Metal SME Sustainability Performance through Green Entrepreneurial Orientation and Circular Economy Practices

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Abstract
Purpose: This study aims to enhance metal craft SMEs' sustainability performance by developing a model integrating green entrepreneurial orientation and the mediating role of circular economy practices.
Methodology/approach: This quantitative survey focused on metal craft SMEs in Bali. Data from 109 purposively sampled respondents (exceeding G*Power's 107 minimum requirement) were collected using a 1-5 Likert questionnaire. Analysis was conducted using SEM-PLS via SmartPLS software.
Results/findings: Green entrepreneurial orientation positively affects both circular economy practices and sustainability performance. Circular economy practices also positively influence sustainability performance and partially mediate the relationship between green entrepreneurial orientation and sustainability performance. The model explains 57.2% of the variance in sustainability performance (R^2 = 0.572), indicating moderate explanatory power.
Conclusions: A green mindset is essential, but its impact is optimal when translated into real action. Integrating green orientation with circular economy practices provides a holistic solution for SMEs to resolve waste issues and achieve long-term sustainability.
Limitations: Focusing exclusively on metal craft SMEs in Bali limits the findings' generalizability to other industries or geographical regions with different contexts.
Contribution: Theoretically, this study extends the Natural Resource-Based View (NRBV) and Dynamic Capabilities Theory literature in the SME context. Practically, it guides the government in redesigning empowerment programs to accelerate the Sustainable Development Goals (SDGs).

Keywords: *Sustainability Performance, Green Entrepreneurial Orientation, Circular Economy, SMEs, Natural Resource-Based View.*

1. Introduction

Small and Medium Enterprises (SMEs), including those in metal crafts, are considered the backbone of Indonesia's economy, creating employment and supporting regional economic growth. Balinese handicraft products, including metal crafts, are recognized for their originality, artistic spirit, and local wisdom, which contribute to sustainable competitive advantage (Arsha, Mahayasa, & Puja, 2025). Balinese silver crafts, a prominent metal handicraft, are produced mainly by SMEs in Gianyar and are highly regarded internationally, although their contribution to Bali's Gross Regional Domestic Product (GRDP) is relatively modest (Suasana, Riana, & Suparna, 2025). The handicraft MSMEs have an expanding market in developed countries, but their informal nature and seasonal demand make them vulnerable to external shocks, such as the pandemic (Agarwal, Mathiyazhagan, Malhotra, & Pimpunchat, 2023). The development of entrepreneurial orientation and business innovation is crucial for improving performance and competitiveness among metal craft SMEs (Suasana et al., 2025). Innovation capability is a key asset for SMEs to increase export performance, especially when tourism declines (Mitariani, Yasa, Giantari, & Setiawan, 2023). Metal handicraft SMEs face challenges such as lack of entrepreneurial orientation, limited understanding of fair trade principles, and the need for business innovation (Mahardika & Dewi, 2024; Suasana et al., 2025; Telagawathi et al., 2022).

The presence of SMEs, including those in metalworking, can lead to changes in local community dynamics, sometimes resulting in negative social impacts if not managed inclusively. Many metal SMEs in Bali operate with simple or outdated technology, which limits their productivity and competitiveness. This technological lag makes it difficult for them to adapt to market changes and compete effectively, especially in the era of industrial revolution 4.0 (Herwanto & Suzianti, 2020; Witjaksono & Rahmadyanti, 2014). Metal SMEs are significant contributors to environmental pollution, particularly through the generation of solid, liquid, and gaseous waste. Inadequate waste management practices can lead to air, water, and soil pollution, impacting both the environment and public health (Nur, Sutadian, Putra, & Nastiti, 2024; Sari, Suryoputro, Kurnia, & Purnomo, 2016). Many SMEs focus primarily on economic gains, often neglecting environmental sustainability. This can exacerbate local environmental degradation, especially in sensitive areas like Bali (Nur et al., 2024; Rahmadyanti & Andre, 2016).

The presence of heavy metals in Bali's environment is linked to small-scale industries, agriculture, and aquaculture, all of which are closely tied to the region's tourism-based economy (Manuruang & Reichelt-Brushett, 2020). A lack of proper waste management and pollution control in small-scale metal processing industries can exacerbate environmental degradation (Derhab & Elkhwesky, 2023; Fresner et al., 2025).

Metal crafts rank second in export value after wood crafts, with the handicraft sector as a whole accounting for 54.26% (US$139 million) of Bali's exports in 2020. Data from the Indonesian Handicraft Exporters and Producers Association indicates that metal craft products from Bali contribute an average of US$6.8 million to exports (Sunda, 2023). The sustainability performance and awareness of MSMEs in Bali including metal artisans remain low. This low level of sustainability is evidenced by the lack of awareness among business owners regarding the consideration, preparation, or publication of reports on environmental impacts. Furthermore, their business approach to environmental issues tends to be reactive. Although they conceptually understand the importance of environmental preservation, these MSME operators lack in-depth knowledge regarding the practical implementation of sustainable business practices in the field (BAPPENAS, 2025).

Sustainable performance epitomizes an organization's capacity to concurrently achieve economic, environmental, and social objectives (Asadi et al., 2020). Sustainability performance is influenced by various factors. According to the Natural-Resource-Based View Theory, sustainability performance is influenced by green entrepreneurial orientation and circular economy practices. Grounded in the Natural-Resource-Based View (NRBV) theory, an organization's sustainability performance is strategically driven by the synergistic integration of its green entrepreneurial orientation and circular economy practices. The NRBV posits that firms can achieve sustainable competitive advantage by developing capabilities and resources that address environmental challenges and opportunities (Hart & Dowell, 2011; McDougall, Wagner, & MacBryde, 2016, 2019).

The NRBV posits that competitive advantage and long-term firm performance depend on the ability to develop unique, valuable capabilities that proactively manage the relationship with the natural environment. Green entrepreneurial orientation (GEO) emphasizes environmental activities, mainly through the adoption of environmentally friendly business practices (Habib, Bao, & Ilmudeen, 2020). Within this framework, green entrepreneurial orientation acts as the strategic mindset that fosters environmental innovation, calculated risk-taking, and ecological market leadership. Circular economy practices constitute a prominent business and economic model aimed at minimizing waste and maximizing resource and energy efficiency through alternative resource utilization methods such as reducing, reusing, recycling, repairing, recovering, and remanufacturing (Amin, Asaduzzaman, Debnath, Rahaman, & Oláh, 2024). Simultaneously, circular economy practices serve as the vital operational mechanisms that execute this green vision through resource optimization, waste reduction, and closed-loop material cycles (reduce, reuse, recycle). By combining the forward-looking strategy of green entrepreneurship with the tangible resource efficiency of circular operations, firms cultivate difficult-to-imitate environmental competencies that generate concurrent economic, social, and ecological benefits, ultimately culminating in superior sustainability performance.

In addition to influencing sustainable performance, green entrepreneurial orientation also affects the green circular economy. Grounded in the Dynamic Capabilities Theory, green entrepreneurial orientation (GEO) functions as a vital dynamic capability that enables a firm to sense environmental opportunities and rapidly reconfigure its resources. By cultivating a proactive, innovative, and risk-taking mindset toward sustainability, GEO empowers an organization to continuously adapt its operations and seamlessly integrate green circular economy practices. Firms with a green entrepreneurial mindset are more likely to implement circular strategies such as resource efficiency, waste reduction, and sustainable production methods, leading to improved environmental performance (Al-Hyari, Alotoum, & Jaradat, 2026; Huda et al., 2026; Musfar, Alwie, & Wijayanto, 2025). Essentially, GEO provides the strategic flexibility and drive required to execute and sustain complex circular business models, thereby exerting a strong positive influence on a firm's transition to a green circular economy.

The novelty of this research lies in its contextual application and theoretical integration. It examines the multidimensional sustainability performance of metal craft SMEs in a developing, tourism-dependent regional economy such as Bali, while integrating the Natural-Resource-Based View (NRBV) and Dynamic Capabilities Theory. The framework positions green entrepreneurial orientation (GEO) as a dynamic capability that promotes circular economy practices (CEP) and as a strategic orientation associated with sustainability performance. This integration is particularly relevant to traditional artisanal businesses facing outdated technology, low environmental awareness, reactive operational practices, and environmental vulnerability.

This study aims to analyze the effect of Green Entrepreneurial Orientation on the Sustainability Performance of metalcraft MSMEs in Bali Province, mediated by Circular Economy Practices.

2. Literature Review and Hypothesis Development

2.1 Natural-Resource-Based View Theory

The NRBV extends the traditional resource-based view by emphasizing that firms can achieve sustainable competitive advantage through capabilities and strategies that protect and leverage natural resources. It highlights the importance of integrating environmental considerations into core business strategies to enhance long-term sustainability performance (Appiah, Sam, Twum, & Godslove, 2023; Cheng & Shiu, 2025; Goel, Karthikeyan, Manigandan, & Raghuram, 2025; Siddiqi, Tanchangya, Islam, Islam, & Islam, 2026; S. Zafar, Huang, Zafar, & Haq, 2025; Zafar, Wenyuan, Khan, Liu, & Iqbal, 2026). The NRBV posits that firms can achieve sustainable competitive advantage by developing capabilities and resources that address environmental challenges and opportunities (Hart & Dowell, 2011; McDougall et al., 2016, 2019). Unlike the traditional RBV, which focuses on internal resources and capabilities, the NRBV incorporates environmental sustainability as a core strategic concern, suggesting that proactive environmental strategies can enhance firm performance (Amores-Salvadó, Castro, & Navas-López, 2014; Hart & Dowell, 2011; McDougall et al., 2016; Menguc & Ozanne, 2005). The NRBV identifies specific capabilities such as environmental product innovation, marketing capabilities, entrepreneurship, corporate social responsibility (CSR), and commitment to the natural environment as critical for leveraging environmental resources for competitive gain (Amores-Salvadó et al., 2014; Menguc & Ozanne, 2005).

2.2 Dynamic Capabilities Theory

Dynamic Capabilities Theory is a strategic management framework that explains how organizations achieve and sustain competitive advantage in rapidly changing environments by continuously adapting, integrating, building, and reconfiguring their internal and external competencies and resources (Altintas, 2025; Cadrazco-Parra, Zapata-Domínguez, & Lombana-Coy, 2020; Cavusgil & Deligonul, 2025; Cristofaro & Lovallo, 2022; Fadhilah & Subriadi, 2021; Öztürk, 2024). Dynamic Capabilities are the organization's ability to sense opportunities and threats, seize them, and reconfigure resources and competencies to address changes in the environment (Altintas, 2025; Cadrazco-Parra et al., 2020;

Cavusgil & Deligonul, 2025; Cristofaro & Lovallo, 2022; Jantunen, Tarkiainen, Chari, & Oghazi, 2018; Öztürk, 2024). Central to the theory is the idea that firms must adapt and innovate to survive and thrive in turbulent markets (Cadrazco-Parra et al., 2020; Cristofaro & Lovallo, 2022; Fadhilah & Subriadi, 2021; Öztürk, 2024). Unlike static resources, dynamic capabilities enable firms to maintain long-term success by responding effectively to environmental shifts (Altintas, 2025; Cadrazco-Parra et al., 2020; Cavusgil & Deligonul, 2025; Öztürk, 2024). The theory emphasizes the importance of reconfiguring both internal and external resources to align with changing business conditions (Altintas, 2025; Cadrazco-Parra et al., 2020; Cavusgil & Deligonul, 2025).

2.3. Sustainability Performance

Sustainable performance epitomizes an organization's capacity to concurrently achieve economic, environmental, and social objectives (Asadi et al., 2020). Sustainable performance encompasses the viewpoints of several stakeholders, necessitating a comprehensive measuring strategy that considers multiple dimensions (Le, Behl, & Pereira, 2024). Therefore, it can be concluded that sustainable performance is performance measured from economic, social, and environmental aspects.

2.4. Circular Economy Practices

Circular economy practices constitute a prominent business and economic model aimed at minimizing waste and maximizing resource and energy efficiency through alternative resource utilization methods such as reducing, reusing, recycling, repairing, recovering, and remanufacturing (Amin et al., 2024). Circular economy practices refer to a set of strategies and actions aimed at maximizing the use of resources, minimizing waste, and promoting sustainability throughout the lifecycle of products and materials. Unlike the traditional linear economy which follows a “take-make-dispose” model, circular economy practices focus on keeping products, materials, and resources in use for as long as possible through methods such as reduction, reuse, recycling, remanufacturing, refurbishing, and upcycling. These practices are designed to extract maximum value from resources while minimizing environmental impact and waste generation (Deutz, 2019; Glöser-Chahoud & Schultmann, 2025; Ma, Shih, & Liao, 2021; Peng, Yu, & Nie, 2025).

Circular economy practices comprise key elements consisting of the following aspects. Using resources more efficiently to reduce raw material consumption and waste (Bertelli, Kocollari, Merzi, & Torricelli, 2025; Wehbie, Kundu, Flox, & Pérez, 2026). Designing processes and products to generate as little waste as possible, and ensuring that any waste produced is recycled or reused (Deutz, 2019; Ma et al., 2021; Peng et al., 2025). Prolonging the life of products through maintenance, repair, refurbishment, and remanufacturing (Ma et al., 2021; Nelles, Nassour, & Morscheck, 2019). Creating feedback loops where materials are continuously cycled back into production, reducing the need for new resources (Nelles et al., 2019; Peng et al., 2025). Adopting innovative business strategies that prioritize environmental and economic sustainability, such as sharing platforms, product-as-a-service, and collaborative consumption (Aluchna & Rok, 2019; Ruiz-Ocampo, Katusic, & Demetriou, 2023).

2.5. Green Entrepreneurial Orientation

Green entrepreneurial orientation (GEO) emphasizes environmental activities, mainly through the adoption of environmentally friendly business practices (Habib et al., 2020). GEO refers to a strategic posture and entrepreneurial efforts to integrate ecologically sustainable practices and values into their decision-making and actions, with the aim of improving environmental performance while also pursuing business growth and innovation. GEO emphasizes balancing economic objectives with environmental goals, fostering sustainability-driven innovation, and leveraging entrepreneurial initiatives to address environmental challenges within a business context (Shivani, Sharma, & Singh, 2025; Tuncer & Korchagina, 2024; Vijaykumar, Gururaja, & Rajeswari, 2025). GEO is seen as a critical framework for reconciling economic growth with environmental sustainability, enabling firms to achieve sustainable economic, environmental, and social outcomes (Huang, Shih, & Cheng, 2024; Ye et al., 2022). It is particularly relevant for small and medium-sized enterprises and is increasingly recognized as essential for sustainable development in response to ecological and institutional pressures (Kharirıyatun, Hermanto, Purnomo, Chan, & Saptana, 2026; Zafar et al., 2026).

2.6. Hypothesis Development

2.6.1. The Effect of Green Entrepreneurial Orientation on Circular Economy Practices

Dynamic Capabilities Theory explains the first stage of this mechanism: GEO enables owners to identify environmental opportunities and mobilize resources for cleaner and more circular production (Al-Hyari et al., 2026; Huda et al., 2026; Musfar et al., 2025)(Musfar et al., 2025; Qin, Ailikamujiang, & Jing, 2024)(Mamash, Iyiola, & Aljuhmani, 2025; Mouawad, 2025).

H1: Green Entrepreneurial Orientation has a positive effect on Circular Economy Practices.

2.6.2. The Effect of Green Entrepreneurial Orientation on Metal SME Sustainability Performance

Grounded in the Natural Resource-Based View (NRBV), firms achieve competitive advantage and superior performance by developing unique, environmentally driven strategic capabilities. In line with this theoretical framework, Green Entrepreneurial Orientation (GEO) enables firms to integrate ecological concerns into their core operations to enhance economic, environmental, and social performance (Anwar et al., 2024; Coelho, Ferreira, & Proença, 2024; Goel et al., 2025; Habib et al., 2020; Ilyas, Chaudhry, & Ashraf, 2026; Kura & Lukman, 2025; Qin et al., 2024; Ye et al., 2022). Furthermore, GEO drives sustainability by facilitating the acquisition and integration of external green knowledge and resources needed for triple-bottom-line outcomes (Xin, Khan, Dagar, & Qian, 2023; Ye et al., 2022). Empirical evidence consistently confirms these positive effects across diverse contexts, particularly within SMEs and emerging markets (Coelho, Ferreira, & Proença, 2024; Goel et al., 2025; Habib et al., 2020; Ilyas, Chaudhry, & Ashraf, 2026; Qin, Ailikamujiang, & Jing, 2024; Ye et al., 2022; Zafar et al., 2026). Therefore, the second hypothesis proposed is:

H2: Green Entrepreneurial Orientation has a positive effect on Sustainability Performance.

2.6.3. The Effect of Circular Economy Practices on Metal SME Sustainability Performance

Grounded in the Natural Resource-Based View (NRBV), managing natural resource constraints through resource-efficient processes generates rare, difficult-to-imitate capabilities that yield long-term competitive advantage (Hart & Dowell, 2011). Circular economy (CE) practices such as reducing, reusing, recycling, and remanufacturing serve as vital operational mechanisms that optimize resource utilization and minimize waste through closed-loop material cycles (Amin et al., 2024). By embedding these resource-efficient operations, firms lower emissions, reduce costs, and enhance corporate reputation, thereby driving comprehensive sustainability performance across economic and environmental (Bertelli et al., 2025; Garza-Reyes et al., 2026; Jayasinghe et al., 2025). Despite minor contextual variations (Mora-Contreras et al., 2023), empirical evidence largely supports that circular operations strengthen overall organizational sustainability (Dey et al., 2022; Verma, 2024). Therefore, the third hypothesis proposed is:

H3: Circular Economy Practices have a positive effect on Sustainability Performance.

2.6.4. The Mediating Role of Circular Economy Practices on the Effect of Green Entrepreneurial Orientation on Metal SME Sustainability Performance

Grounded in Dynamic Capabilities Theory, Green Entrepreneurial Orientation (GEO) serves as a vital strategic mindset that enables firms to identify environmental opportunities, reconfigure resources, and foster eco-friendly innovation (Habib et al., 2020). By embedding ecological concerns into core operations, GEO provides the strategic flexibility needed to adopt and execute complex circular economy practices, such as resource efficiency and waste reduction (Al-Hyari et al., 2026; Huda et al., 2026; Musfar et al., 2025). According to the Natural Resource-Based View (NRBV), managing natural resource constraints through closed-loop operational processes generates rare capabilities that yield long-term competitive advantage (Hart & Dowell, 2011). Circular economy practices serve as operational mechanisms that optimize resource utilization and minimize waste (Amin, Asaduzzaman, Debnath, Rahaman, & Oláh, 2024; Bertelli, Kocollari, Merzi, & Torricelli, 2025; Garza-Reyes et al., 2026; Jayasinghe et al., 2025). By embedding these resource-efficient operations, firms directly elevate economic, environmental, and social performance (Dey et al., 2022; Malhotra, 2024; Verma, 2024).

Synthesizing these perspectives, GEO acts as the overarching strategic driver that fosters operational circular practices, translating strategic intent into tangible triple-bottom-line outcomes (Xin, Khan, Dagar, & Qian, 2023). Thus, circular economy practices serve as a vital operational mediator linking green strategic orientation to superior sustainability performance. Therefore, the fourth hypothesis proposed is:

H4: Circular Economy Practices mediate the positive effect of Green Entrepreneurial Orientation on Sustainability Performance.

The integrated framework assigns distinct but complementary roles to the two theories. Dynamic Capabilities Theory explains the process through which GEO enables SMEs to sense environmental opportunities, reconfigure resources, and adopt CEP; therefore, it primarily underpins H1. NRBV explains how GEO and CEP become valuable environmental capabilities that support economic, environmental, and social performance; therefore, it primarily underpins H2 and H3. H4 integrates these roles by specifying CEP as the operational mechanism through which GEO contributes to sustainability performance.

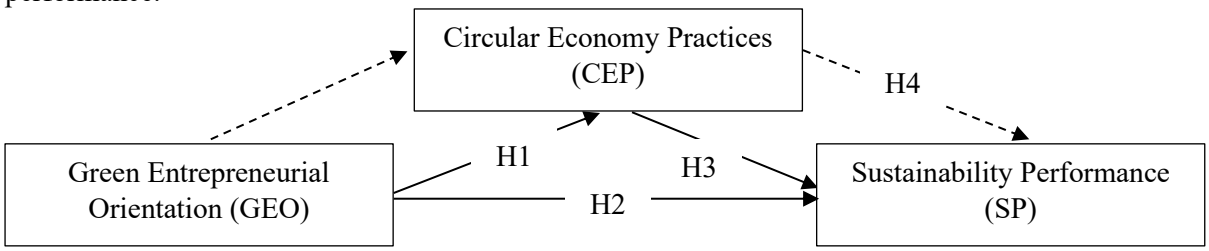


Figure 1. Conceptual Framework
Source: Developed by the authors (2026).

3. Methodology

3.1 Research Design

This study employed a quantitative, causal-associative design to examine the structural relationships among green entrepreneurial orientation, circular economy practices, and sustainability performance in metal craft SMEs in Bali Province.

3.2 Population and Sample

The study focused on metal craft SMEs operating in Bali Province. A purposive sampling technique was used to select 109 respondents. Eligible respondents met five criteria: (1) the SME was located in Bali Province and actively engaged in metal craft production; (2) the business had operated continuously for more than one year; (3) the respondent was an owner, manager, or person responsible for production and environmental decision-making; (4) the respondent was familiar with material use, metal residues, energy use, or waste-handling practices in the business; and (5) the respondent was willing to complete the questionnaire. These criteria ensured that the selected respondents had sufficient operating experience and informed knowledge to assess green entrepreneurial orientation, circular economy practices, and sustainability performance. The minimum sample size was calculated using G*Power with a linear multiple regression approach (fixed model, R^2 deviation from zero), a 5% significance level, 95% statistical power, an effect size (f^2) of 0.15, and two predictors. The calculation yielded a minimum requirement of 107 respondents; therefore, the final sample of 109 respondents met the required sample adequacy.

3.3 Instrument and Measurement

Primary data were collected through a structured questionnaire using a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The indicators used to measure green entrepreneurial orientation, circular economy practices, and sustainability performance are presented in Table 1.

Table 1. Variable Measurement Indicators

Variable	Indicator
Sustainability Performance (Y2)	1. Economic performance 2. Environmental performance 3. Social performance (Hu & Tresirichod, 2024)
Circular Economy Practices (Y1)	1. Production of replacement products and provision of repair services throughout the product life cycle. 2. Reuse of product wastage for subsequent production processes. 3. Recycling of raw materials for reuse. 4. Remanufacturing of raw materials. 5. Remanufacturing of used products to create new products. 6. Reduction in energy consumption, operational costs, and raw material usage compared to previous periods. (Amin et al., 2024)
Green Entrepreneurial Orientation (X)	1. Environmental orientation 2. Green innovativeness 3. Green risk taking (Hu & Tresirichod, 2024)

Source: Compiled from Prior Studies (2026).

3.4 Data Analysis

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 software. The analysis assessed the measurement model through construct validity and reliability and assessed the structural model to test the proposed direct and mediating relationships.

4. Results and discussion

4.1 Result

The PLS-SEM analysis evaluates the measurement model (outer model), structural model (inner model), and hypotheses. The measurement model assesses validity and reliability through convergent validity, composite reliability, and discriminant validity, with an ideal factor loading criterion of greater than 0.70 (Abdillah & Hartono, 2015). The convergent validity assessment for this study is presented in Table 2 below.

Table 2. Initial Outer Loadings of Research Variable Indicators

	Circular Economy Practices (Y1)	Green Entrepreneurial Orientation (X)	Sustainability Performance (Y2)
X.1		0.911	
X.2		0.885	
X.3		0.903	
Y1.1	0.793		
Y1.2	0.748		
Y1.3	0.783		
Y1.4	0.695		
Y1.5	0.754		
Y1.6	0.840		
Y2.1			0.847
Y2.2			0.804

Y2.3	0.880

Source: SmartPLS Output (2026).

As detailed in Table 2, indicator Y1.4 was excluded from further analysis because its outer loading failed to meet the established threshold of 0.70. Table 3 illustrates the recalculated outer loadings following the removal of this item.

Table 3. Final Outer Loadings of Research Variable Indicators

	Circular Economy Practices (Y1)	Green Entrepreneurial Orientation (X)	Sustainability Performance (Y2)
X.1		0.911	
X.2		0.885	
X.3		0.902	
Y1.1	0.795		
Y1.2	0.765		
Y1.3	0.788		
Y1.5	0.771		
Y1.6	0.846		
Y2.1			0.848
Y2.2			0.802
Y2.3			0.880

Source: SmartPLS Output (2026).

The data in Table 3 confirm the validity of all remaining indicators, as each outer loading surpassed the 0.70 threshold. Discriminant validity was then evaluated through the Heterotrait-Monotrait (HTMT) ratio, with the empirical findings displayed in Table 4.

Table 4. Heterotrait-Monotrait Ratio of Correlations

	Circular Economy Practices (Y1)	Green Entrepreneurial Orientation (X)
Circular Economy Practices (Y1)		
Green Entrepreneurial Orientation (X)	0.584	
Sustainability Performance (Y2)	0.815	0.751

Source: SmartPLS Output (2026).

Based on Table 4, the requirement for discriminant validity has been met, as all inter-construct correlation values are below 0.90.

Subsequently, construct reliability was evaluated using composite reliability, and the results are presented in Table 5 below.

Table 5. Composite Reliability Test Results

	Composite reliability
Circular Economy Practices (Y1)	0.895
Green Entrepreneurial Orientation (X)	0.927
Sustainability Performance (Y2)	0.881

Source: SmartPLS Output (2026).

According to the results in Table 5, every construct exhibited adequate internal consistency, as composite reliability values comfortably exceeded 0.70.

The subsequent stage involves the inner model analysis to illustrate the relationships among the latent variables based on a robust substantive theoretical foundation. The evaluation of the structural model in PLS is conducted using the R^2 (R-square) values for the dependent variables, the Goodness of Fit (GoF) index, and the Stone-Geisser Q^2 test to assess predictive relevance. The strength of the structural model is determined by the R^2 criteria, where values of 0.75, 0.50, and 0.25 indicate strong, moderate, and weak models, respectively (Ghozali & Latan, 2020). The results of the R^2 testing are presented in Table 6 below:

Table 6. R-Square Test Results

	R-square
Circular Economy Practices (Y1)	0.261
Sustainability Performance (Y2)	0.572

Source: SmartPLS Output (2026).

As detailed in Table 6, Circular Economy Practices (Y1) yielded an R^2 value of 0.261, indicating that Green Entrepreneurial Orientation (X) accounts for 26.1% of its variance, with the remaining 73.9% driven by exogenous factors beyond the scope of this model. According to the criteria established by Ghozali and Latan (2020), this value falls into the weak category. Meanwhile, Sustainability Performance (Y2) yields an R^2 value of 0.572, indicating that 57.2% of its variance is jointly explained by Green Entrepreneurial Orientation (X) and Circular Economy Practices (Y1), with the remaining 42.8% accounted for by unexamined variables. Based on the benchmark criteria, the structural strength for the Sustainability Performance construct is categorized as moderate.

The evaluation of the PLS structural model can also be assessed using the Q^2 (Q-Square) test, which represents the goodness of fit of the observed values generated by the model along with its parameter estimates. A Q^2 value greater than zero ($Q^2 > 0$) indicates that the model possesses predictive relevance, whereas a value below zero ($Q^2 < 0$) signifies a limitation in predictive relevance. More specifically, the degree of predictive relevance is classified into three structural thresholds: 0.02 (weak), 0.15 (moderate), and 0.35 (strong) (Ghozali & Latan, 2020). The Q^2 values are presented in Table 7 below:

Table 7. Q^2 Test Results

	SSO	SSE	Q^2 (=1-SSE/SSO)
Circular Economy Practices (Y1)	545.000	459.127	0.158
Green Entrepreneurial Orientation (X)	327.000	327.000	0.000
Sustainability Performance (Y2)	327.000	198.756	0.392

Source: SmartPLS Output (2026).

Based on the Q^2 test results presented in Table 7, Circular Economy Practices (Y1) yields a Q^2 value of 0.158 ($Q^2 > 0$), demonstrating that the structural model possesses moderate predictive relevance (Ghozali & Latan, 2020). Meanwhile, Sustainability Performance (Y2) achieves a Q^2 value of 0.392 ($Q^2 > 0$), indicating a strong level of predictive relevance. Because all endogenous constructs exhibit Q^2 values exceeding zero, the proposed structural model is confirmed to have satisfactory predictive accuracy and relevance for the target constructs.

The Goodness of Fit (GoF) evaluates the overall model fit by assessing both the measurement and structural models. The model is deemed to exhibit a good fit when the Standardized Root Mean Square Residual (SRMR) value falls below the threshold of 0.08 (Ghozali & Latan, 2020). The GoF assessment results are presented in Table 8 below.

Table 8. Goodness of Fit

	Estimated model
SRMR	0,077

Source: SmartPLS Output (2026).

Table 8 presents an SRMR value of 0.077. This value is below the threshold of 0.08, indicating that the model exhibits a good fit Cho et al. (2020).

Explanatory research typically applies the Partial Least Squares Structural Equation Modeling (PLS-SEM) method as its primary analytical instrument. To evaluate the statistical significance of relationships among variables, a bootstrapping procedure is required. This bootstrapping process operates through repeated resampling generated entirely from the original dataset. Methodological guidelines generally recommend a parameter of 5,000 bootstrap samples, provided the subsample size exceeds the initial sample size. Nevertheless, relevant literature indicates that 200 to 1,000 replications are sufficient to accurately estimate standard errors in PLS modeling (Ghozali & Latan, 2020).
The structural model resulting from the hypothesis testing is presented in Figure 2 below.

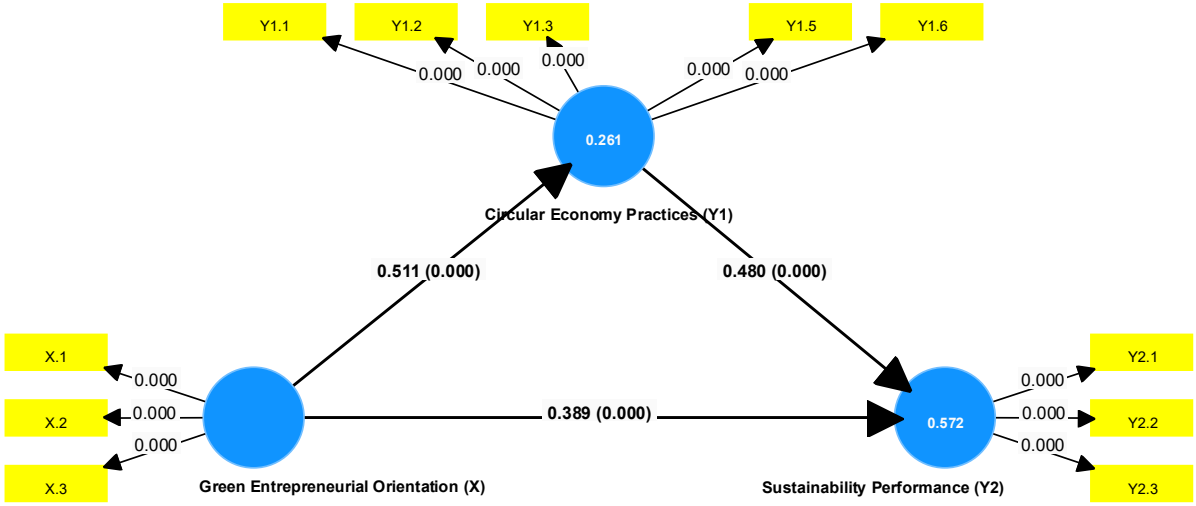


Figure 2. Structural Model for Hypothesis Testing
Source: SmartPLS Output (2026).

Figure 2 illustrates the structural model evaluated for hypothesis testing, while the corresponding empirical results are presented in Table 9 below:

Table 9. Hypothesis Testing Results

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Green Entrepreneurial Orientation (X) -> Circular Economy Practices (Y1)	0.511	0.516	0.061	8.367	0.000
Green Entrepreneurial Orientation (X) -> Sustainability Performance (Y2)	0.389	0.388	0.078	4.995	0.000
Circular Economy Practices (Y1) -> Sustainability Performance (Y2)	0.480	0.483	0.076	6.300	0.000
Green Entrepreneurial Orientation (X) -> Circular Economy Practices (Y1) -> Sustainability Performance (Y2)	0.245	0.248	0.045	5.400	0.000

Source: SmartPLS Output (2026).

Based on the hypothesis testing results presented in Table 9, Green Entrepreneurial Orientation has a positive effect on Circular Economy Practices (β = 0.511, p = 0.000), supporting H1. Green Entrepreneurial Orientation and Circular Economy Practices also have positive effects on Sustainability Performance (β = 0.389, p = 0.000; β = 0.480, p = 0.000, respectively), supporting H2 and H3. The indirect effect of Green Entrepreneurial Orientation on Sustainability Performance through Circular Economy Practices is positive and significant (β = 0.245, p = 0.000). Because both the direct and indirect effects are positive and significant, the mediation is classified as complementary partial mediation according to the mediation typology (Zhao, Lynch, & Chen, 2010).

4.2 Discussion

4.2.1. The Effect of Green Entrepreneurial Orientation on Circular Economy Practices

The positive GEO-to-CEP relationship (β = 0.511, p = 0.000) indicates that Balinese metal craft SMEs with a stronger green entrepreneurial orientation are more likely to translate environmental awareness into resource-efficient production. In practice, this orientation can be reflected in efforts to reuse metal scraps, reduce energy consumption, and manage production residues more carefully. For this traditional craft sector, GEO therefore functions as a practical driver of the transition from linear production routines to circular practices.

This finding is consistent with Dynamic Capabilities Theory: GEO helps SME owners recognize environmental opportunities and reconfigure limited resources into circular production practices. The result highlights that the relevant contribution of GEO in this study is not only an environmental intention, but also its capacity to initiate concrete operational change (Al-Hyari et al., 2026; Huda et al., 2026; Musfar et al., 2025)(Musfar et al., 2025; Qin et al., 2024).

For metal craft SMEs in Bali, institutional expectations, market pressure from environmentally conscious buyers, and local environmental concerns can further encourage this conversion of GEO into circular action (Mamash et al., 2025; Mouawad, 2025)(Huda et al., 2026; Musfar et al., 2025).

4.2.2. The Effect of Green Entrepreneurial Orientation on Metal SME Sustainability Performance

The positive direct effect of GEO on Sustainability Performance (β = 0.389, p = 0.000) shows that a green strategic posture contributes to economic, environmental, and social outcomes even before circular practices are considered as a mediator. For Balinese metal craft SMEs, cleaner production choices and environmental innovation can reduce waste-related costs, protect the local environment, and strengthen the appeal of craft products to sustainability-oriented tourists and international buyers.

From an NRBV perspective, GEO represents a strategic environmental capability that can generate value when SMEs integrate ecological considerations into business decisions. In the present context, this capability supports competitiveness by aligning artisan production with resource stewardship and stakeholder expectations (Hart & Dowell, 2011)(Habib et al., 2020)(Anwar et al., 2024; Coelho et al., 2024; Goel et al., 2025; Habib et al., 2020; Ilyas et al., 2026; Kura & Lukman, 2025; Qin et al., 2024; Ye et al., 2022)(Goel et al., 2025; Ilyas et al., 2026; Musfar et al., 2025)(Goel et al., 2025; Zafar et al., 2026)(Xin et al., 2023; Ye et al., 2022).

4.2.3. The Effect of Circular Economy Practices on Metal SME Sustainability Performance

The positive CEP-to-Sustainability Performance relationship (β = 0.480, p = 0.000) indicates that circular practices are the strongest direct predictor of sustainability performance in this model. For metal craft SMEs in Bali, practices such as recovering metal scraps, reducing material loss, improving energy efficiency, and extending product usefulness can simultaneously lower costs, reduce environmental impacts, and strengthen the reputation of local craft enterprises.

NRBV explains this result by treating resource-efficient operations as capabilities that can be valuable and difficult to imitate. In this study, CEP is the operational channel through which environmental

resource management is converted into sustainability benefits (Hart & Dowell, 2011)(Amin et al., 2024).

The result also emphasizes a practical implication for Bali's metal craft sector: circularity should be implemented as a set of daily operational routines rather than treated solely as an environmental commitment (Bertelli et al., 2025; Garza-Reyes et al., 2026; Jayasinghe et al., 2025)(Bertelli et al., 2025; Jayasinghe et al., 2025)(Bertelli et al., 2025; Jayasinghe et al., 2025)(Dey et al., 2022)(Malhotra, 2024)(Verma, 2024)(Alsaoudi, Acquaye, Swarnakar, & Khalfan, 2026; Alsaoudi, Acquaye, Khalfan, & Lenny Koh, 2026; De et al., 2024).

4.2.4. The Mediating Role of Circular Economy Practices on the Effect of Green Entrepreneurial Orientation on Metal SME Sustainability Performance

Circular Economy Practices complementarily and partially mediate the positive effect of GEO on Sustainability Performance (indirect $\beta = 0.245$, $p = 0.000$). The significant direct effect of GEO remains, while the significant indirect effect shows that green strategic orientation produces stronger sustainability outcomes when it is enacted through circular operations. This pattern constitutes complementary partial mediation under the Zhao, Lynch, and Chen typology. For Balinese metal craft SMEs, this means that environmental commitment needs to be accompanied by concrete actions such as material recovery, waste reduction, and energy-efficient production (Zhao, Lynch, & Chen, 2010).

Grounded in Dynamic Capabilities Theory, Green Entrepreneurial Orientation (GEO) serves as a vital strategic mindset that enables firms to identify environmental opportunities, reconfigure resources, and foster eco-friendly innovation (Habib et al., 2020). By embedding ecological concerns into core operations, GEO provides the strategic flexibility needed to adopt and execute complex circular economy practices, such as resource efficiency, waste reduction, and cleaner production (Al-Hyari et al., 2026; Huda et al., 2026; Musfar et al., 2025). This relationship is further supported by green innovations, marketing strategies, environmental regulations, and institutional pressures, particularly within SMEs and resource-intensive sectors in emerging economies (Mamash, Iyiola, & Aljuhmani, 2025; Mouawad, 2025; Qin, Ailikamujiang, & Jing, 2024)

NRBV explains the second stage: once CEP is embedded in operations, resource efficiency and waste reduction become environmental capabilities that support economic, environmental, and social performance (Hart & Dowell, 2011)(Amin, Asaduzzaman, Debnath, Rahaman, & Oláh, 2024; Bertelli, Kocollari, Merzi, & Torricelli, 2025; Garza-Reyes et al., 2026; Jayasinghe et al., 2025)(Dey et al., 2022; Malhotra, 2024; Verma, 2024)(Alsaoudi, Acquaye, Swarnakar, & Khalfan, 2026; Alsaoudi, Acquaye, Khalfan, & Lenny Koh, 2026; De et al., 2024).

Together, these findings show that CEP is the operational bridge between strategic green orientation and sustainability performance. This interpretation integrates the process-based role of Dynamic Capabilities Theory with the outcome-based role of NRBV without repeating the hypothesis-development arguments (Xin, Khan, Dagar, & Qian, 2023)(Anwar et al., 2024; Coelho et al., 2024; Goel et al., 2025; Habib et al., 2020; Ilyas et al., 2026; Kura & Lukman, 2025; Qin et al., 2024; Ye et al., 2022).

5. Conclusion

Conclusion should consist of conclusion, limitation, and suggestion.

5.1. Conclusion

This study successfully accomplished its objectives by empirically validating the structural relationships among green entrepreneurial orientation, circular economy practices, and sustainability performance within metal craft SMEs in Bali. Grounded in the Natural Resource-Based View and Dynamic Capabilities Theory, the empirical results confirm that all four hypothesized relationships are

supported. First, green entrepreneurial orientation has a significant positive effect on circular economy practices (β = 0.511, P value = 0.000), demonstrating that an eco-friendly strategic posture serves as a critical dynamic capability driving operational waste reduction and material reuse. Second, green entrepreneurial orientation directly enhances sustainability performance (β = 0.389, P value = 0.000), confirming that proactive environmental strategies directly contribute to economic, environmental, and social goals. Third, circular economy practices exert a strong positive influence on sustainability performance (β = 0.480, P value = 0.000), illustrating that embedding closed-loop operations directly yields tangible triple-bottom-line gains. Finally, circular economy practices partially mediate the relationship between green entrepreneurial orientation and sustainability performance (β = 0.245, P value = 0.000). This confirms that while a green mindset is foundational, its overall impact on SME performance is significantly optimized when operationalized through concrete circular economy activities.

5.2. Limitation

Despite its empirical contributions, this study possesses several limitations that warrant consideration. Methodologically, the research relies on a cross-sectional design and primary data collected through self-reported questionnaires, which may limit the observation of long-term temporal dynamics in sustainability performance over time. Contextually, the empirical investigation was restricted to metal craft SMEs in Bali Province. While this contextual focus yields deeply tailored regional insights, it limits the direct generalizability of the findings to other manufacturing sub-sectors, non-artisanal industries, or geographical regions with differing socio-economic and regulatory environments. Furthermore, the model explains 57.2% of the variance in sustainability performance (R^2 = 0.572), leaving 42.8% of the variance attributable to unexamined external and internal determinants.

5.3. Suggestion

Based on the empirical findings and recognized limitations, several actionable suggestions are proposed for practice, policy, and future research. For SME practitioners and craft operators, business owners should move beyond conceptual environmental awareness and actively implement actionable circular economy techniques such as scrap metal recycling, energy-efficient production methods, and repair services to maximize overall business performance. For policymakers and government agencies, local authorities in Bali should design targeted technical training programs, facilitate access to eco-friendly technology, and establish financial incentives for artisans adopting circular practices to accelerate the Sustainable Development Goals (SDGs). For future scholars, subsequent studies are encouraged to adopt longitudinal or mixed-method research designs to capture the long-term impact of green strategies. Additionally, expanding the analytical framework to include additional variables such as green supply chain integration, Industry 4.0 technology adoption, or institutional pressures across broader industrial sub-sectors would enhance the generalizability and robustness of the model.

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