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ECO-FRIENDLY DIGITAL ENTREPRENEURSHIP MODEL FOR TOWARDS SUSTAINABILITY DEVELOPMENT

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Abstrak

Perkembangan teknologi digital telah mendorong transformasi signifikan dalam dunia kewirausahaan, tidak hanya dalam hal inovasi dan efisiensi, tetapi juga dalam penerapan prinsip-prinsip keberlanjutan. Model kewirausahaan digital yang ramah lingkungan merupakan salah satu pendekatan strategis untuk menjawab tantangan era Revolusi Industri 4.0 sekaligus mendukung pencapaian Tujuan Pembangunan Berkelanjutan (TPB). Penelitian ini bertujuan untuk mengidentifikasi dan menganalisis elemen-elemen kunci dalam pengembangan model kewirausahaan digital yang menggabungkan teknologi, inovasi, dan praktik ramah lingkungan. Metode penelitian yang digunakan adalah metode campuran dengan menggabungkan studi literatur, survei kuantitatif terhadap pelaku usaha digital, dan wawancara mendalam dengan para ahli keberlanjutan. Hasil penelitian menunjukkan bahwa adopsi teknologi hijau, efisiensi pemanfaatan sumber daya, dan inovasi berbasis ekonomi sirkular merupakan faktor utama dalam membentuk model kewirausahaan digital yang berkelanjutan. Selain itu, dukungan kebijakan pemerintah, kolaborasi lintas sektor, dan kesadaran konsumen terhadap isu-isu lingkungan memperkuat keberhasilan implementasi model ini. Temuan ini diharapkan dapat menjadi referensi bagi pelaku usaha, pembuat kebijakan, dan akademisi dalam mengembangkan ekosistem kewirausahaan digital yang inklusif, inovatif, dan ramah lingkungan untuk mewujudkan tujuan pembangunan berkelanjutan.

Kata Kunci: Kewirausahaan Digital, Ramah Lingkungan, Pembangunan Berkelanjutan, Teknologi Hijau, SDGs.

Abstract

The development of digital technology has driven a significant transformation in the world of entrepreneurship, not only in terms of innovation and efficiency, but also in the application of sustainability principles. The environmentally friendly digital entrepreneurship model is one of the strategic approaches to answer the challenges of the Industrial Revolution 4.0 era while supporting the achievement of the Sustainable Development Goals (SDGs). This research aims to identify and analyze key elements in the development of digital entrepreneurship models that combine technology, innovation, and environmentally friendly practices. The research method used is mixed methods by combining literature studies, quantitative surveys on digital

business actors, and in-depth interviews with sustainability experts. The results show that the adoption of green technology, resource use efficiency, and circular economy-based innovation are the main factors in shaping a sustainable digital entrepreneurship model. In addition, government policy support, cross-sector collaboration, and consumer awareness of environmental issues strengthen the successful implementation of this model. These findings are expected to be a reference for business actors, policymakers, and academics in developing an inclusive, innovative, and environmentally friendly digital entrepreneurship ecosystem to realize sustainable development goals.

Keywords: Digital Entrepreneurship, Eco-Friendly, Sustainable Development, Green Technology, SDGs.

Introduction

The development of digital technology has brought significant changes in various aspects of life, including the world of entrepreneurship (Ayşe Esra İşmen, 2025). Digital transformation not only facilitates market access and improves operational efficiency, but also opens up new opportunities for the development of more innovative and sustainable business models (Hu et al., 2025). In the global context, sustainability is one of the main agendas contained in the Sustainable Development Goals (SDGs), which emphasize the importance of balancing economic growth, environmental conservation, and social welfare (MHA Hendriks, 2020).

Eco-friendly digital entrepreneurship is a strategic approach that integrates digital technology with sustainability principles (Picaud-Bello et al., 2024). This model not only focuses on financial gains, but also considers the impact on the environment through waste reduction, optimization of resource use, and the implementation of business practices that support the green economy (Picaud-Bello et al., 2024). Through the use of technology such as e-commerce, cloud-based applications, big data, and the Internet of Things (IoT), entrepreneurs can create innovative solutions that are efficient while minimizing the carbon footprint (Shamzzuzoha et al., 2022).

The implementation of environmentally friendly digital entrepreneurship has great potential to support the achievement of several SDGs, especially SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Change Management) (Layek & Koodamara, 2024). By adopting this model, business actors can utilize technology as a tool to empower the community, expand job opportunities, and encourage innovation that is in line with sustainability principles (Alkatiri et al., 2024).

However, the implementation of an environmentally friendly digital entrepreneurship model still faces various challenges, such as limited digital literacy, technological infrastructure barriers, and low awareness of business actors towards sustainable business practices (Paijan et al., 2024). Therefore, a comprehensive, adaptive, and contextual model is needed according to local needs to ensure that digital entrepreneurship is not only a trend, but also a real solution in fostering sustainable development (Kholifah et al., 2024). The development of digital technology has brought a paradigm shift in the world of entrepreneurship. The integration of information technology, the internet, and digital innovation allows businesses to access a wider

market, increase efficiency, and develop business models that are more adaptive to changes in the global environment (Wahdi et al., 2025).

Menurut World Economic Forum (2023), transformasi digital mampu mendorong economic growth while accelerating the adoption of sustainable business practices through energy efficiency, smart supply chain management, and resource optimization. Green digital entrepreneurship is an evolutionary form of the concept of sustainable entrepreneurship that combines the use of digital technology with green economy principles (Rahman et al., 2024). This model not only pursues profitability, but also minimizes negative impacts on the environment through innovation of low-carbon products, processes, and services. Examples of its application include environmentally friendly e-commerce platforms, Internet of Things (IoT)-based energy consumption monitoring applications, low-emission logistics systems, and the use of big data analytics for waste management and production efficiency (Schönherr et al., 2023). A number of studies show a close relationship between environmentally friendly digital entrepreneurship and the achievement of the Sustainable Development Goals (SDGs). A study by Chen et al. (2022) revealed that the integration of digital technology in sustainable business practices can reduce carbon footprint by up to 30% compared to traditional models. This is in line with several SDGs goals, in particular (Sottile, 2024).

Based on literature review and recent developments, research on the Green Digital Entrepreneurship Model has been widely studied in the context of developed countries and generally focuses on one aspect, such as digital technology, social entrepreneurship, or sustainable business separately. However, there is still a research gap that is the basis for the novelty of this study, namely: This research combines the principle of triple bottom line (profit, people, planet) into a digital entrepreneurship model, thus providing a complete framework to achieve economic, social, and environmental sustainability simultaneously. The novelty lies in mapping digital strategies that are not only economically efficient, but also environmentally friendly and empowering the community (Ren, 2024).

Literature Review

2.1 Entrepreneurial Orientation

Entrepreneurial Orientation (EO) is a concept that describes the extent to which behaviors, strategies, and decision-making processes within an organization or individual reflect the nature of entrepreneurship (Schönherr et al., 2023). Lumpkin and Dess (1996) define it as the tendency to innovate, be proactive, and dare to take risks in pursuit of business opportunities. Covin and Slevin (1989) emphasized that EO is a strategic mindset that distinguishes entrepreneurial organizations from conservative organizations.

The Importance of Entrepreneurial Orientation as a Driver of Business Performance: Research by Rauch et al. (2009) shows that EO has a positive effect on the financial and non-financial performance of companies (Wahdi et al., 2025). Source of competitive advantage: EO encourages companies to create competitive advantage through innovation and speed of market adaptation (Wiklund & Shepherd, 2005). Key to business sustainability: In the context of modern business, EO helps companies survive in a dynamic and uncertain environment (Kraus et al., 2012).

Factors Influencing EO (1) Internal factors: leadership vision, organizational culture, organizational structure, human resource capabilities. External factors: market dynamics,

government support, technological developments, and business networks (Wahdi et al., 2025). The relationship between EO and the Research Context EO is often used as an independent variable in research that measures its influence on business performance, innovation, competitive advantage, or sustainability. In MSMEs, EO has been proven to strengthen adaptability to market changes and digital technology (Wahdi et al., 2025) (Paijan et al., 2024).

2.2 Character Statistics Personnel Enterpreunership

An entrepreneur's personal characteristics are a set of traits, attitudes, and behaviors that an individual possesses that drive him or her to identify opportunities, manage risks, and create value through business activities (Kholifah et al., 2024). According to Meredith et al. (2002), the characteristics of entrepreneurs include the courage to take risks, be confident, be results-oriented, have a vision, and be innovative (Hermawati et al., 2024). Zimmerer & Scarborough (2008) state that these characteristics are the main differentiator between successful and unsuccessful entrepreneurs (Fakhira & Arief, 2024).

Many literature groups the personal characteristics of entrepreneurs into the following dimensions: (1) Self-Confidence Confidence in one's ability to make decisions and face challenges. (2) Achievement Motivation Internal motivation to achieve high business goals. (3) Creativity & Innovation: The ability to generate new ideas and apply them in business. (4) Risk-Taking Propensity Willingness to face uncertainty for greater opportunities. (5) Perseverance and Resilience Resilience to failure and the ability to bounce back (Layek & Koodamara, 2024). (6) Interpersonal Skills The ability to build relationships, negotiate, and lead a team. Factors That Shape the Personal Characteristics of Entrepreneurs Internal factors: personality, experience, education, and life values. External factors: family environment, social network, local culture, and support for the entrepreneurial ecosystem.

2.3 Managerial Skills

Managerial abilities are the skills and competencies that a person possesses in planning, organizing, leading, and controlling resources to achieve the goals of an organization or business effectively and efficiently. Robbins & Coulter (2021) define it as the capacity to coordinate human, financial, and physical resources in order to achieve organizational goals. Katz (1974) divides managerial abilities into technical abilities, human abilities, and conceptual abilities (Lagorio et al., 2024).

Based on Katz (1974), Whetten & Cameron (2016), as well as the latest MSME research, managerial skills can be grouped into: Technical Skills Specific skills related to methods, procedures, and techniques in running a business (Picaud-Bello et al., 2024). Human Skills The ability to cooperate, motivate, and lead others. Conceptual Skills Kemampuan memahami organisasi secara keseluruhan dan mengintegrasikan berbagai bagian untuk mencapai tujuan.

A. Eco-Friendly Digital

The term green digital technology refers to the use of information and communication technology (ICT) designed to minimize negative impacts on the environment through energy efficiency, carbon emission reduction, and sustainable resource management (Hilty & Aebischer, 2015). This approach covers the entire life cycle of digital technology, from hardware design, software development, to the application and disposal of e-waste with circular economy principles (GeSI, 2022).

According to the Global e-Sustainability Initiative (GeSI, 2022), there are three main dimensions in the implementation of environmentally friendly digital: Energy Efficiency the use of digital devices and infrastructure with low energy consumption, as well as the optimization of data centers through power-saving technology (Shamzzuzoha et al., 2022). Carbon Emission Reduction the implementation of technologies to reduce carbon footprints, such as cloud computing, smart grids, and digital supply chain optimization. Electronic Waste Management the implementation of a recycling and remanufacturing system of electronic devices to prevent environmental pollution. Digital technology plays a dual role in sustainability: as a tool to monitor and manage resources, as well as as a catalyst for the innovation of environmentally friendly business models. For example, the use of the Internet of Things (IoT) allows real-time energy monitoring, while Artificial Intelligence (AI) can optimize production processes to reduce waste (Bai et al., 2020).

B. Sustainability Development

Sustainable development is a development process that meets the needs of the present generation without sacrificing the ability of future generations to meet their needs (WCED, 1987). In recent developments, this concept has been expanded to include three main dimensions: economic, social, and environmental that interact with and influence each other (UN, 2023) (MHA Hendriks, 2020). According to the United Nations Department of Economic and Social Affairs (UNDESA, 2023), sustainable development consists of three main pillars: Economic Pillar – covering inclusive economic growth, innovation, job creation, and resource efficiency. Social Pillar – emphasizing social justice, poverty alleviation, quality education, health, and gender equality. Environmental Pillar – includes ecosystem protection, wise management of natural resources, climate change mitigation, and biodiversity conservation.

Sustainable Development Goals (SDGs) which include targets in the fields of clean energy, sustainable industries, livable cities, responsible consumption, and climate action (UNDP, 2023). The implementation of the SDGs is a roadmap for countries to achieve sustainable prosperity by 2030. The latest reports of UNEP (2023) and the World Economic Forum (2023) note several key trends in sustainable development, Green Technology and

Digitalization: the application of green technology, renewable energy, and the digitalization of industrial processes to reduce carbon footprints. Circular Economy: a reduce-reuse-recycle-based production and consumption system to reduce waste. Clean Energy Transition: the transition from fossil fuels to renewable energy sources such as solar, wind, and biomass. Social Innovation: the development of business models that pay attention to the welfare of the community while protecting the environment (Zhang & Zhao, 2024).

Method

This analysis was carried out using a quantitative method approach. The population consists of Human Resources (Employees) who work industry Companies in Medan City. The variables in this study consist. Sampling is individuals from a larger population who are specifically selected to represent the population of Entrepreneurial Orientation, Characteristics of Personal Entrepreneurs, Managerial Skills, Digital Environmental Friendliness,

Sustainability Development as a whole (Abdillah & Hartono, 2015). This study uses a non-probability purposive sampling technique because the identity of the respondents for the preparation of the sample framework could not be obtained in detail. Purposive sampling is sampling with certain criteria, such as experts (Milman et al., 2020). Since the population size cannot be ascertained (Chen & Rahman, 2018), the sample count needs to be at least 5-10 times the indicator variable. This results in a sample obtained by multiplying the indicator by 5 (25×5 = 125). Thus, the sample of this study is 125 industry companies in the city of Medan.

This study uses structural equation modeling (SEM) with partial least squares (PLS) to analyze the data because the statistical model is quite complex and aims to explore knowledge. The benefit of using PLS is that it minimizes the demand on data distribution and works on nominal, ordinal, and interval variables. In addition, PLS can detect differences between different groups and is best suited for predicting a set of dependent variables and a large set of independent variables (Hair et al., 2019).

Result and Discussion

Table 1 shows that of all respondents, 65 (65%) were male and 35 (35%) were female. By age, 16-25 (5%) respondents were 26-35 years old, (10%) were aged 36-45 (35%) and were between 37-45 (25. And > 45 (5%) Based on their last education, respondents had a Bachelor's degree (40%) had a high school diploma (15%) had a postgraduate degree (20%) had a diploma (25%). Based on the income of the respondents, the >respondent earns between IDR 13,000,000 (5%), earns between IDR 9,000,000-12,000,000 (35%), earns between 4,000,000-8,000,000 (40%), earns between 1,000,000-3,000,000 (20%).

Table 1. Characteristics of the respondents

Characteristics	**Options**	**Responden**	
		N	%
Gender	Male	65	65
	Female	35	35
Age (years)	16-25	5	5
	26-35	10	10
	36-45	35	35
	37-45	25	25
	>45	5	5
Education	Diploma Degree	25	25
	Postgraduate's Degree	40	40
	Bachelor's Degree	20	20
	High School Degree	15	15
Income	> IDR 13,000,000	5	5
	> IDR 9,000,000 up to 12,000,000	35	35
	> IDR 4,000,000 up to 8,000,000	40	40
	IDR 1,000,000 up to 3,000,000	20	20

The first evaluation is to assess the loading factor. This evaluation aims to determine the relationship between indicators and latent variables. The value of the loading factor must have a value of (λ) > 0.7. The model is recalculated if the loading value (λ) < 0.7, and if the loading factor value (λ) is 0.7, then the variable indicator is considered valid. Indicators with high loading factors greatly contribute to explaining latent variables. If the value of the loading factor for the variance inflation factor.

Table 2. Loading factors, CR, AVE, and CA

Indicator	Loading Factor	Composite Reliability	AVE	Cronbach's Alpha
Entrepreneurial Orientation		0,924	0,775	0,902
- Developing new products/services Routinely.	0,816			
- Adopt technology	0,733			
- Adopt the latest methods	0,773			
- Invest in R&D for product/process improvement	0,718			
- Entering new markets with no guarantee of success.	0,743			
Character Personnel Entrepreneur		0,932	0,744	0,923
- Ability to generate new and unique ideas.	0,840			
- Combining old concepts into new innovations.	0,843			
- Identifying opportunities through creative thinkingf.	0,825			
- It is not easy to give up when faced with failure.	0,846			
- Be consistent in carrying out business plans.	0,875			
Managerial Skills		0,944	0,760	0,934
- Develop business goals and strategies Short and long term.	0,851			
- Determine the priorities of business activities.	0,832			
- Allocate resources in a systematic manner effective.	0,831			
- Define an efficient work structure.	0,834			
- Assign duties and responsibilities employee.	0,832			
Eco-Friendly Digital		0,976	0,766	0,914
- Device and infrastructure usage power-saving digital.	0,832			
- Data *center optimization* for Reduce energy consumption.	0,846			
- Utilization of renewable energy in Digital Operations	0,834			
-Implementation *of cloud computing* for e Resource Efficiency.	0,867			
- Utilizing *remote working* to reduce physical transportation.	0,865			
Sustainability Development		0,958	0,749	0,924

-Sustainable economic growth	0,898
-Social justice and gender equality	0,897
-Reduction of greenhouse gas emissions	0,985
-Policies and regulations support sustainability	0,867
-Sustainable waste management.	0,875

(VIF) less than 5, there is no multicollinearity between indicators. Further, the AVE value for the checked variable was above the minimum value of 0.5. The results are shown in Table 2. There are three criteria for assessing convergent validity: (1) all loading factor > 0.60, (2) composite reliability (CR) must be greater than 0.70, and (3) the mean of extracted variance (AVE) must > 0.50. In addition, all Cronbach's Alpha (CA) values must be greater than 0.70 to indicate good measurement reliability. The discriminant validity of all constructs is also sufficient because the square root of the AVE of each construct (diagonal entry of each column) is greater than its correlation with other constructs (Prebensen & Xie, 2017).

Discriminant validity refers to the degree to which the construct differs of a particular model. There are several tests of discriminant validity, such as the Fornell-Larcker Criterion, cross-loading, and the Heterotrait-Monotrait Ratio (HTMT). This study uses HTMT because all HTMT ratios are less than the maximum value and maximum limit of 0.93, which proves that HTMT is the superior method in assessing discriminant validity (Su et al., 2020). Therefore, this study uses HTMT analysis to assess discriminant validity, as summarized in Table 3.

Table 3. Discriminant validity

Variable	DAI	DI	DL
Entrepreneurial Orientation	0,864		
Character Personnel Entrepreneur	0,852	0,853	
Managerial Skills	0,834	0,844	0,833
Eco-Friendly Digital	0,823	0,835	0,829
Sustainability Development	0,819	0,826	0,817

Table 4 shows the hypothesis testing. This study found that Entrepreneurial Orientation had a positive impact on Sustainability Development ($\beta = 0.864$, $p < 0.000$). Entrepreneurial Personal Characteristics significantly affect Sustainability Development ($\beta = 0.852$, $p < 0.000$). Impactful managerial skills positif pada Sustainability Development ($\beta = 0{,}834$, $p < 0{,}001$). Environmentally friendly digital mediates the relationship between entrepreneurial orientation, entrepreneurial personal characteristics and managerial ability to Sustainability Development $\beta = 0.819$, $p < 0.000$).

Table 4. Direct and mediated influence on the variables

Hypotesis	B	*p*-value	Decision
H1. **Entrepreneurship Orientation has a positive effect and significant to environmentally friendly digital towards**	0,632	0,000	Accepted

Sustainability Development			
H2: **Personal Characteristics of Influential Entrepreneurs positive and significant towards digitaleco-friendly towards Sustainability Development**	0,571	0,000	Accepted
H3: **Managerial Ability has a positive effect and significant to environmentally friendly digital towards Sustainability Development**	0,166	0,001	Accepted
H4:**Environmentally Friendly Digital has a positive effect and significant towards sustainability Development**	0,473	0,000	Accepted
H5: **Entrepreneurial Orientation has a positive and significant effect on Sustainability Development**	0,434	0,000	Accepted
H6: **Personal Characteristics of Influential Entrepreneurs positive and significant towards Sustainability Development**	0,427	0,000	Accepted
H7: **Managerial Ability has a positive effect and significant towards Sustainability Development**	0,437	0,000	Accepted
H8:**Entrepreneurial Orientation has a positive and significant effect towards Sustainability Development through environmentally friendly digital**	0,358	0,000	Accepted
H9: **Personal Characteristics of Influential**	0,346	0,001	Accepted

Entrepreneurs positive and significant towards Sustainability Development through eco-friendly digital			
***H10:*Managerial Ability has a positive effect and significant towards Sustainability Development through Eco-friendly digital**	0,425	0,000	Accepted

Note: * and ** signify the rejection of the null hypothesis at 1% and 5% significance.

This study examines the influence of Entrepreneurial Orientation and on the success of Sustainability Development(Yulianti et al., n.d.). The study also explores the role of mediation in a digital-friendly environment that shapes the relationship between Entrepreneurial Orientation, Personal Characteristics of Managerial Abilities, and Sustainability Development. Sustainability Development has become an indicator of entrepreneurial orientation, personal characteristics, and managerial abilities in improving sustainable development(Al Faruq & Suwaji, 2024). One form of sustainable development success for Entrepreneurial Orientation, Personal Characteristics, and Managerial Ability is to carry out personal innovation, work motivation and employee creativity. Generally, employees choose the same sustainable development success as bentuk komitmen terhadap inovasi pribadi dan kemudian meningkatkan motivasi dan kreativitas kerja karyawan (Satriawan et al., 2022).

This study found that Entrepreneurial Orientation has a significant influence on sustainable development in a company. This means that the higher the entrepreneurial orientation in a company, the greater the success of sustainable development. In addition, the study found that the success of sustainable development significantly affects Entrepreneurial Orientation, Personal Characteristics, Managerial Abilities. An individual's conformity to personal innovation helps develop an aspiring corporate image within their social group. The suitability of entrepreneurial orientation with certain sustainable development has a positive impact on environmentally friendly digital, (Fonseca et al., 2021). Individuals seek to align their true and ideal selves through the products they consume (Kressmann et al., 2006). Authenticity is a personal innovation that affects the employee experience in a company. Authenticity is created from the authenticity of information (Nurfajrina & Aprilia, 2022).

The results of this study are also consistent with Gary Becker's theory) which states that human resources (education, skills, experience) are important assets in the creation of economic value, including in the context of entrepreneurship. In environmentally friendly digital, the quality of human resources such as digital skills, innovation, and adaptability greatly determine business success(Wahdi et al., 2025). Furthermore, this study found that Entrepreneurship as an agent of change through the process *of creative destruction*, creates new combinations through innovation. Environmentally friendly digital plays an innovator in the industrial era 4.0, disrupting old business models through digital technology and HR innovation(Kholifah et al., 2024). Another study reveals that it requires digital competence, collaboration, and creativity from innovation-oriented human resources to be the main determinants of sustainable development competitiveness. This will reinforce the importance of human resources in sustainable success in the Industry 4.0 era. Another study in sustainable development success from a resource-based view of quality human resources (competent, innovative, digitally literate) is a strategic asset. successful ones are able to utilize unique talents and knowledge to differentiate themselves from competitors. Relevance to startups is

that startup products/services that are innovative but easy to use and in accordance with market needs are easier to accept. Creative human resources and understanding the market play a very important role in the success of innovation diffusion.

For Business Actors Expanding the use of energy-efficient digital technologies, such as *green cloud computing*, *IoT* for monitoring resource use, and *e-commerce* with eco-friendly packaging. Integrate *green innovation* into core business strategies, not just as an additional program. For the Government and Supporting Institutions. Providing fiscal incentives, training, and green digital infrastructure to drive sustainable business transformation. Make clear regulations and *standards for green digital business* as a guide for business actors. For the Next Researcher Testing this model on various industry sectors to see the consistency of results. Develop more detailed and local green digital entrepreneurship *measurement indicators.* Examining the role *of artificial intelligence* and *big data* in strengthening business sustainability.

Conclusion (S) and Recommendation (S)

5.1 Conclusion

This study aims to examine the influence of Entrepreneurial Orientation (EO), Personal Characteristics of Entrepreneurs (PCE), and Managerial Skills (MS) on the success of Sustainability Development (SD), while exploring the mediating role of Eco-Friendly Digital (EFD). The results of the analysis using Structural Equation Modeling with Partial Least Squares (SEM-PLS) lead to the following conclusions:

1. . Entrepreneurial Orientation (EO) has a positive and significant effect on Sustainability Development (SD). This indicates that a higher entrepreneurial orientation within a company leads to greater success in sustainable development.
2. Entrepreneurial Personal Characteristics (PCE) have a positive and significant effect on Sustainability Development (SD). Individual conformity to personal innovation, creativity, and motivation helps develop an aspiring corporate image within their social group and improves sustainable development success.
3. Managerial Skills (MS) have a positive and significant effect on Sustainability Development (SD). Human resources (education, skills, experience) are crucial assets in creating economic value, including digital skills, innovation, and adaptability, which greatly determine business success.
4. Eco-Friendly Digital (EFD) has a positive and significant effect on Sustainability Development (SD). EFD acts as an innovator, disrupting old business models through digital technology and HR innovation to accelerate sustainable development.
5. Eco-Friendly Digital (EFD) significantly mediates the relationship between EO, PCE, and MS towards SD (Hypotheses H8, H9, and H10 are accepted). This confirms that the success of sustainable development is shaped by the quality of entrepreneurial orientation, personal characteristics, and managerial abilities, with the adoption of environmentally friendly digital practices playing a crucial mediating role.

5.2 Recommendations

Based on the research findings, the following recommendations are proposed:

1. For Business Actors: Business actors are advised to integrate *green innovation* into their core business strategies, not just as an add-on program. This must be supported by

expanding the use of energy-efficient digital technologies, such as *green cloud computing* and the *Internet of Things (IoT)*, for monitoring resource usage.

2. For the Government and Supporting Institutions: The government and supporting institutions must provide fiscal incentives, training, and *green digital infrastructure* to drive sustainable business transformation. Furthermore, they need to establish clear regulations and standards for *green digital business* to serve as a guide for business actors.
3. For Future Researchers: Future research is recommended to test this eco-friendly digital entrepreneurship model across various industry sectors to check the consistency of the results, and to examine the in-depth role of *Artificial Intelligence* (AI) and *Big Data* in strengthening business sustainability.

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