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Millennial Entrepreneurship Model in Islands: The Role of Digital Entrepreneur Ecosystem and Productive Entrepreneur in Realized Business Sustainability

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ABSTRACT

This study examines the relationships among the digital entrepreneurial ecosystem, productive entrepreneurship, sustainable business, and millennial entrepreneurship in MSMEs, while exploring their role in improving business competitiveness and addressing unemployment in Indonesia. A quantitative approach was employed using purposive sampling of 174 millennial-owned food industry MSMEs across seven locations in the Bangka Belitung Islands. Data were collected through surveys and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings reveal that the digital entrepreneurial ecosystem positively and significantly influences productive entrepreneurship, which in turn strengthens millennial entrepreneurship. Both the digital entrepreneurial ecosystem and productive entrepreneurship also positively affect sustainable business, while sustainable business significantly enhances millennial entrepreneurship, highlighting the importance of sustainability in improving business performance and competitiveness. This study concludes that integrating digital ecosystems, entrepreneurial productivity, and sustainability orientation strengthens the resilience and long-term growth of MSMEs.

Keywords: Millennial Entrepreneurship; Digital Entrepreneurship Ecosystem; Productive Entrepreneurship; Sustainable Business

INTRODUCTION

Entrepreneurship is an important element in the economic development of a country (Xin & Park, 2024). Entrepreneurship helps address social disparities and drives economic transformation. (Wen et al., 2024) Entrepreneurship is the basis for establishing and creating new businesses that support growth and development by increasing competition, creating jobs and increasing innovation capacity through the commercialization of ideas (Graham & Bonner, 2024). MSMEs are part of entrepreneurial activities that play an important role in the development of a country in generating wealth and employment (Sigchaa et al., 2024).

Indonesia, with its diversity of natural resources, especially in the food sector, is a priority for economic development for the welfare of the people (Syafitri et al., 2022) MSMEs have a strategic role in strengthening the food industry by utilizing the agriculture, livestock, forestry, and fisheries sectors, especially in the food crops subsector. (Hubeis, 2021). MSMEs as the main driving force of the economy that contributes to Gross Domestic Product (Agarwal et al., 2023). MSMEs play an important role in creating jobs, eliminating the rural-urban gap, supporting equitable growth and encouraging an entrepreneurial culture (Kumar et al., 2024).

MSMEs are a crucial pillar of economic growth in Indonesia. According to data from the Ministry of Cooperatives and MSMEs, the number of MSMEs in Indonesia currently reaches 64.2 million, contributing 61.07% of GDP, or IDR 8,573.89 trillion. They play a crucial role in employment, with 97% of workers employed in this sector. (Junaidi, 2023) In Pangkalpinang City, the unemployment rate decreased from 6.81% in 2021 to 5.76% in 2023 (Bangka Belitung Province Statistics Agency, 2024).

The heightThe interest of young people in entrepreneurship is an opportunity for Indonesia to overcome unemployment which is supported by the large population and consumption of society. (Bappenas, 2022) Therefore, entrepreneurship can be a solution to Indonesia's unemployment problem. This research focuses on the millennial entrepreneurship model because the millennial generation has better focus in decision-making, is able to think rationally, and is willing to take risks. (Nadlifatin et al., 2021), and familiar with technology and the internet that supports business activities in terms of marketing and promotion (Dewi, 2021).

Entrepreneurial ecosystem is an important factor in driving innovation, economic growth and job creation (Rukmana et al., 2023). The entrepreneurial ecosystem aims to foster entrepreneurship within an ecosystem by encouraging the entrepreneurial process towards success (Asmit et al., 2024). In improving the performance of diverse entrepreneurs, digital tools are needed to develop digital abilities and skills (Paul et al., 2023).

Entrepreneurial activities require productive activities to ensure smooth operation. Productivity refers to production efficiency and is a key concern for any business, reflecting a company's ability to generate profits and achieve an advantage over competitors (Teng et al., 2023). Entrepreneurial productivity encompasses conditions that can lead to structural transformation and economic growth driven by entrepreneurship (Fredström et al., 2021). To create productive entrepreneurs, innovation is needed as a basic foundation for development (Saunia & Hidayah, 2023). Good entrepreneurship is entrepreneurship that is able to achieve competitive advantage and this can be realized through a Sustainable Business strategy (Al-Shaikh & Hanaysha, 2023) Sustainable Business is a strategy to survive a crisis and create new opportunities. (AlQershi et al., 2023) Sustainable Business can be achieved by

maximizing the use of existing resources (Utama et al., 2024). The younger generation is very interested in business sustainability issues that emphasize environmental and social issues, when professionals enter the world of work, they tend to be attracted to companies that prioritize sustainability as an intrinsic aspect of their business (Florek-Paszkowska & Hoyos-Vallejo, 2023).

LITERATURE REVIEW

Digital Entrepreneurial Ecosystem

The Digital Entrepreneurship Ecosystem is a combination of Digital Entrepreneurship and the Entrepreneurship Ecosystem.(Bejjani et al., 2023).Entrepreneurial ecosystem is a dynamic interaction embedded within institutions between entrepreneurial attitudes, abilities, and aspirations by individuals, which drives the allocation of resources through the creation and operation of new ventures, while digitalization refers to the use of digital technology and the effects of digital data on the way things work, thus the entrepreneurial ecosystem and digitalization mutually support business growth and innovation.(Venâncio et al., 2023). The digital entrepreneurship ecosystem is interconnected to facilitate collaboration between resources and other supporting sources outside the company to support the success of digital entrepreneurship (Herlina, 2023)

Bejjani et al., (2023) conceptualizes the Digital Entrepreneurial Ecosystem (DEE) into seven ecosystem attributes with their characteristics, namely: (1) Governance can be independent, distributed, undefined, or managed by the platform, (2) Actors, (3) Resources, (4) Architecture, (5) Complementarity, (6) Reach, and (7) Identification Process.
H1. Digital Entrepreneur Ecosystemhas a positive and significant influence on the Millennial Entrepreneurship Model

Productive Entrepreneurship

Productivity refers to production efficiency and is one of the main concerns for any business, as it reflects the company's ability to gain profits and advantages over competitors (Teng et al., 2023). Entrepreneurial productivity encompasses conditions that can lead to structural transformation and economic growth driven by entrepreneurship (Fredström et al., 2021).

Entrepreneurial productivity plays an important role in facing future challenges, as changes in technology, the economy and society can create new opportunities for entrepreneurs, but also provide a complexity of problems that have not existed before (Fatmawati & Mutiah, 2023). To create productive entrepreneurs, innovation is needed as a basic foundation for development (Saunia & Hidayah, 2023). Productivity can be measured through the Global Entrepreneurship and Development Index (GEDI) with three sub-indices, namely Entrepreneurial Attitude, Entrepreneurial Ability, and Entrepreneurial Aspiration (Herman & Szabo, 2014).
H2. Productive Entrepreneurship has a positive and significant effect on the Millennial Entrepreneurship Model

Sustainability Business

Sustainable business practices continue to evolve every year, aiming to minimize negative impacts on the environment while promoting social and economic benefits (Sjioen et al., 2023). A strategy for building a sustainable business involves taking an approach that considers the long-term environmental, social, and economic impacts of a business. Furthermore, this strategy also involves a commitment to social responsibility, such as empowering surrounding communities, ensuring employee welfare, and contributing to the development of the surrounding community (Yanti, 2024).

Sustainable Businessis a strategy to survive the crisis and create new opportunities (AlQershi et al., 2023). A Sustainable Business Model is defined as a business model that explicitly expands the scope of value creation to various stakeholders.(Norris, 2023)Sustainable business practices are based on the Triple Bottom Line (TBL) approach which emphasizes the need to balance environmental, social, and economic aspects.(Florek-Paszkowska & Hoyos-Vallejo, 2023)Sustainable Business can be achieved by maximizing the use of existing resources.(Utama et al., 2024).
H3. Digital Entrepreneur Ecosystem has a positive and significant impact on Sustainable Business
H4. Productive Entrepreneurship has a positive and significant impact on Sustainable Business

Millennial Entrepreneurship Model
The millennial generation is a generation that developed alongside digital technology and was born around the 1980s (Nadlifatin et al., 2021). Millennial entrepreneurs have great potential as the millennial generation is very close to technology and the internet, so that business activities can utilize technology in business activities as a marketing tool and product promotion (Dewi, 2021). The millennial generation has more innovative, creative, and critical thinking, thus millennial entrepreneurs are familiar with the tastes of young people and understand what is currently trending or what will become trendsetters (Budiono, 2021).

Characteristics that influence millennial entrepreneurial activities are: Locus of Control, tendency to take risks, self-confidence, need for achievement, tolerance of ambiguity and innovation (Kurjono & Yolanda, 2022). The millennial generation has a participatory and insightful perspective in running a business to become a successful millennial entrepreneur (Haris & Taryono, 2020).

H5. Sustainable Business and the Millennial Entrepreneurship Model have a positive and significant relationship
H6. Digital Entrepreneur Ecosystem and Productive Entrepreneurship simultaneously have a positive and significant influence on the Millennial Entrepreneurship Model, and have an impact on Sustainable Business

RESEARCH METHOD

The method in this research is implemented in four stages, namely: (1) Preparation stage, including topic selection, background preparation, problem formulation, to preparation of research instruments, (2) Implementation stage, including data collection and analysis, discussion, and preparation of conclusions and suggestions, (3) Report writing, carried out as a form of accountability and evaluation of research effectiveness, and (4) Publication stage. The variables measured in this research are Digital Entrepreneur Ecosystem, Productive Entrepreneurship, Sustainable Business and Millennial Entrepreneurship Model.

This research uses a quantitative approach for collaborative use to obtain comprehensive, valid, reliable, and objective data. Data collection in this study was conducted using field study methods, including interviews, questionnaires, and literature review. The population in this study were MSMEs in the food industry in the Bangka Belitung Islands region. Meanwhile, the sample size represents the number and characteristics of the population (Sugiyono, 2020). The sampling technique used in this study was quota sampling. Quota sampling is a sampling technique that determines the number of samples based on certain characteristics as targets that must be met

(Sugiyono, 2020). Therefore, the number of samples in this study was 174 MSME food industry actors from 7 (seven) locations in the Bangka Belitung Islands.

The sample determination was based on a purposive sampling technique where the sample determined as respondents had the following criteria: food industry MSME actors, the business had been running for at least 2 (two) years and had already managed the business online. The analysis in this study used the SmartPLS program. The Outer Model was assessed by looking at the convergent validity (the size of the loading factor for each construct). Loading factors above 0.70 are highly recommended, however, loading factors of 0.50 – 0.60 can still be tolerated as long as the model is still in the development stage. In addition to the loading factor value, it can also be seen from the composite reliability value, Cronbach alpha and the square root value of AVE. If the square value of AVE is higher than the correlation between other constructs, it can be concluded that the construct has a good level of discriminant validity.

RESULTS

Respondent Description

Respondent Identity Based on Age

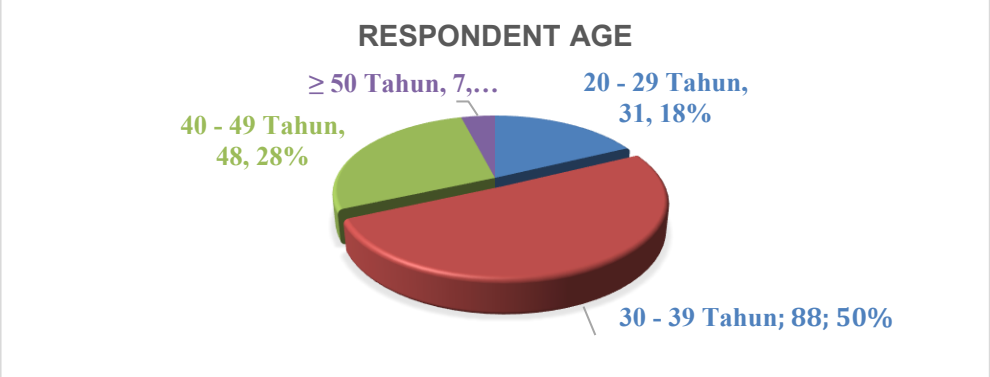

Figure 1 Respondent Identity
Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on the age distribution diagram of respondents, the 30-39 age group was the largest, with 88 respondents (50%), followed by the 40-49 age group with 48 respondents (48.8%). There were 31 respondents in the 20-29 age group (18%), while there were 7 respondents (4%) in the ≥ 50 age group. This data indicates that the majority of respondents are in the productive age range.

Respondent Identity Based on Year of Starting Business

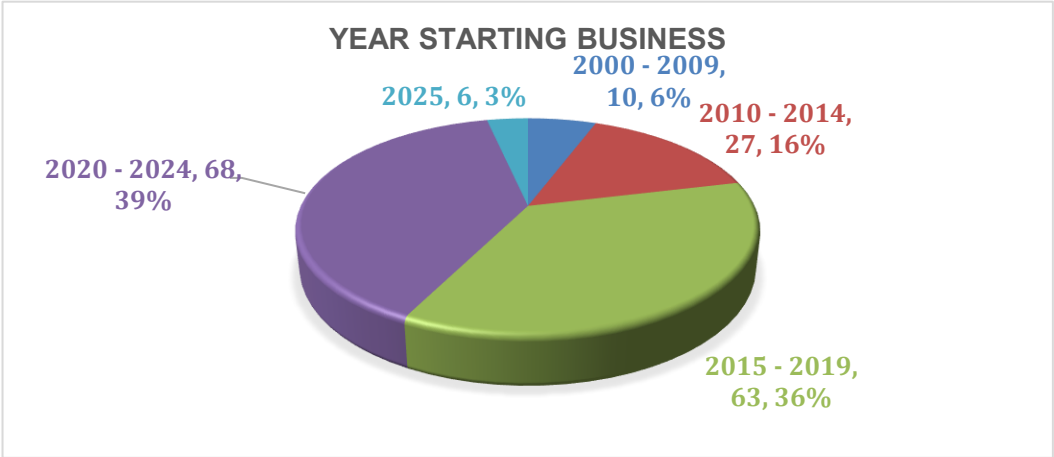

Figure 2. Respondent Identity Based on Year of Starting Business
Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on the diagram shown, it can be interpreted that the majority of respondents started their businesses in the 2020–2024 period, namely 68 business units or 39% of the total respondents. This finding indicates that in the last five years there has been a significant increase in business establishments, reflecting the high interest in entrepreneurship during that period. Furthermore, the 2015–2019 period ranked second with 63 business units or 36%, which also indicates a fairly high level of entrepreneurial activity before the 2020 period.

Meanwhile, in the 2010–2014 period, 27 business units, or 16%, were recorded, a relatively lower number compared to the two subsequent periods. In the 2000–2009 period, 10 businesses, or 6%, were recorded. In 2025, there were only 6 businesses, or 3%, the lowest percentage. This is understandable considering that 2025 is still underway, so not many businesses were recorded as established during that period.

Respondents Based on Business Category

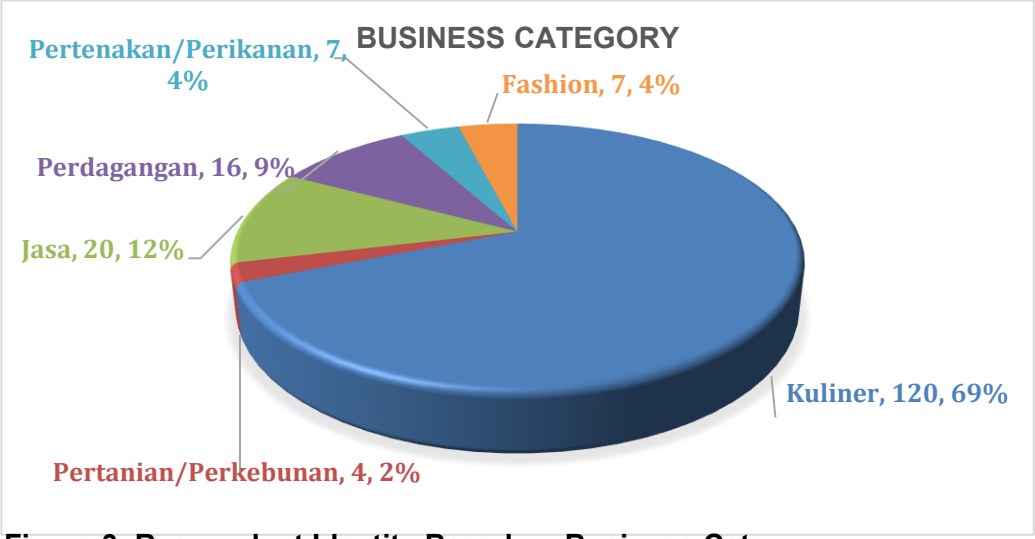

Figure 3. Respondent Identity Based on Business Category
Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on the pie chart of business types, it is known that the majority of respondents run businesses in the culinary sector, amounting to 69% of the total respondents. This indicates that the food and beverage business is the most dominant sector, in line with the high consumer needs and demand for daily consumption products. Furthermore, the service sector ranks second with a percentage of 12%, indicating the contribution of service-based businesses in the respondents' economic activities. The trade sector is next in line with a percentage of 9%, indicating that the activity of buying and selling goods is also quite developed among respondents. Meanwhile, the livestock/fisheries and fashion sectors each have a percentage of 4%, indicating that both types of businesses are still run by a small portion of respondents. Meanwhile, the agriculture/plantation sector is the type of business with the smallest proportion, namely 2% of the total respondents.

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Respondent Identity Based on Business Category

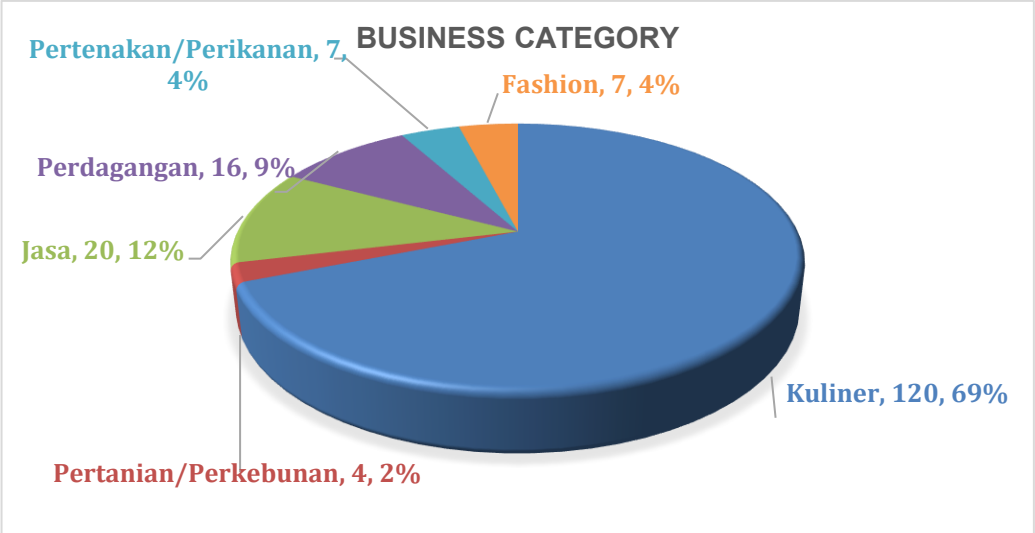

Figure 5.4 Respondent Identity Based on Social Media Used

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on the social media diagram used, it is known that WhatsApp is the most dominant social media used by respondents, with a percentage of 45.82%, which indicates that this platform is the main means in supporting business activities, especially for communication and service to consumers. Furthermore, Facebook is used by 21.74% of respondents, followed by Instagram at 17.39%, which reflects the role of social media as a means of promotion and delivery of business information.

However, 6% of respondents stated that they do not use social media at all in running their businesses. This indicates that some business owners are still not utilizing social media as a business support tool, possibly due to limited knowledge, technological access, or a preference for conventional business practices. Meanwhile, the use of other social media platforms, such as YouTube, Shopee, and X, was only 0.33% each, indicating that these platforms are not yet the primary choice for respondents.

Descriptive Statistics

Table 1.Descriptive Statistics of Digital Entrepreneur Ecosystem Variable (X1)

Variables	Indicator	Mean	Information
X1	X1_1	3.84	Tall
	X1_2	3.86	Tall
	X1_3	3.66	Tall
	X1_4	4.08	Tall
	X1_5	4.17	Tall
	X1_6	3.74	Tall
	X1_7	3.92	Tall
	X1_8	4.08	Tall
	X1_9	4.26	Very high
	X1_10	4.01	Tall
	X1_11	4.13	Tall
	X1_12	4.27	Very high
	X1_13	4.28	Very high
	X1_14	4.05	Tall

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on Table 1 Descriptive Statistics of the Digital Entrepreneur Ecosystem Variable (X1), it is known that the average value of all indicators is in the high to very high category. This indicates that respondents have a positive perception of the aspects that form the digital entrepreneurship ecosystem. The indicators with the highest average values are X1_13 (4.28) and X1_12 (4.27) which are in the very high category, followed by X1_9 (4.26) which is also included in the very high category. This condition indicates that these three indicators are perceived as the strongest by respondents in supporting the existence and development of the digital entrepreneurship ecosystem. Meanwhile, other indicators such as X1_4 (4.08), X1_5 (4.17), X1_8 (4.08), X1_10 (4.01), X1_11 (4.13), and X1_14 (4.05) are in the high category, which indicates the consistency of respondents' assessment of the Digital Entrepreneur Ecosystem variable. The indicator with the lowest average value is X1_3 (3.66), but this indicator remains in the high category, so it still reflects a good perception.

Table 2 Descriptive Statistics of Productive Entrepreneurship Variable (X2)

Variables	Indicator	Mean	Information
X2	X2_1	4.64	Very high
	X2_2	4,586	Very high
	X2_3	4.44	Very high
	X2_4	4.44	Very high
	X2_5	4.52	Very high
	X2_6	4.38	Very high

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on Table 2 Descriptive Statistics of the Productive Entrepreneurship Variable (X2), it is known that all indicators in the Productive Entrepreneurship variable are in the very high category, with average values ranging from 4.38 to 4.64. This indicates that respondents gave a very positive assessment of aspects that reflect entrepreneurial productivity. The indicator with the highest average value is X2_1 (4.64), followed by X2_2 (4.586), which indicates that these two indicators are perceived as the most dominant in describing entrepreneurial productivity. Furthermore, indicator X2_5 (4.52) also shows a high average value, strengthening the consistency of respondents' assessment of this variable. Meanwhile, the indicator with the lowest average value is X2_6 (4.38). Nevertheless, these indicators remain in the very high category.

Table 3 Descriptive Statistics of Sustainable Business Variable (Y)

Variables	Indicator	Mean	Information
Y	Y_1	4.26	Very high
	Y_2	4.14	Tall
	Y_3	4.30	Very high
	Y_4	4.32	Very high
	Y_5	4.47	Very high
	Y_6	4.24	Very high

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on Table 3 Descriptive Statistics of the Sustainable Business (Y) Variable, it is known that most indicators are in the very high category, with average values ranging from 4.14 to 4.47. This indicates that respondents gave a very positive assessment of aspects that reflect business sustainability. The indicator with the highest average value is Y_5 (4.47), which indicates that this aspect is perceived as the strongest in representing business sustainability. Furthermore, indicators Y_4 (4.32) and Y_3 (4.30)

are also in the very high category, which confirms the consistency of respondents' perceptions of this variable.

Meanwhile, indicator Y_2 (4.14) has the lowest average value compared to other indicators, but remains in the high category, thus still reflecting positive perceptions from respondents. Other indicators such as Y_1 (4.26) and Y_6 (4.24) are also included in the very high category.

Table 4 Descriptive Statistics of Millennial Entrepreneurship Variables (Z)

Variables	Indicator	Mean	Information
Z	Z_1	4.51	Very high
	Z_2	4.46	Very high
	Z_3	4.25	Very high
	Z_4	4.29	Very high
	Z_5	4.42	Very high
	Z_6	4.38	Very high
	Z_7	4.44	Very high
	Z_8	4.55	Very high
	Z_9	4.42	Very high
	Z_10	4.28	Very high

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on Table 4 Descriptive Statistics of Millennial Entrepreneurship Variable (Z), it is known that all indicators are in the very high category, with average values ranging from 4.25 to 4.55. This indicates that respondents gave a very positive and consistent assessment of the characteristics of millennial entrepreneurship. The indicator with the highest average value is Z_8 (4.55), which indicates that this aspect is perceived as the most prominent in representing millennial entrepreneurship. Furthermore, indicators Z_1 (4.51) and Z_2 (4.46) also show high average values, strengthening the consistency of respondents' assessment of this variable.

Meanwhile, the indicator with the lowest average value was Z_3 (4.25). However, this indicator remains in the very high category, thus not indicating any significant weaknesses in the millennial entrepreneurship variable. Other indicators such as Z_4 (4.29), Z_5 (4.42), Z_6 (4.38), Z_7 (4.44), Z_9 (4.42), and Z_10 (4.28) also fell in the same category, indicating relatively even support from respondents.

Outer Model Test
Convergent Validity Test

Table 5 Outer Loading Test Results

Variable	Indicator	Outer Loading	Condition	Information
Digital Entrepreneur Ecosystem	X1_1	0.548	> 0.5	Valid
	X1_2	0.630	> 0.5	Valid
	X1_3	0.641	> 0.5	Valid
	X1_4	0.730	> 0.5	Valid
	X1_5	0.744	> 0.5	Valid
	X1_6	0.594	> 0.5	Valid
	X1_7	0.614	> 0.5	Valid
	X1_8	0.569	> 0.5	Valid
	X1_9	0.708	> 0.5	Valid
	X1_10	0.637	> 0.5	Valid

Variable	Indicator	Outer Loading	Condition	Information
	X1_11	0.754	> 0.5	Valid
	X1_12	0.673	> 0.5	Valid
	X1_13	0.754	> 0.5	Valid
	X1_14	0.742	> 0.5	Valid
Productive entrepreneurship	X2_1	0.712	> 0.5	Valid
	X2_2	0.791	> 0.5	Valid
	X2_3	0.823	> 0.5	Valid
	X2_4	0.843	> 0.5	Valid
	X2_5	0.767	> 0.5	Valid
	X2_6	0.773	> 0.5	Valid
Millennial Entrepreneurship	Z1	0.630	> 0.5	Valid
	Z2	0.705	> 0.5	Valid
	Z3	0.721	> 0.5	Valid
	Z4	0.797	> 0.5	Valid
	Z5	0.814	> 0.5	Valid
	Z6	0.791	> 0.5	Valid
	Z7	0.747	> 0.5	Valid
	Z8	0.687	> 0.5	Valid
	Z9	0.851	> 0.5	Valid
	Z10	0.569	> 0.5	Valid
Sustainable business	Y1	0.688	> 0.5	Valid
	Y2	0.701	> 0.5	Valid
	Y3	0.670	> 0.5	Valid
	Y4	0.688	> 0.5	Valid
	Y5	0.709	> 0.5	Valid
	Y6	0.623	> 0.5	Valid

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on the test results in Table 5, all indicators have outer loading values above 0.50, thus generally meeting the initial criteria for convergent validity. However, the Average Variance Extracted (AVE) test results show that the Digital Entrepreneur Ecosystem and Sustainable Business constructs still have AVE values below 0.50. To improve convergent validity, two indicators were removed: X1_1, X1_4, X1_6, X1_8, and X1_10 from the Digital Entrepreneur Ecosystem construct and Y6 from the Sustainable Business construct. The removal of these two indicators was proven to increase the AVE values of both constructs to exceed the minimum limit of 0.50.

Table 6 Results of the Average Variance Extracted (AVE) Test

Variables	Before	After	Condition	Information
Digital Entrepreneur Ecosystem	0.450	0.501	> 0.50	Valid
Productive entrepreneurship	0.618	0.618	> 0.50	Valid
Millennial Entrepreneurship	0.542	0.541	> 0.50	Valid
Sustainable business	0.463	0.515	> 0.50	Valid

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on the results of the Average Variance Extracted (AVE) test in Table 6, it is known that before the removal of indicators, the Digital Entrepreneur Ecosystem and Sustainable Business constructs had AVE values of 0.450 and 0.463, respectively, which were still below the minimum limit of 0.50. After the removal of indicators X1_1, X1_4, X1_6, X1_8, X1_10 and Y6, the AVE values of the two constructs increased to 0.501 and 0.515. These results indicate that all constructs have met the convergent validity criteria, because the AVE values of all variables have exceeded the recommended threshold of 0.50.

After removing indicators X1_1, X1_4, X1_6, X1_8, X1_10 in the Digital Entrepreneur Ecosystem construct and Y6 in the Sustainable Business construct, the model was re-estimated using SmartPLS to obtain more accurate measurement results.

Table 7 Second Stage Outer Loading Test Results

Variable	Indicator	Outer Loading	Condition	Information
Digital Entrepreneur Ecosystem	X1_2	0.545	> 0.5	Valid
	X1_3	0.586	> 0.5	Valid
	X1_5	0.775	> 0.5	Valid
	X1_7	0.540	> 0.5	Valid
	X1_9	0.758	> 0.5	Valid
	X1_11	0.782	> 0.5	Valid
	X1_12	0.751	> 0.5	Valid
	X1_13	0.823	> 0.5	Valid
	X1_14	0.762	> 0.5	Valid
Productive entrepreneurship	X2_1	0.713	> 0.5	Valid
	X2_2	0.791	> 0.5	Valid
	X2_3	0.822	> 0.5	Valid
	X2_4	0.842	> 0.5	Valid
	X2_5	0.767	> 0.5	Valid
	X2_6	0.774	> 0.5	Valid
Millennial Entrepreneurship	Z1	0.627	> 0.5	Valid
	Z2	0.703	> 0.5	Valid
	Z3	0.721	> 0.5	Valid
	Z4	0.797	> 0.5	Valid
	Z5	0.814	> 0.5	Valid
	Z6	0.788	> 0.5	Valid
	Z7	0.748	> 0.5	Valid
	Z8	0.688	> 0.5	Valid
	Z9	0.851	> 0.5	Valid
	Z10	0.574	> 0.5	Valid
Sustainable business	Y1	0.741	> 0.5	Valid
	Y2	0.726	> 0.5	Valid
	Y3	0.699	> 0.5	Valid
	Y4	0.728	> 0.5	Valid
	Y5	0.694	> 0.5	Valid

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on Table 7, the results of the second-stage outer loading test, all indicators for each variable have outer loading values above 0.5, thus meeting the convergent validity criteria. This value indicates that each indicator has a strong enough contribution to explaining the construct being measured, thus adequately representing the research

variables. Therefore, all variables in the research model are declared valid and suitable for further analysis.

4.1 Discriminant Validity Test

Table 8.Fornell-Lacker Test Results

Variables	*Digital Entrepreneur Ecosystem*	*Productive entrepreneurship*	*Sustainable business*	Millennial Entrepreneurship
Digital Entrepreneur Ecosystem	0.708			
Productive entrepreneurship	0.429	0.786		
Sustainable business	0.514	0.577	0.718	
Millennial Entrepreneurship	0.495	0.702	0.632	0.736

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on the results of the Fornell-Larcker Criterion test in Table 8, it can be seen that the square root of the AVE value (shown on the diagonal) for each construct is greater than the correlation between other constructs in the same column. The square root of the AVE values for the Digital Entrepreneur Ecosystem, Productive Entrepreneurship, Sustainable Business, and Millennial Entrepreneurship constructs are 0.708; 0.786; 0.718; and 0.736, respectively. These results indicate that each construct has good discriminant validity because it is able to distinguish itself from other constructs in the model. Thus, it can be concluded that all variables in this study have met the discriminant validity criteria based on the Fornell-Larcker Criterion method.

Table 9.Cross Loading Test Results

Indicator	X1	X2	Y	Z
X1-11	**0.782**	0.304	0.400	0.431
X1-12	**0.751**	0.248	0.353	0.382
X1-13	**0.823**	0.373	0.395	0.439
X1-14	**0.762**	0.38	0.381	0.432
X1-2	**0.545**	0.245	0.416	0.200
X1-3	**0.586**	0.226	0.372	0.217
X1-5	**0.755**	0.253	0.361	0.304
X1-7	**0.540**	0.187	0.265	0.106
X1-9	**0.758**	0.442	0.336	0.474
X2-1	0.311	**0.713**	0.423	0.484
X2-2	0.292	**0.791**	0.425	0.525
X2-3	0.328	**0.822**	0.450	0.547
X2-4	0.359	**0.842**	0.510	0.670
X2-5	0.345	**0.767**	0.400	0.542
X2-6	0.384	**0.774**	0.503	0.521
Y-1	0.402	0.380	**0.741**	0.411
Y-2	0.319	0.378	**0.726**	0.373

Y-3	0.340	0.356	**0.699**	0.462
Y-4	0.410	0.417	**0.728**	0.379
Y-5	0.366	0.508	**0.694**	0.594
Z1	0.306	0.401	0.432	**0.627**
Z10	0.566	0.394	0.387	**0.574**
Z2	0.277	0.543	0.438	**0.703**
Z3	0.374	0.438	0.490	**0.721**
Z4	0.371	0.573	0.621	**0.797**
Z5	0.397	0.663	0.561	**0.814**
Z6	0.314	0.523	0.417	**0.788**
Z7	0.311	0.498	0.413	**0.748**
Z8	0.295	0.456	0.339	**0.688**
Z9	0.425	0.604	0.481	**0.851**

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on the cross-loading test results presented in Table 9, it can be seen that all indicators have higher loading values for their original constructs compared to their correlations with other constructs. This indicates that each indicator is able to represent the construct it measures more strongly than other constructs in the model. These results indicate that each construct has good discrimination against other constructs.

Table 10 HTMT Test Results

Variables	*Digital Entrepreneur Ecosystem*	*Productive entrepreneurship*	*Sustainable business*	Millennial Entrepreneurship
Digital Entrepreneur Ecosystem				
Productive entrepreneurship	0.479			
Sustainable business	0.632	0.690		
Millennial Entrepreneurship	0.534	0.777	0.734	

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

The results of the HTMT test indicate that all correlation values between constructs are below the threshold of 0.90 as recommended by Hair et al. (2017). Thus, it can be concluded that the research model has met the criteria for discriminant validity through all three approaches, so that the model can be declared suitable to proceed to the next stage, namely testing the overall construct reliability.

Reliability Test

Table 11.Reliability Test Results

Variables	CA Value	CR Value	Information
Digital Entrepreneur Ecosystem	0.873	0.899	Reliable
Productive entrepreneurship	0.876	0.906	Reliable
Millennial Entrepreneurship	0.904	0.921	Reliable

Variables	CA Value	CR Value	Information
Sustainable business	0.766	0.841	Reliable

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on the reliability test results in the table above, all research variables demonstrated Cronbach's Alpha (CA) values above 0.60 and Composite Reliability (CR) values above 0.70. This indicates that all constructs have met reliability criteria. Therefore, all indicators in each variable are able to consistently measure the intended construct, thus all variables are deemed reliable and suitable for use in the next stage of analysis.

Inner Model Test

Q-Square Test

Table 12Q-Square Test Results

Variables	Q-Square	Information
Productive entrepreneurship	0.108	Low
Sustainable business	0.228	Currently
Millennial Entrepreneurship	0.283	Currently

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

The Q-Square test results show that the Productive Entrepreneurship variable has a Q^2 value of 0.068, which is included in the low category. Meanwhile, the Sustainable Business variable obtained a Q^2 value of 0.228 and the Millennial Entrepreneurship variable of 0.283, both of which are in the medium category. These findings indicate that the model has weak predictive relevance to Productive Entrepreneurship, but is quite adequate in explaining Sustainable Business and Millennial Entrepreneurship. Thus, the model built can be said to have quite good predictive ability on most endogenous variables. Therefore, the analysis can proceed to the next stage, namely the R-Squared test to assess the contribution of independent variables in explaining the dependent variable in the research model.

R-Square Test

Table 13. R-Square Test

Variables	*Adjusted R-square*	Information
Productive entrepreneurship	0.182	Weak
Sustainable business	0.469	Currently
Millennial Entrepreneurship	0.533	Currently

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

The R-Squared test results in Table 13 show that the Productive Entrepreneurship variable has an Adjusted R-Square value of 0.182, which is categorized as weak. Meanwhile, the Sustainable Business variable obtained a value of 0.569 and the Millennial Entrepreneurship variable 0.533, both of which are in the moderate category. These findings indicate that the model's ability to explain the Productive Entrepreneurship variable is still limited, but sufficient in explaining the Sustainable Business and Millennial Entrepreneurship variables. Therefore, the analysis can be continued to the next stage, namely the f-square test to see the magnitude of the influence of variable X on variable Y in the research model.

F-Square Test

Table 14. F-Square Test Results

Variables	*Digital Entrepreneur Ecosystem*	*Productive entrepreneurship*	*Sustainable business*	Millennial Entrepreneurship
Digital Entrepreneur Ecosystem		0.230	0.081	0.099
Productive entrepreneurship			0.048	0.631
Sustainable business				
Millennial Entrepreneurship			0.112	

Source: Results of the Distribution of Questionnaires Tested by Researchers (2025)

Based on Table 14 F-Square Test Results, the Digital Entrepreneur Ecosystem variable has a moderate influence on Productive Entrepreneurship with a value of 0.230, and a weak influence on Sustainable Business of 0.081 and on Millennial Entrepreneurship of 0.099. This indicates that the digital entrepreneurship ecosystem contributes to explaining endogenous variables, although not all of them are in the strong influence category. Furthermore, the Productive Entrepreneurship variable has a weak influence on Sustainable Business with a value of 0.048, but shows a strong influence on Millennial Entrepreneurship of 0.631. These findings indicate that entrepreneurial productivity has a significant role in shaping the characteristics of millennial entrepreneurs.

Meanwhile, the Sustainable Business variable has a weak influence on Millennial Entrepreneurship, with a value of 0.112. Overall, the F-Square test results indicate that there is variation in the level of influence between variables, with Productive Entrepreneurship showing the strongest contribution to Millennial Entrepreneurship. Therefore, the analysis can proceed to the hypothesis testing stage.

Direct Effect Hypothesis Test

Table 15 Results of the Digital Entrepreneur Ecosystem Hypothesis Test on Productive Entrepreneurship

Latent Variables	Original Sample (o)	T-Statistic	P-Values	Information
X1 Against X2	0.433	4,777	0,000	Significant

Source: Questionnaire results processed by researchers (2025)

DISCUSSION

Based on the test results shown in the table, the relationship between the Digital Entrepreneur Ecosystem (X1) and Productive Entrepreneurship (X2) shows an original sample value (O) of 0.433, a T-statistic of 4.777, and a P-value of 0.000. Because the P-value is smaller than 0.05, the influence of the Digital Entrepreneur Ecosystem on Productive Entrepreneurship is declared statistically significant. The positive coefficient indicates that the better the digital entrepreneurship ecosystem, the higher the level of

entrepreneurial productivity. Quantitatively, every one unit increase in the Digital Entrepreneur Ecosystem will increase Productive Entrepreneurship by 0.433 (43.3%). Thus, hypothesis (H1) is accepted, which means the digital entrepreneurship ecosystem has a positive and significant effect on entrepreneurial productivity.

Table 16 Results of the Digital Entrepreneur Ecosystem Hypothesis Test on Millennial Entrepreneurship

Latent Variables	Original Sample (o)	T-Statistic	P-Values	Information
X1 Against Z	0.237	3,577	0,000	Significant

Source: Questionnaire results processed by researchers (2025)

Based on the results of the hypothesis testing, the original sample value was obtained at 0.237 with a T-statistic of 3.577 and P-values of 0.00 (<0.05). These results indicate that the Digital Entrepreneur Ecosystem variable (X1) has a significant effect on Millennial Entrepreneurship (Z). Thus, the first hypothesis (H2) is accepted. This means that the existence of a digital entrepreneurship ecosystem makes a significant contribution (23.7%) to increasing millennial entrepreneurship in this research model.

Table 17 Results of the Productive Entrepreneurship Hypothesis Test on Millennial Entrepreneurship

Latent Variables	Original Sample (o)	T-Statistic	P-Values	Information
X2 Against Z	0.599	8,918	0,000	Significant

Source: Questionnaire results processed by researchers (2025)

Based on the results of the hypothesis test, the original sample value (O) was obtained at 0.599 with a T-statistic of 8.918 and a P-value of 0.000, which is below the significance threshold of 0.05. These results indicate that the Productive Entrepreneurship variable (X2) has a positive and significant effect on Millennial Entrepreneurship (Z). Thus, the second hypothesis (H3) is accepted. The direction of the positive relationship indicates that every one unit increase in entrepreneurial productivity will increase millennial entrepreneurship by 0.599 (59.9%). This finding emphasizes that entrepreneurial productivity is one of the main factors that plays an important role in encouraging the development of millennial entrepreneurship.

Table 18 Results of the Millennial Entrepreneurship Hypothesis Test on Sustainable Business

Latent Variables	Original Sample (o)	T-Statistic	P-Values	Information
Z Against Y	0.357	3,884	0,000	Significant

Source: Questionnaire results processed by researchers (2025)

Based on the results of the hypothesis testing, the original sample value (O) was 0.357, the T-statistic was 3.884, and the P-value was 0.000, which is smaller than 0.05. These results indicate that the Millennial Entrepreneurship variable (Z) has a positive and significant effect on Sustainable Business (Y). Thus, the fourth hypothesis (H4) is accepted. The coefficient of 0.357 indicates that every one unit increase in millennial entrepreneurship will increase sustainable business development by 35.7%. The

direction of this positive relationship confirms that millennial entrepreneurship plays a significant role in encouraging the creation of sustainability-oriented business practices.

Table 19 Results of the Digital Entrepreneur Ecosystem Hypothesis Test on Sustainable Business

Latent Variables	Original Sample (o)	T-Statistic	P-Values	Information
X1 Against Y	0.239	3,577	0,000	Significant

Source: Questionnaire results processed by researchers (2025)

Based on the test results shown in the table, the relationship between Digital Entrepreneur Ecosystem (X1) and Sustainable Business (Y) shows an original sample value (O) of 0.239, a T-statistic of 3577, and P-values of 0.000. Because the P-value is smaller than 0.05, the influence of the Digital Entrepreneur Ecosystem variable on Sustainable Business is statistically significant at 23.9%. Thus, the fifth hypothesis (H5) is accepted.

Table 20 Results of the Productive Entrepreneurship Hypothesis Test on Sustainable Business

Latent Variables	Original Sample (o)	T-Statistic	P-Values	Information
X2 Against Y	0.224	2,529	0.012	Significant

Source: Questionnaire results processed by researchers (2025)

Based on the test results shown in the table, the relationship between Productive Entrepreneurship (X2) and Sustainable Business (Y) shows an original sample value (O) of 0.224, a T-statistic of 2.529, and a P-value of 0.012. Because the P-value is smaller than 0.05, the effect of Productive Entrepreneurship on Sustainable Business is declared statistically significant. The positive coefficient indicates that increasing entrepreneurial productivity contributes to strengthening sustainable business practices. Quantitatively, every one unit increase in Productive Entrepreneurship will increase Sustainable Business by 0.224 (22.4%). Thus, hypothesis (H6) is accepted, which means that entrepreneurial productivity has a positive and significant influence in supporting business sustainability.

TestHypothesis of the Mediating Influence of Millennial Entrepreneurship Variables

Table 21 Results of the Hypothesis Test of the Mediation Effect

Latent Variables	Original Sample (o)	T-Statistic	P-Values	Information
X1 → Z → Y	0.085	2,501	0.013	Significant
X2 → Z → Y	0.214	3,254	0.001	Significant

Source: Questionnaire results processed by researchers (2025)

Based on the results of the indirect influence test presented in Table V.22, it is known that the path X1 (Digital Entrepreneur Ecosystem) to Y (Sustainable Business) through Z (Millennial Entrepreneurship) has a coefficient value of 0.085 with a T-statistic of 2.501 and a P-value of 0.013, so it is declared significant. This shows that Millennial Entrepreneurship mediates the relationship between Digital Entrepreneur Ecosystem and Sustainable Business. Furthermore, the path X2 (Productive Entrepreneurship) to Y (Sustainable Business) through Z (Millennial Entrepreneurship) has a coefficient value

of 0.214, with a T-statistic of 3.254 and a P-value of 0.001. This value indicates that the mediation effect on this path is also significant, because the P-value is greater than 0.05. Thus, it can be concluded that the Millennial Entrepreneurship variable acts as a mediator in both relationships, both between the Digital Entrepreneur Ecosystem and Productive Entrepreneurship, and Sustainable Business. Therefore, hypotheses (H7 and H8) are accepted.

CONCLUSION

This study concludes that strengthening the digital entrepreneurship ecosystem and increasing entrepreneurial productivity are key factors in the development of sustainable millennial entrepreneurship in island regions. Integrating the digital ecosystem, entrepreneurial productivity, and sustainability orientation can enhance the resilience and sustainability of MSMEs.

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