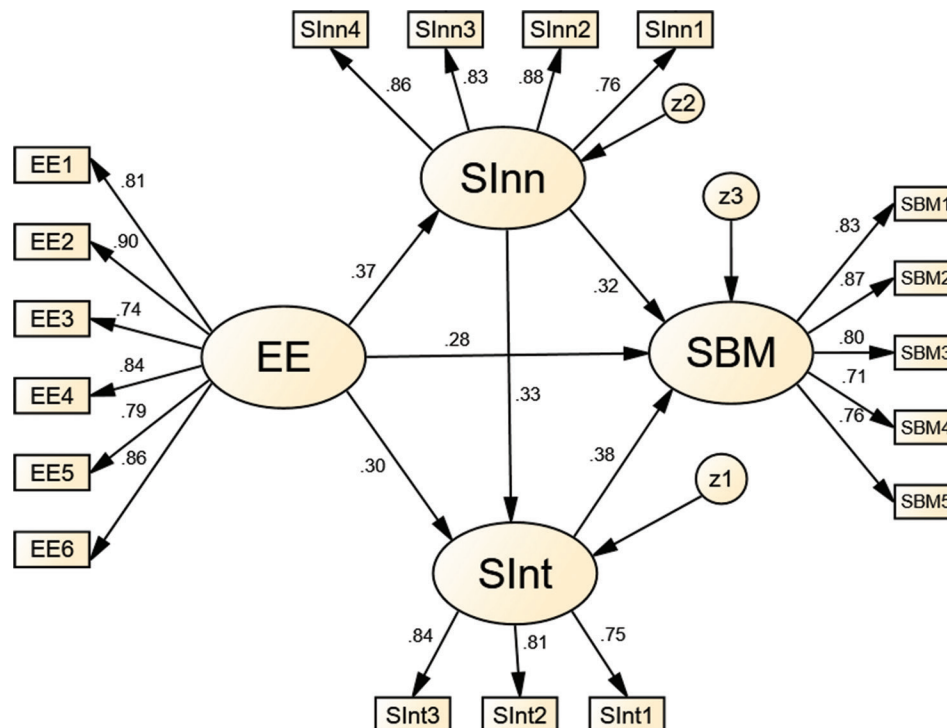


Table 6: Results of structural analysis

Hypothesis	Path	P	β	Conclusion
H1	EE→SInn	0.00	0.37	Received
H2	EE→SInt	0.00	0.30	Received
H3	EE→SBM	0.00	0.28	Received
H4	SInn→SInt	0.00	0.33	Received
H5	SInn→SBM	0.00	0.32	Received
H6	SInt→SBM	0.00	0.38	Received
H7	EE→SInn→SBM	0.00	0.14	Received
H8	EE→SInt→SBM	0.00	0.11	Received
H9	EE→SInn→SInt→SBM	0.00	0.05	Received

*Total indirect effect EE→SBM, $\beta = 0.30$

*Total effect of EE→SBM, $\beta = 0.58$

of sustainability, including how social, environmental, and economic aspects are interrelated in a business context (García-Castanedo et al., 2024; Rashid, 2019). This enables them to develop sustainable innovations (SInn) that are relevant to environmental and social challenges (Kickul et al., 2018; Shu et al., 2020). Furthermore, this education also shapes SInt, which is a key factor in driving sustainable entrepreneurial behavior (Alvarez-Risco et al., 2021; Ashari et al., 2022). Through its direct influence on SBM, EE helps individuals to design business models that integrate sustainability principles, from value creation to environmental impact management (Hermann and Bossle, 2020; Strachan, 2018). Thus, EE has a significant impact on driving the transformation of young entrepreneurs towards business practices that support sustainability as a whole.

This study demonstrates that SInn affected SInt and SBM. Sustainability innovation denotes the development of concepts, goods, or systems aimed at minimizing environmental impacts while delivering social and economic advantages (Breuer et al., 2018; Lüdeke-Freund, 2020; Lüdeke-Freund et al., 2018). The results show that entrepreneurs who develop SInn tend to have stronger SInt, where they consistently consider sustainability as a primary factor in their business decision-making. In this context, SInn encourages individuals to commit to sustainability values by creating relevant solutions to environmental and social issues (Salehe et al., 2024; Todeschini et al., 2017). In addition, SInn directly influences SBM by providing technical and strategic foundations for designing sustainability-oriented business models. The study by (Bocken and Geradts, 2020) emphasized that sustainability innovation is a key element in transforming traditional business models into SBM. In this study, SInn serves as a catalyst that enables entrepreneurs to identify and exploit new opportunities, such as green product development, resource efficiency, or waste management. This process ultimately enhances their ability to create value that is not only economic but also has positive social and environmental impacts (Cosenz et al., 2020; Gupta and Matharu, 2022).

The findings of this investigation indicated that SInt significantly affects SBM. In prior literature, SInt is characterized as an individual's dedication or intention to participate in activities that promote sustainability (Maritz et al., 2022; Pauceanu et al., 2019). In this context, SInt reflects the intrinsic motivation that drives entrepreneurs to incorporate sustainability ideas into their business plans and practices. This study supports the TPB

theory (Ajzen, 1991), which emphasizes that intention is a major predictor of actual behavior. The positive relationship between SInt and SBM suggests that sustainability intention guides how their business models are designed and implemented (Musona et al., 2021; Vuorio et al., 2018). (Haldar, 2019) found that entrepreneurs with strong SInt are more likely to develop SBM that considers sustainability values in every stage of their business operations. For example, SInt encourages more inclusive decision-making, such as the selection of environmentally friendly raw materials, sustainable supply chain management, and the involvement of local communities in business activities (Ghobakhloo et al., 2021; Thao et al., 2019).

This study also revealed the indirect effect of EE on SBM through the mediation pathways of SInn and SInt. These results highlight the importance of the mediation pathway in understanding the full impact of EE on SBM development. Although EE has a direct effect on SBM, its impact is stronger when SInn and SInt are considered as mediators. This pathway suggests that EE not only provides basic knowledge about entrepreneurship but also builds the capacity to create sustainable innovations and form strong sustainability intentions (Agu et al., 2021; Kolb et al., 2017; Su et al., 2021). Young entrepreneurs exposed to EE tend to be more open to exploring innovative ideas that support sustainability (Dvorakova and Polents, 2021; Shaw and Sørensen, 2022). This SInn then drives the emergence of SInt, where individuals have a greater commitment to implementing sustainability values in their business operations (Salehe et al., 2024; Todeschini et al., 2017). Finally, the combination of SInn and SInt supports the development of a more holistic SBM, where sustainability is at the heart of business strategy. This result is in line with latest studies showing that innovation and sustainability intentions are key elements in linking entrepreneurship education to business sustainability (Alvarez-Risco et al., 2021; Rauter et al., 2017; Singh et al., 2021). Schaltegger et al. (2017) showed that SInn and SInt play an essential role in transforming traditional business models into more inclusive and environmentally friendly SBM. Therefore, this mediation pathway confirms that the success of EE in supporting SBM depends on its ability to facilitate innovation and build deep sustainability intentions.

6. CONCLUSION

This investigation demonstrates the substantial influence of Entrepreneurship Education (EE) on the development of

the Sustainability Business Model (SBM) by means of the mediation pathway of Sustainability Innovation (SInn) and Sustainability Intention (SInt). The results indicate that EE has a direct impact on SBM, as well as an indirect impact through the increase in SInn and SInt. These findings verify that sustainability-oriented entrepreneurship education has the capacity to motivate entrepreneurs to create sustainable innovation, establish sustainability intentions, and create business models that concatenate environmental, economics and social factors. Furthermore, this investigation validates a substantial correlation between SInn and SInt, in which entrepreneurs are motivated to demonstrate a more fervent dedication to sustainability practices through the implementation of sustainability innovation. The relationship between SInt and SBM is also a significant discovery, as it confirms that sustainability intention is a critical factor in the implementation of sustainable business models. The sustainable entrepreneurship literature is enhanced by the theoretical and empirical contributions of this study. This study theoretically incorporates EE, SInn, SInt, and SBM into a comprehensive conceptual framework, elucidating the ways in which entrepreneurship education can impact the SBM development. Furthermore, this research incorporates perspectives from developing countries, particularly Indonesia, that are still relatively underrepresented in international literature. In practical terms, the findings of this study offer educational institutions and policymakers valuable insights for the development of more effective entrepreneurship education programs that promote sustainability. The results are also pertinent for youthful entrepreneurs, as they serve as an incentive for them to incorporate sustainability and innovation into their business operations.

This work offers significant insights; nonetheless, numerous limitations must be acknowledged. This study used a quantitative methodology with a cross-sectional approach, hence it cannot elucidate the causal link in detail. Longitudinal studies are essential to comprehend the dynamics of the impact of EE, SInn, and SInt on SBM over an extended duration. The study's sample is confined to young entrepreneurs in Indonesia who have participated in entrepreneurship education programs. This study depends on self-reported data from participants, which may be affected by societal bias or personal perspectives. Future researchers should broaden the scope of this study by incorporating samples from diverse geographic regions or industry sectors. Comprehensive research is required to investigate intricate mediation mechanisms, including variables such as governmental funding, organizational culture, and technological availability. Moreover, qualitative or mixed-method research can yield profound insights into entrepreneurs' experiences with implementing SBM. The efficacy of entrepreneurship education interventions tailored to sustainability can be evaluated to enhance their practical contributions to a sustainable entrepreneurial ecosystem.

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