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Circular Economy Practices in Small and Medium Enterprises: Aligning Model of Green Economic Incentives and Environmental Commitment

Abstract

Purpose - The present study aimed to examine the relationship between green economic incentives and environmental commitment as drivers of the circular economy practices in Small and Medium Enterprises.

Design/methodology/approach -A cross-sectional study of 594 assistant managers and SME managers was used while data was analyzed through Smart PLS.

Findings - The results showed that green economic incentives positively affect the SMEs' environmental commitment and the circular economy practice model. Furthermore, environmental commitment is the triple mediator between green economic incentives and the three circular economy practices: internal environmental management, eco-design, and corporate asset management and recovery.

Originality - This study enhanced the natural resource-based view (NRBV), describing the mechanisms that view green economic incentives (GEI) and environmental commitment (EC) as pollution prevention in circular economy practice.

Practical implications - The present study provided a basis for understanding the relevance of SMEs' circular economy practices and designing a strategic plan for its implementation. Also, it provides insight that collaboration between triple helix (the government, SMEs, and the community) is needed in increasing environmental awareness towards sustainability.

Keywords - Green economic incentives, environmental commitment, internal environmental management, eco-design, corporate asset management and recovery, circular economy practices

Paper type - Research paper

1 Introduction

The circular economy (CE) is an essential environmental strategy concept for waste minimization, nature recuperation (Bag *et al.*, 2021), sharpening environmental conservation, and efficient energy consumption for a sustainable business (Gupta *et al.*, 2021; Arsawan *et al.*, 2021) by paying great attention to the environment and resources (Korhonen *et al.*, 2018). As a result, industrial waste is a valuable input that can be repaired, reused, and recycled (Bag *et al.*, 2021; Yadav *et al.*, 2020). It leads to oriented and environmental value products, methods, and processes (Schroeder *et al.*, 2019). A circular economy approach benefits businesses and society with improved environmental awareness (Khan *et al.*, 2021; Centobelli *et al.*, 2021), lower resource price volatility, better customer relations, and job opportunities (Ellen MacArthur Foundation, 2013).

The circular economy is affected by the internal and external environment. Internal factors include behavior (Ling and Xu, 2021; Saleem *et al.*, 2021), environmental commitment (Galkina, 2021; Lin *et al.*, 2015), and organizational capabilities (Prieto-Sandoval *et al.*, 2019;Singh *et al.*, 2018). Meanwhile, government pro-environmental regulations and support are considered external factors for CE practices (Bhupendra and Sangle, 2016; Lozano, 2012). The present study aimed to address various gaps, including the unavailability of studies on the SMEs' readiness of the circular economy (Singh *et al.*, 2018). First, although it affects economic growth (Suryantini *et al.*, 2021),

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the role of SMEs in saving the environment needs to be examined (Saleem *et al.*, 2021). A supportive ecosystem should be maintained to build sustainability (Koval *et al.*, 2021) through green-oriented strategies and innovation optimization (Arsawan *et al.*, 2021). Second, CE has not been comprehensively studied, especially in the SMEs sector, due to limited behavior and internal resource capabilities (Luthra *et al.*, 2022; Temminck *et al.*, 2015). It can be an opportunity for SMEs to improve internal capabilities (Centobelli *et al.*, 2021) for effective green marketing and new markets creation and design process, and circular products and attract a value-oriented talent environment (Barros *et al.*, 2021;Diaz *et al.*, 2021). Third, the results from Singh *et al.* (2018) showed that Green Economic Incentives (GEI) do not contribute to building environmental commitment. However, the importance of green incentives in building environmental commitment was demonstrated by Centobelli *et al.* (2021). This divergence shows the need for more research on GEI and CE to support SMEs' need for environmental self-regulation for environmental improvements (Lin *et al.*, 2015; Ling and Xu, 2021).

The present study was motivated by the research gaps and examined the relationship between GEI, environmental commitment, CE-IEM, CE-ED, CE-CAM&R on SMEs in Indonesia for three reasons. First, Indonesia is a developing country with 63 million SMEs continuously growing, classified as 62 million medium enterprises and 750.000 small businesses, potentially boosting national economic growth (Surya *et al.*, 2021). Consequently, government regulations are needed to sustain environmental attention (Nurdiana *et al.*, 2021). Second, CE is at an early implementation stage and faces many challenges, particularly infrastructure and regulation (Fatimah *et al.*, 2020; Nurdiana *et al.*, 2021). For that reason, the government's role and efforts are crucial in making consistent regulations (Rizos *et al.*, 2015), increasing commitment environment (Singh *et al.*, 2016; Lin *et al.*, 2015), and providing green economic incentives for its implementation (Centobelli *et al.*, 2021; Singh *et al.*, 2018). Three, data from Schwab and World Economic Forum-WEF (2019) stated that this country lacks internal resources, particularly business dynamics capability, developing a sustainable innovation (Arsawan *et al.*, 2020). However, the innovations should be environmentally oriented and environmentally friendly technologies (Agnello *et al.*, 2015). Furthermore, the second part of this study is the literature review, which includes the hypotheses formulation, while the third and fourth describes the method and the analysis respectively. The last part contains conclusions, theoretical and managerial contributions, research limitations, and suggest for further research.

2. Literature Review and Hypothesis Development

2.1 Natural Resource-Based View

The natural resource-based view was coined by Hart (1995) as an extension of the resource-based view (Barney, 1991). Three additions were suggested including 1) environmental-oriented capabilities for enhanced organizational profitability, 2) pollution preventive action, and 3) product stewardship for reach sustainable development (Hart, 1995). Pollution preventive action refers to effective waste and emissions management during production process (Hart and Dowell, 2011) and the other side, product stewardship refers to development for integrated design (Hart, 1995). Sustainable development refers to a production configuration "sustained indefinitely into the future" (Hart and Dowell, 2011). The influence of NRBV was tested by Hart and Dowell (2011) and found that previous research only focused on pollution prevention capabilities, leaving the other two capabilities unexplored. Based on this, this study examined the three NRBV capabilities role, namely GEI as an effort to take precautions (Hart and Dowell, 2011), EC also known as an

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effort to build environmentally oriented products, product life cycle strategies for enhanced product stewardship (Green *et al.*, 2015) while CE is a sustainable development implementation (Liu *et al.*, 2018; Sarkis, 2012).

2.2 Circular Economy Practices in Small and Medium Enterprises

The present study considered CE practices that require SMEs to integrate ecological requirement, including efficiency and reduction of raw , recycling, reuse, and replacement of materials into organizational routine activities (Botezat *et al.*, 2018; Masi *et al.*, 2017). CE Practices are divided into 3 main dimensions, including internal environmental management (Schmidt *et al.*, 2021), environmentally friendly design (Zhu *et al.*, 2011), and company assets management and recovery (Zhu *et al.*, 2011). First, internal environmental management is the preparation of environmentally-oriented procedures, such as green human resource management practices (Marrucci *et al.*, 2021; Bag *et al.*, 2021), training and development programs (Persis *et al.*, 2021), and environmental-based performance evaluation systems (Zhu *et al.*, 2011), in supporting organizational environmental objectives (Koval *et al.*, 2021), building environmental ethics (York, 2009) and improving ecological performance (Lin *et al.*, 2015; Parker *et al.*, 2009; Pimenova and Van der Vorst, 2004). Second, eco-design describes the product design process considering environmental impacts (Lozano, 2012), and is an effective strategy to achieve eco-efficiency (Polverini, 2021; Dalhammar *et al.*, 2021). Therefore, product design must be environmentally oriented (Longo *et al.*, 2021). Apart from environmental efficiency, environmentally friendly design practices help companies to provide different products in the market (Dalhammar, 2016) and increase the global value proposition (Blévennec *et al.*, 2022). Third, the organizational's assets management and recovery refers to the capability to recover investment (Schmidt *et al.*, 2021), resell (Susanty *et al.*, 2020), and recycle materials (Zhu *et al.*, 2011). For this reason, companies required to implement strategies that mitigate emerging issues to gain greater value (Jain *et al.*, 2022) and is a CEs substantial objective to be reached (Lieder and Rashid, 2016).

2.3 Green Economic Incentives (GEI)

Green economy incentives (GEI) from government needed by organization to build and motivate pro-environmental behavior (Clemens, 2006) through financial (Ling and Xu, 2021) and supporting regulations (Parker *et al.*, 2009). Financial rewards support waste management (Ling and Xu, 2021), recycling, and resource efficiency (Rizos *et al.*, 2015) as well as environmentally oriented innovations (Pieroni *et al.*, 2019). Supporting regulatory incentives enhances environmentally-oriented products creation (Agustiono *et al.*, 2020) and promotes self-regulation (Lin *et al.*, 2015). Meanwhile, GEI strengthens internal capabilities (Singh *et al.*, 2018) and positively influences the organizational's internal decision-making processes (Rizos *et al.*, 2015). Incentives through subsidies, environmental grants, loans, and tax concessions influence the behavior of owners/managers (Bradford and Fraser, 2008; Chang *et al.*, 2011) towards a circular economy (Roxas and Coetzer, 2012). Similarly, the government support by marketing and procurement of recycled raw materials helps SMEs to enhance in pro environmental practices (Pimenova and Van der Vorst, 2004). Therefore, economic support strengthens internal capabilities (Prieto-Sandoval *et al.*, 2019), stimulating green-oriented commitments (Sezen and Çankaya, 2013; Chang *et al.*, 2011). The present study considered three indicators as green economy incentives determinants, namely 1) Government Subsidies and Tax Benefits (GSTB), 2) premium prices for green products (PP), and 3) cheaper recycled raw materials (CP).

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2.4 Environmental Commitment

A company must have an internal and external environmental orientation to protect the environment (Saleem *et al.*, 2021), and design green strategies (Arsawan *et al.*, 2021; Bradford and Fraser, 2008) as evidenced in environmental saving actions (Singh *et al.*, 2014). In this case, environmental commitment is an organization's ethical value in protecting the environment (Chang *et al.*, 2011) and green activities to reduce environmental degradation (Suryantini *et al.*, 2021), protecting business, society, and its ecology (York, 2009). This is viewed as a strategic business orientation (Singh *et al.*, 2014) which reflects the company's sustainable business attitude (Green *et al.*, 2015). Environmental commitment involves manner, behavior, perspectives and economic benefits (Saleem *et al.*, 2021). Furthermore, Stone (2006) revealed the environmental commitment role in increasing green awareness and responsibility (Saleem *et al.*, 2021), which led to organizational pro-environmental sustainability, enhanced business performance, and effective waste management (Singh *et al.*, 2016). Considering the diversity of SMEs effective implementation commitments (Parker *et al.*, 2009), environmental awareness is still low (Singh *et al.*, 2018) due to the assumption that waste management is not related to productivity (Saleem *et al.*, 2021; Parker *et al.*, 2009) and organizational profits (Bhupendra and Sangle, 2016). Therefore, the present study considered the Environmental Products and Processes awareness (EPP), Resource Reuse and Recycling (RRR), and Environmental Responsibility (ER) to measure the company's environmental commitments.

2.4 Hypothesis Development

The natural resource-based view suggested an environmentally oriented and pollution-preventing capability for sustainable development (Hart, 1995). This is the government's basis to be involved by implementing regulations (Fatimah *et al.*, 2020) and financial incentives (Botezat *et al.*, 2018). This means that GEI stimulates an organizational solution to increase environmental commitment (Zhang *et al.*, 2013; Clemens, 2006). The important role of the government in making regulations related to providing green incentives will change the perspective of SME managers about the importance of contributing to saving the environment (Singh *et al.*, 2018). Thus, green incentives have an impact on increasing environment commitment. Based on the above description, the following hypothesis is formulated:

H1: GEI has a significant positive effect on EC

Several studies revealed that green incentives provided through financial (Clemens, 2006) and non-financial (Ling and Xu, 2021) can be allocated to make the internal environment guidelines such as the procurement process or recruiting employees with environmental conservation knowledge (Marrucci *et al.*, 2021; Bag *et al.*, 2021), preparation of training and development programs aimed to save the environment (Persis *et al.*, 2021) and environmentally sustainable strategies (Green *et al.*, 2015). Furthermore, GEI is important in the manufacture of environmentally friendly products (Longo *et al.*, 2021; Lozano, 2012), enhancing environmental efficiency (Polverini, 2021). The green economy incentives increase the organization's internal capabilities for investment recovery (Schmidt *et al.*, 2021), reselling used materials and goods (Susanty *et al.*, 2020), and recycling materials (Zhu *et al.*, 2011), prolonging the product life cycle (Corona *et al.*, 2019). Consequently, the company adopts a better sustainability system (Lozano, 2012). Based on the above description, the hypothesis is formulated as follows:

H2: GEI positively affects IEM

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H3: GEI positively affects ED
H4: GEI positively affects CAM&R

Environmental commitment is considered as the organization's first step in its role to save the environment. It enhances the circular economy, especially in the internal environmental management, including planning, drafting, implementing, and evaluating the internal sustainable programs such as pollution prevention and waste reduction (Schmidt *et al.*, 2021), building cross-functional collaboration for environmental improvement (Parker *et al.*, 2009), and quality environment management (Zhang and Ma, 2021; York, 2009). Further, environmental commitment is a starting point for SMEs to design energy-efficient products, recyclable, safe raw materials, and minimize waste (Schmidt *et al.*, 2021). Therefore, it can affect investment recovery, inventory effectiveness, and sales of used goods and materials (Schmidt *et al.*, 2021). Based on the above description, the hypothesis is formulated as follows:
H5: EC positively affects IEM.
H6: EC positively affects ECO
H7: EC positively affects CAM&R

Green Economy Incentives (GEI) is significant in building organizational involvement and commitment to save the environment. It is the government and non-governmental organizations benefit to adopt environmental initiatives (Singh *et al.*, 2018; Agnello *et al.*, 2015). Incentives include additional or financial rewards (Ling and Xu, 2021) that encourage organizations to design or implement environmental practices (Kahupi *et al.*, 2021). The incentive improves recycling techniques (Bag *et al.*, 2021) and facilitates the transition to CE (Ling and Xu, 2021). Also, GEI enhances dynamic capabilities (Prieto-Sandoval *et al.*, 2019) that affect decision-making processes (Diaz *et al.*, 2021) although some SMEs perceive that investing in CE increases cost than expected return (Rizos *et al.*, 2015). Consequently, the increasing environmental commitment will motivate SME managers to implement CE (Kuo and Chang, 2021). The environmental commitment will strengthen the internal capabilities of SMEs (Marrucci *et al.*, 2021; Bag *et al.*, 2021), manufacture environmentally-friendly designed products (Longo *et al.*, 2021), and improve asset recovery and investment capabilities (Schmidt *et al.*, 2021). Therefore, the green economy incentives will increase environmental commitment and improve CE practices in SMEs. Based on the above description, the hypothesis is formulated as follows:
H8: Environmental commitment partially mediates the relationship of green economic incentives to internal environment management
H9: Environmental commitment partially mediates the relationship of green economic incentives to eco-design
H10: Environmental commitment partially mediates the relationship between green economic incentives on corporate asset management and recovery

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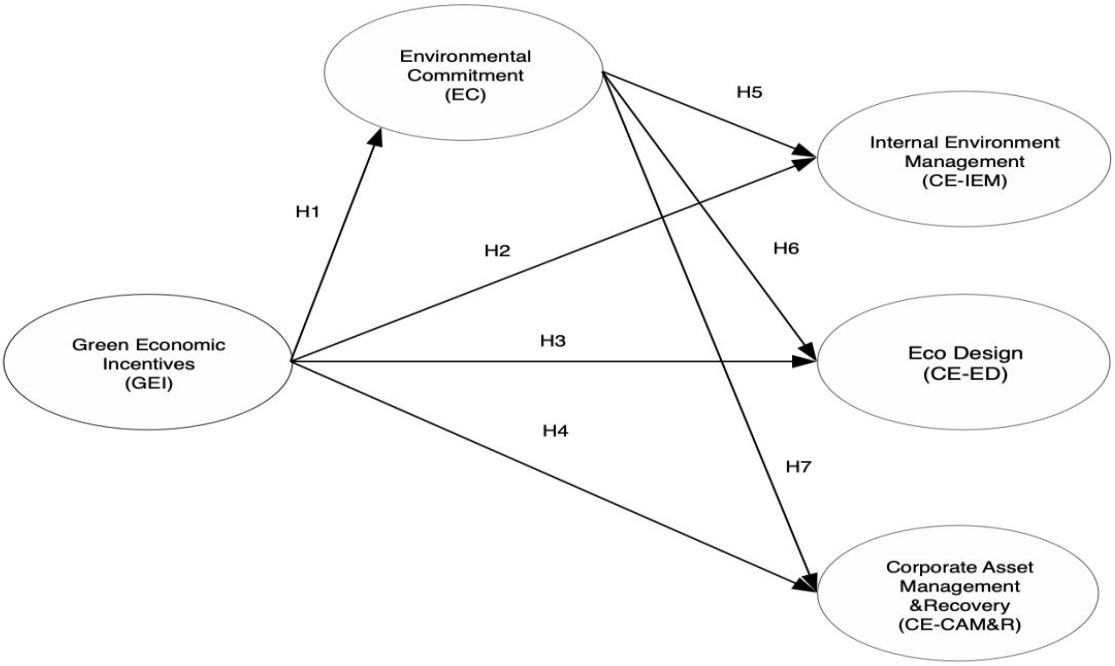

Figure 1. Proposed Conceptual Framework

3 Methodology

3.1 Data and Sampling Method

The present study uses a quantitative approach through the distribution of questionnaires which focused on SME-producing companies (with 50–200 full time employees), which are the essential sector of the Indonesian economy that still growth and develop (Surya *et al.*, 2021). Population is 1,299 SMEs located in 9 regencies of Bali Province. Formula from Krejcie and Morgan, (1970) were used to determine the sample frames, obtaining a total of 297 SMEs. This selection was carried out using random sampling (lottery method). From the 297 SMEs, two respondents were recruited from each to fill out the research questionnaire. The total number of the participants was 594 people which include managers and assistant managers. Their selection was triggered by the assumption that they possess organizational characteristics and knowledge on circular economy practices. Data were collected from March to June 2021 via email and Google Forms and direct visits by first sending email notification on this study agenda. The 594 responses were analyzed to achieve the aims of the present study. Table 1 presents the population information, sample frame, and the number of respondents.

Insert Table 1

3.2 Measurement

The magnitude of the variable construct used was based on the previous empirical studies. The previous study measurement was adopted to the subject namely, SMEs in Bali Province over 9 districts. The construct indicators assessment used a 7-point Likert scale, "1: strongly disagree to 7: strongly agree". To avoid ambiguity, the questionnaire (in Indonesian) was tested on 30 SME CEOs with knowledge of the Circular Economy (CE). The Green Economic Incentive (GEI) variable was adopted from (Singh *et al.*, 2018; Esfahbodi *et al.*, 2016), consisting of 3 indicators. The environmental commitment variable was adopted from (Singh *et al.*, 2018; Liu and Bai, 2014), consisting of 3 indicators. While, the CE-IEM was adopted from (Schmidt *et al.*, 2021) and (Zhu *et al.*, 2011), consisting of 8 indicators. The CE-ED variable was adopted from (Schmidt *et al.*, 2021; Zhu *et al.*, 2011) with 4 indicators. Moreover, CE-CAM&R was adopted from (Schmidt *et al.*, 2021) and (Zhu *et al.*, 2011) with 3 indicators.

The present study used the variance-based partial least squares to test the hypothesis (PLS-SEM) with Smart PLS 3.2.9 software. The PLS-SEM was used to assess the relationship between constructs and their predictive power on endogenous variables (Hair *et al.*, 2014). The present study validated the circular economy practices model and the data was not assessed as normally distributed data, making the CE model assessment associated with GEI and EC predictors using PLS-SEM appropriate (Hair *et al.*, 2016).

4 Results and Discussion

Table 2 describes the characteristics of the 594 respondents.

Insert Table 2

4.1 Measurement Model

The VIFs test was used to evaluate the collinearity problem, scoring 2.872 (Green Economics Incentives), 1.826 (Environmental commitment), 3,558 (CE-Internal Environment Management), 1.832 (CE-Eco-Design, and 2.119 (CE-Corporate Asset Management and Recovery). All VIF coefficients were lower than 5 which is the recommended limit value by Hair *et al.*, (2016) that the data do not have general variance problems. The outer model was tested to evaluate the reliability and validity of the construct variables. Table 2 shows the results that each item of factor loadings is more than 0.6. The convergent validity test explains that the validity requirements are met because the average extracted variance (AVE) is more than 0.5 and the factor loading is more than 0.6 (Hair Jr *et al.*, 2016). This shows that the discriminant validity conditions of all constructs have been met.

** Insert Table 3**

The Heterotrait-Monotrait Ratio (HTMT) was used to assess the discriminant constructs validity. For this criteria according to Hair Jr *et al.* (2016) the value was lower than 0.9. Due to the values ranging from 0.384 to 0.701, the HTMT test showed that discriminant validity was achieved. The composite reliability values in both samples were above the recommended level of 0.7 therefore, the construct was reliable.

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4.2 Inner Model Measurement

The present study applied the bootstrap method with 5000 samples to assess the research indicators and path coefficient's significance (Chin *et al.*, 2008). The results showed that the goodness-of-fit (GoF) model has a value of 0.367 which stated that the model is fit. In addition, testing on the standard residual root means square (SRMR) and normed fit index (NFI) shows that the SRMR value was 0.081 while the NFI was 0.716. The SRMR cut-off value was 0.8 and the NFI was below 0.9 which indicates that all criteria are met. The results showed that GEI explains EC by 0.268 (26.8%). The explanatory power of EC at CE-IEM was 0.347 (34.7%), at CE-ED, it was 0.224 (22.4%) and at CE-CAM%R it was 0.212 (21.2%). In addition, the value of Q^2 showed that all constructs have positive values and good predictive relevance (Chin, 2010).

4.3 Hypothesis Testing

Table 4 shows the results of the relationship between GEI, EC and CE-IEM, CE-ED and CE-CAM&R. To test the hypotheses, we use path coefficients (β), t values, and p values. According to Hair *et al.* (2016) if the path coefficient greater than 0.1, t value greater than 1.96 and 0.05 level of significance thats mean the hypotheses are supported. The results support the significant role of GEI in achieving EC (H_1) with, CE-IEM (H_2), CE-ED (H_3), and CE-CAM&R (H_4). Furthermore, EC has an important role in achieving CE-IEM (H_5), CE-ED (H_6), and CE-CAM&R (H_7).

Insert Table 4

After exaiming direct relationship, the next step was to determine mediating role as shown in Table 5. The present study tested three mediation patterns. According to Hair *et al.* (2014), the method used is to measure the VAF value < 0.20, meaning there is no mediation, while 0.20-0.80 indicates partial and the VAF value > 0.80 means full mediation. To test the model mediation effect, non-parametric bootstrap was used (Hair *et al.*, 2016). Finally, variance values (VAF) were calculated to obtain indirect and total link sizes. When the VAF is greater than 80%, it shows full mediation; between 20 and 80% is partial; and below 20% means no mediating effect (Hair *et al.*, 2013).

The mediating role in the causal relationship between GEI and CE-IEM, CE-ED, and CE-CAM&R was examined using VAF assays. This study tested three mediation pathways and concluded that environmental commitment partially mediates the relationship between GEI and CE-IEM, where the VAF value is 35.90%, indicating that hypothesis 8 is accepted. EC also functions as a partial mediating relationship between GEI and CE-ED, with a VAF value of 24.10%, which means that hypothesis 9 is accepted. At the same time, EC functions as a partial mediating relationship between GEI and CE-CAM&R, with a VAF value of 65.50%, which means that hypothesis 10 is accepted.

Insert Table 5

Insert Figure 2

5 Conclusion

Most previous studies examined the circular economy but did not focus on combining green economic incentives and environmental commitment, especially in the SMEs sector. The CE

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provides opportunities and encourages every country, industry, and business entity to jointly maintain sustainability and protect the environment. This study examined the role of GEI and EC in achieving CE for environmental sustainability. The results showed that GEI plays a significant role in environmental sustainability efforts to achieve CE. This is support study by Zhang *et al.* (2013), which stated external references, such as financial incentives, affect organizational attitude and commitment in the CE concept implementation (Centobelli *et al.*, 2021; Clemens, 2006). However, Singh *et al.* (2018) established that GEI does not affect building environmental commitment. Furthermore, the relationship between GEI and CE-IEM was significant (H2). The green economic incentives (Clemens, 2006) financial and non-financial (Ling and Xu, 2021) can help develop environmentally-oriented procedures, such as employee procurement processes (Marrucci *et al.*, 2021; Bag *et al.*, 2021), implementing environmental training and development programs (Persis *et al.*, 2021) and environmentally sustainable strategy (Green *et al.*, 2015). Hypothesis 3 proposed the relationship between GEI and CE-ED and showed positive results. Therefore, the role of GEI on Eco-design is incentives optimization to manufacture environmentally friendly products (Longo *et al.*, 2021; Lozano, 2012), enhancing environmental efficiency (Polverini, 2021). Furthermore, GEI positively affects CE-CAM&R. Incentives optimization can increase the organization's capability to recover investment (Schmidt *et al.*, 2021), resell (Susanty *et al.*, 2020), and recycle materials (Zhu *et al.*, 2011). The hypothesis 5 showed a positive relationship between EC and CE-IEM, meaning that internal commitment and environmental management improves CE practices. Environmental commitment is achieved through internal organizational programs, such as pollution prevention (Schmidt *et al.*, 2021), cross-functional collaboration (Parker *et al.*, 2009), and quality environment management (Zhang and Ma, 2021; York, 2009). The relationship between EC and CE-ED was positive, hence hypothesis 6 was accepted. This proved that environmental commitment is the first step for SMEs to design energy-efficient products, recyclable, safe materials, and minimize waste (Schmidt *et al.*, 2021). Moreover, the relationship between EC and CE-CAM&R turned positive therefore hypothesis 7 was accepted. Environmental commitments can affect CE-CAM&R through investment recovery, excess inventory, sales of used goods and materials (Schmidt *et al.*, 2021).

5.1 Theoretical Contribution

There is increased attention by policymakers, researchers, and practitioners, for CE practices that can advance sustainable development goals. Therefore, this study explained the mechanisms that SMEs can utilize to successfully implement CE practices, including the role of GEI and EC. It complemented previous studies that failed to show antecedents for specific CE practices (Green *et al.*, 2015; Schmidt *et al.*, 2021; Liu *et al.*, 2018). There are very few studies that exclusively focused on the direct relationship between GEI and the implementation of CE practices. In contrast, this study showed that EC influences the relationship between GEI and three CE practices in Indonesian SMEs, specifically internal environmental management, green design, and CAM&R.

This study contributed to the CE literature and related theories in three folds. Firstly, it contributed to enhanced the natural resource-based view, describing the mechanisms that view GEI and EC as pollution prevention in CE practice. The results showed that GEI and EC are translated in a strategic orientation. The CE practices implementation can be affected by an organizations failure to commit to the environment. This study examined antecedents used to overcome these barriers (de Oliveira *et al.*, 2018). The finding contributed to the literature by integrating previous research

on GEI (Centobelli *et al.*, 2021) and environmental commitment (Galkina, 2021) as CE practice implementation drivers. Particularly, it showed that GEI can trigger the emergence of EC in CE practices, positively affecting internal environmental management and green design, and strengthens asset management and recovery. From a natural resource-based perspective, the results demonstrated the importance of companies building a commitment culture to implement CE practices.

Second, this study expanded the literature by dividing CE practices into three main dimensions namely internal environmental management, green design, and enterprise asset management and recovery. As mentioned by Centobelli *et al.*(2021) and Singh *et al.* (2018), the present study distinguished these three practices. The results showed that EC influences the relationship between GEI and internal environmental management, green design, and corporate asset management and recovery, acting as a triple mediator. Although the three tested mediation relationships are significant, GEI-EC and asset management and recovery have more influence. This result proved that SMEs strongly focus on resource recovery to develop enterprise asset management and recovery practices easily. It requires the involvement of purchasing managers in Indonesian SME in investment recovery practices (Betancourt Morales and Zartha Sossa, 2020). The Indonesian SME business have had inventory recovery practices for decades, making it a serious concern for organizational sustainability, increasing productivity and innovation, and environmental sustainability orientation.

Third, CE is an interesting topic for academics, policymakers, and practitioners, but the literature is not thorough on how Indonesian SMEs can develop CE practices. Most studies focused on the European context whereas this study contributed to the CE literature in developing countries and supported findings in the European context (Schmidt *et al.*, 2021). The results showed that GEI and EC influences the implementation of all three CE practices. Furthermore, this is the first study linking GEI and EC as antecedents of CE practice in an emerging country. Whereas, GEI is common in developed countries such as the US (Clemens, 2006), India (Singh *et al.*, 2018), and Italy (Centobelli *et al.*, 2021). Overall, these findings helped academics by contributing to the theory and generating evidence that incorporating the sub-constructs of CE practice may not always work, especially for developed countries like Germany. These results provided practitioners with insights for implementing CE practices in their companies.

5.2 Managerial Contribution

The governments and countries concerned about saving the environment must provide green economy subsidies, tax incentives, soft loans, and subsidized materials, to increase sustainable waste management strategies (Singh *et al.*, 2018; Möllemann, 2016). The regulations can strengthen the commitment and consistency of SMEs to saving the environment efforts (Kahupi *et al.*, 2021;Lin *et al.*, 2015; Roxas and Coetzer, 2012). Second, proper utilization of government's green economic incentives by SMEs managers will increase commitment to the environment. The GEI enabled SMEs to build a strong culture with higher trust in the environment, implementing green actions for sustainable development, and creating innovative sustainable business models to increase economic growth. The incentives also influence the implementation of environmentally oriented standards and building environmental ethics. Furthermore, green economic incentives facilitate SMEs collaboration with large companies to achieve organizational sustainability especially the raw materials provision, and supply chain management. Such actions develop a

strong attitude and increases the company's environmental commitment to the circular economy implementation.

5.3 Limitations and Further Study

This study identified several limitations causing a gap for future studies. First, the study design used assistant managers and managers for information. Future studies can overcome this common method bias and choose a proper design. Second, this study focused on the mechanisms influencing development of CE practices and assumed that GEI and EC are prerequisites for companies to implement this. Meanwhile, future studies can establish additional aspects that influence the proposed mechanism, such as environmental supply chain collaboration or green strategies and innovation. Third, previous studies including this, focused on the antecedents of CE practice in developed and developing countries. Future studies can therefore make comparisons to expand and generalize these findings by considering the differences in institutional contexts between countries.

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Table

Table 1. Population and Sample Frame

No	SMEs Business Field (1)	Research Population (2)	Population's percentage (3)	No. of Sample (4)	No. of Respondents (5)
1	Manufacturing	100	7.6	23	46
2	Medical pharma/chemical	171	13.2	39	78
3	Food	188	14.5	43	86
4	Textile	331	25.5	76	152
5	Woodcraft	405	31.2	92	184
6	Others	104	8.0	24	48
	Total	1.299	100	297	594

Table 2. Characteristics of Respondents

Criteria	Data	Frequency	Percentage
Gender	Male	450	75,8
	Female	144	24,2
Age	21-30	39	6,6
	31-40	272	45,8
	41-50	238	40,1
	51-60	45	7,6
Educational level	Bachelor	550	92,6
	Master	38	6,4
	Doctoral	6	1,0
Experience (years)	<5	56	9,4
	6-10	157	26,4
	11-15	204	34,3
	16-20	134	22,6
	>21 or more	43	7,3
Position	General managers	305	51,3
	Assistant managers	289	48,7

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Table 3. Construct Validity and Reliability

Description	Loading	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Green Economic Incentives		0.848	0.847	0,908	0,768
The government provides subsidies and tax benefits for the implementation of CE practices (GSTB).	0,879				
Industrial/direct buyers are ready to pay a premium price for green products (PP)	0,930				
Availability of cheaper recycled raw material than virgin raw material (CP)	0,817				
Environmental Commitment		0.755	0.767	0,860	0,672
My firm considers the potential environmental consciousness of the product and production process (EPP).	0,877				
My firm reduces the use of virgin resources by emphasizing the reuse and recycling of EC resources (RRR).	0,821				
My firm values the environment and describes itself as an environmentally EC responsible firm (ER).	0,756				
Circular economy practices—Internal environmental management		0.860	0.873	0,891	0,507
Cross-functional cooperation for environmental improvements	0,803				
Special training for workers on environmental issues	0,762				
Total quality environmental management	0,671				
Existence of pollution prevention programs such as cleaner production	0,626				
Internal performance evaluation system incorporating environmental factors	0,652				
Generate environmental reports for internal evaluation	0,763				
Commitment to named practices from senior managers	0,773				
Support for named practices from mid-level managers	0,622				
Circular economy practices—Eco-design		0.839	0.850	0,892	0,675
Design of products for reduced consumption of materials/energy	0,761				
Design of products for reuse, recycling, and recovery of material parts	0,804				
Design of products to avoid or reduce the use of hazardous products	0,865				
Design of processes for minimization of waste	0,852				
Circular economy practices—Corporate asset management		0.777	0.782	0,871	0,693
Investment recovery (sale) of excess inventories/materials	0,886				
Sale of scrap and used materials	0,826				
Sale of excess capital equipment	0,782				

Table 4. Path Coefficients

Path (Hypothesis)	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Remarks
- Green Economic Incentives -> Environmental Commitment (H1)	0.518	0.520	0.036	14.202	0.000	Supported
- Green Economic Incentives -> Internal environment management (H2)	0.326	0.326	0.048	6.795	0.000	Supported
- Green Economic Incentives -> Eco Design (H3)	0.333	0.333	0.055	6.051	0.000	Supported

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- Green Economic Incentives -> Corporate Asset Management and Recovery (H4)	0.108	0.104	0.048	2.258	0.024	Supported
- Environmental Commitment -> Internal Environment Management (H5)	0.351	0.353	0.042	8.292	0.000	Supported
- Environmental Commitment -> Eco Design (H6)	0.205	0.207	0.042	4.855	0.000	Supported
- Environmental Commitment -> Corporate Asset Management and Recovery (H7)	0.395	0.399	0.044	9.033	0.000	Supported

Table 5. Testing of mediation effects

Link*	Mediator*	Independent Variable-Mediator	Mediator-Dependent Variable	Direct	Indirect	Total effect	VAF (%)	Decision
GEI-CE-IEM	EC	0.518	0.351	0.326	0.182	0.507	0.359	Partial mediation
GEI-CE-ED	EC	0.518	0.205	0.333	0.106	0.440	0.241	Partial mediation
GEI-CE-CAM&R	EC	0.518	0.395	0.108	0.205	0.313	0.655	Partial mediation

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Figure

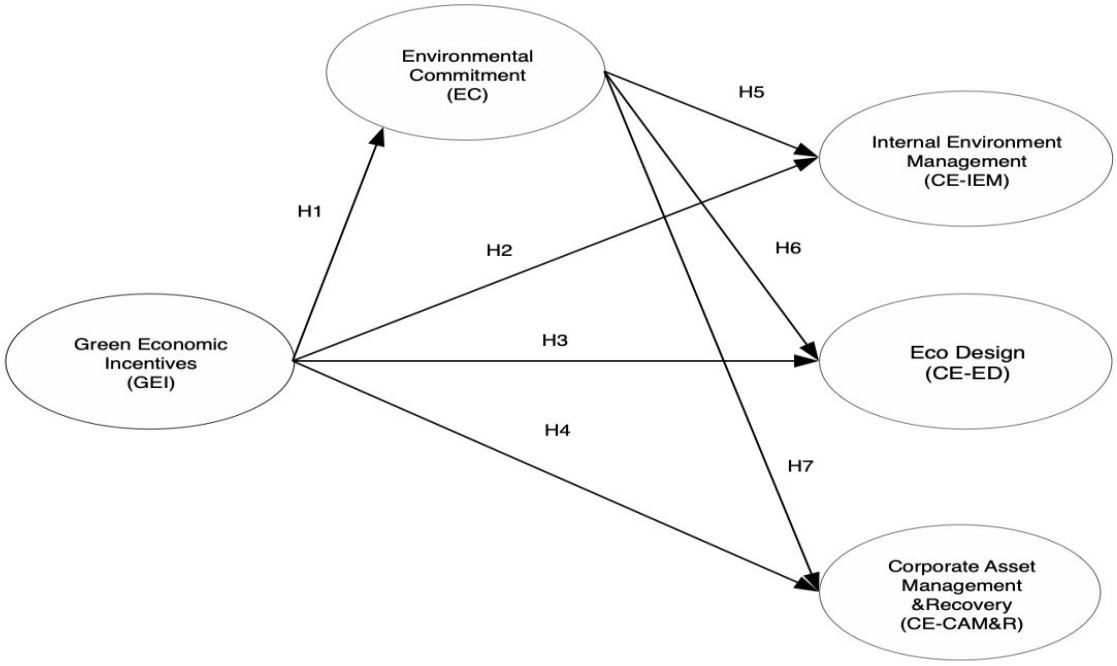

Figure 1. Proposed Conceptual Framework

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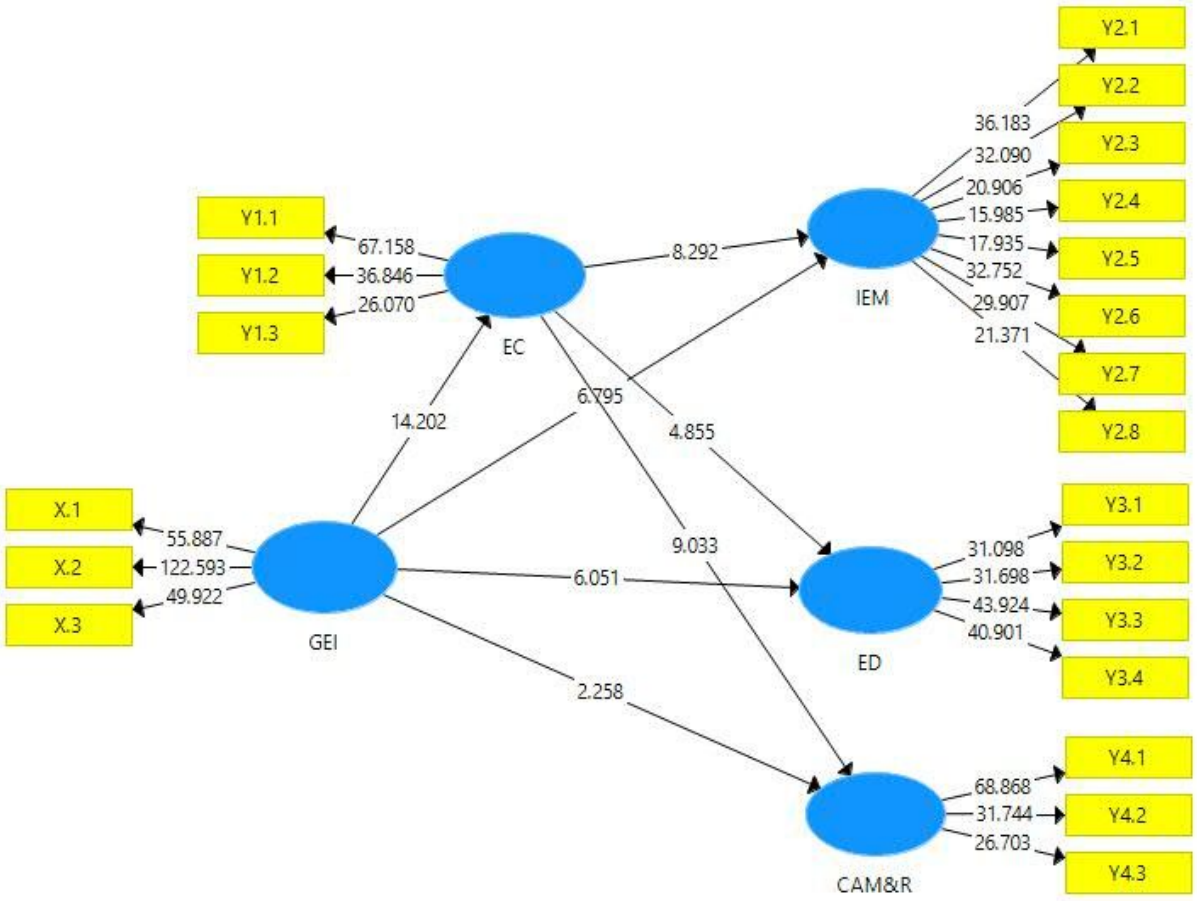

Figure 2. Output analysis

and Performance Management

Circular economy practices in SMEs: aligning model of green economic incentives and environmental commitment

Circular economy practices in SMEs

In this section only the affiliation field can be edited. If any other changes are required in this section please add a comment.

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Purpose

The present study aim~~sed~~ to examine the relationship between green economic incentives (GEIs) and environmental commitment (EC) as drivers of the circular economy (CE) practices in small and medium enterprises (SMEs).

Design/methodology/approach

A cross-sectional study of 594 assistant managers and SME managers was used while data ~~was~~ were analyzed through Smart PLS.

Findings

The results showed that ~~green economic incentive~~GEIs positively affect the SMEs' ~~environmental commitment~~EC and the ~~circular economy~~ CE practice model. Furthermore, ~~environmental commitment~~EC is the mediator between ~~green economic incentive~~GEIs and the three ~~circular economy~~ CE practices: internal environmental management, eco-design~~,~~ and corporate asset management and recovery (CAM&R).

Practical implications

The present study provided a basis for understanding the relevance of SMEs' ~~circular economy~~ CE practices and designing a strategic plan for its implementation. Also, it provides insight into that collaboration between triple helix (the government, SMEs~~,~~ and the community) is needed in increasing environmental awareness toward~~s~~ sustainability.

Originality/value

This study enhanced the natural resource-based view (NRBV), describing the mechanisms that view ~~green economic incentives (~~GEIs~~)~~ and ~~environmental commitment (~~EC~~)~~ as pollution prevention in ~~circular economy~~CE practice.

Keywords: Green economic incentives, Environmental commitment, Internal environmental management, Eco-design, Corporate asset management and recovery, Circular economy practices

1. Introduction

Q6 The circular economy (CE) is an essential environmental strategy concept for waste minimization, nature recuperation (Bag *et al.*, 2021), sharpening environmental conservation~~,~~ and efficient energy consumption for a sustainable business (Gupta *et al.*, 2021; Arsawan *et al.*, 2021) by paying great attention to the environment and resources (Korhonen *et al.*, 2018). As a result, industrial waste is a valuable input that can be repaired, reused~~,~~ and recycled (Bag *et al.*, 2021; Yadav *et al.*, 2020). It leads to oriented and environmental value products, methods~~,~~ and processes (Schroeder *et al.*, 2019). A ~~circular economy~~CE approach benefits businesses and society with improved environmental awareness (Khan *et al.*, 2021; Centobelli *et al.*, 2021), lower resource price volatility, better customer relations~~,~~ and job opportunities (Ellen MacArthur Foundation, 2013).

The ~~circular economy~~CE is affected by the internal and external environment. Internal factors include behavior (Ling and Xu, 2021; Saleem *et al.*, 2021), environmental commitment (EC) (Galkina, 2021; Lin *et al.*, 2015)~~,~~ and organizational capabilities (Prieto-Sandoval *et al.*, 2019; Singh *et al.*, 2018). Meanwhile, government pro-environmental regulations and support are considered external factors for CE practices (Bhupendra and Sangle, 2016; Lozano, 2012). The present study aimed to address various gaps, including the unavailability of studies on the SMEs' readiness for the ~~circular economy~~CE (Singh *et al.*, 2018). First, although it affects economic growth (Suryantini *et al.*, 2021), the role of SMEs in saving the environment needs to be examined (Saleem *et al.*, 2021). A supportive

ecosystem should be maintained to build sustainability through green-oriented strategies and innovation optimization (Arsawan *et al.*, 2021). Second, CE has not been comprehensively studied, especially in the SMEs sector, due to limited behavior and internal resource capabilities (Luthra *et al.*, 2022; Temminck *et al.*, 2015). It can be an opportunity for SMEs to improve internal capabilities (Centobelli *et al.*, 2021) for effective green marketing and new markets creation and design process, and circular products and attract a value-oriented talent environment (Barros *et al.*, 2021; Diaz *et al.*, 2021). Third, Singh *et al.* (2018) showed that green economic incentives (GEIs) do not contribute to building ~~environmental commitment~~EC. However, the importance of green incentives in building ~~environmental commitment~~EC was demonstrated by Centobelli *et al.* (2021). This divergence shows the need for more research on ~~green economic incentive~~GEIs and ~~environmental commitment~~EC to support SMEs' need for environmental self-regulation for environmental improvements (Lin *et al.*, 2015; Ling and Xu, 2021).

The present study was motivated by the research gaps and examined the relationship between ~~green economic incentive~~GEIs, ~~environmental commitment~~EC, internal environmental management (CE-IEM), eco-design (CE-ED), corporate asset management~~,~~ and recovery (CE-CAM&R) on SMEs in Indonesia for three reasons. First, Indonesia is a developing country with 64~~,~~5 million SMEs continuously growing and potentially boosting national economic growth (Arsawan *et al.*, 2022a). Consequently, government regulations must sustain environmental attention (Nurdiana *et al.*, 2021). Second, CE is at an early implementation stage and faces many challenges, particularly infrastructure and regulation (Fatimah *et al.*, 2020; Nurdiana *et al.*, 2021). For that reason, the government's role and efforts are crucial in making consistent regulations (Rizos *et al.*, 2015), increasing commitment environment (Singh *et al.*, 2016; Lin *et al.*, 2015)~~,~~ and providing ~~green economic incentive~~GEIs for its implementation (Centobelli *et al.*, 2021; Singh *et al.*, 2018). Third~~ee~~, data from Schwab and World Economic Forum-WEF (2019) stated that this country lacks internal resources, particularly business dynamics capability, developing a sustainable innovation (Arsawan *et al.*, 2022b). However, the innovations should be environmentally oriented and environmentally friendly technologies (Agnello *et al.*, 2015). Furthermore, the second part of this study is the literature review, which includes the hypotheses formulation, while the third and fourth describes the method and the analysis, respectively. Finally, the last part contains a discussion, theoretical and managerial contributions, conclusions, research limitations~~,~~ and suggestions for further research.

2. Literature review and hypothesis development

2.1 Natural resource-based view

Hart (1995) coined the natural resource-based view (NRBV) to extend the resource-based view (Barney, 1991). Three additions were suggested, including (1) environmental-oriented capabilities for enhanced organizational profitability, (2) pollution preventive action~~,~~ and (3) product stewardship for reaching sustainable development (Hart, 1995). Pollution preventive action refers to effective waste and emissions management during the production process (Hart and Dowell, 2011). On the other side, product stewardship refers to the development of integrated design (Hart, 1995). Finally sustainable development refers to a production configuration “sustained indefinitely into the future” (Hart and Dowell, 2011). The influence of NRBV was tested by Hart and Dowell (2011) and found that previous research only focused on pollution prevention capabilities, leaving the other two capabilities unexplored. Based on this, this study examined the three NRBV capabilities role, namely ~~green economic incentive~~GEIs as an effort to take precautions (Hart and Dowell, 2011), ~~environmental commitment~~EC, also known as an effort to build environmentally oriented products, product life cycle strategies for enhanced product stewardship (Green *et al.*, 2015) while the ~~circular economy~~CE is a sustainable development implementation (Liu *et al.*, 2018; Sarkis, 2012).

2.2 Circular economy practices in small and medium enterprises

The present study considered ~~circular economy~~CE practices that require SMEs to integrate ecological requirements, including efficiency and reduction of raw, recycling, reuse~~,~~ and replacement of materials into organizational routine activities (Botezat *et al.*, 2018; Masi *et al.*, 2017). Circularity is considered as a solution-based framework system capable of addressing many social challenges such as waste management, climate change, pollution and loss of biodiversity (Appolloni *et al.*, 2023). In addition, ~~circular economy~~CE practices provide new perspectives for developing efficient strategies and methodologies for sustainable environmental management (Sundar *et al.*, 2023). ~~Circular economy~~CE practices are divided into three main dimensions, including internal environmental management (Schmidt *et al.*, 2021), environmentally friendly design (Zhu *et al.*, 2011)~~,~~ and company assets management and recovery (Zhu *et al.*, 2011). First, internal environmental management is the preparation of environmentally-oriented

procedures, such as green human resource management practices (Marrucci *et al.*, 2021; Bag *et al.*, 2021), training and development programs (Persis *et al.*, 2021), and environmental-based performance evaluation systems (Zhu *et al.*, 2011), and supporting organizational environmental objectives (Yadegaridehkordi *et al.*, 2023), building environmental ethics (York, 2009) and improving ecological performance (Lin *et al.*, 2015; Parker *et al.*, 2009; Pimenova and Van der Vorst, 2004). Second, eco-design describes the product design process considering environmental impacts (Lozano, 2012) and is an effective strategy to achieve eco-efficiency (Polverini, 2021; Dalhammar *et al.*, 2021). Therefore, product design must be environmentally oriented (Longo *et al.*, 2021). Apart from environmental efficiency, environmentally friendly design practices help companies to provide different products in the market (Dalhammar, 2016) and increase the global value proposition (Le Blévennec *et al.*, 2022). Third, the organizational assets management and recovery refers to the capability to recover investment (Schmidt *et al.*, 2021), resell (Susanty *et al.*, 2020), and recycle materials (Zhu *et al.*, 2011). For this reason, companies are required to implement strategies that mitigate emerging issues to gain greater value (Jain *et al.*, 2022), and it is a CEs substantial objective to be reached (Lieder and Rashid, 2016).

2.3 Green economic incentives (GEI)

~~Green economy incentives (~~GEI~~s)~~ from the government are needed by the organization to build and motivate pro-environmental behavior (Clemens, 2006) through financial (Ling and Xu, 2021) and supporting regulations (Parker *et al.*, 2009). Financial rewards support waste management (Ling and Xu, 2021), recycling, and resource efficiency (Rizos *et al.*, 2015), as well as environmentally oriented innovations (Pieroni *et al.*, 2019). Supporting regulatory incentives enhances environmentally-oriented product creation (Agustiono *et al.*, 2020) and promotes self-regulation (Lin *et al.*, 2015). Meanwhile, GEI strengthens internal capabilities (Singh *et al.*, 2018) and positively influences the internal organizational decision-making processes (Rizos *et al.*, 2015). Incentives through subsidies, environmental grants, loans, and tax concessions influence the behavior of owners/managers (Bradford and Fraser, 2008; Chang *et al.*, 2011) toward a ~~circular economy~~CE (Roxas and Coetzer, 2012). Similarly, the government, supported by marketing and procurement of recycled raw materials helps SMEs enhance in pro-environmental practices (Pimenova and Van der Vorst, 2004; Tsimoshynska *et al.*, 2021). Therefore, economic support strengthens internal capabilities (Prieto-Sandoval *et al.*, 2019), stimulating green-oriented commitments (Sezen and Çankaya, 2013; Chang *et al.*, 2011). Thus, the government's important role in supporting the transition process from a linear economy to a ~~circular economy~~CE is to provide financial support in the form of incentives to stakeholders (Sundar *et al.*, 2023). The ~~green economic incentive~~GEI can be allocated to carry out sustainable procurement. Thus, it will lead to product life cycle costs, sustainable oriented innovation (Koval *et al.*, 2023), return on social investment, reduction of waste, and the ability to produce environmentally friendly products (Shaikh *et al.*, 2023). The present study considered three indicators as green economy incentives determinants, namely (1) government subsidies and tax benefits (GSTB), (2) premium prices for green products (PP), and (3) cheaper recycled raw materials (CP).

2.4 Environmental commitment

A company must have an internal and external environmental orientation to protect the environment (Saleem *et al.*, 2021) and to design green strategies (Arsawan *et al.*, 2021; Bradford and Fraser, 2008), as evidenced in environmental saving actions (Singh *et al.*, 2014). In this case, ~~environmental commitment~~EC is an organization's ethical value in protecting the environment (Chang *et al.*, 2011) and green activities to reduce environmental degradation (Suryantini *et al.*, 2021), protecting business, society, and its ecology (Appolloni *et al.*, 2021; York, 2009). It is viewed as a strategic business orientation (Singh *et al.*, 2014) which reflects the company's sustainable business attitude (Green *et al.*, 2015). ~~Environmental commitment~~EC involves manner, behavior, perspectives, and economic benefits (Saleem *et al.*, 2021). Furthermore, Stone (2006) revealed the ~~environmental commitment~~EC role in increasing green awareness and responsibility (Saleem *et al.*, 2021), which led to organizational pro-environmental sustainability, enhanced business performance, and effective waste management (Singh *et al.*, 2016). However, considering the diversity of SMEs' effective implementation commitments (Parker *et al.*, 2009), environmental awareness is still low (Singh *et al.*, 2018) due to the assumption that waste management is not related to productivity (Saleem *et al.*, 2021; Parker *et al.*, 2009) and organizational profits (Bhupendra and Sangle, 2016). Therefore, the present study considered environmental products and processes (EPP) awareness ~~(EPP)~~, resource reuse and recycling (RRR), and environmental responsibility (ER) to measure the company's ~~environmental commitment~~ECs.

2.5 Hypothesis development

2.5.1 Green economic incentives and environmental commitment

The NRBV~~natural resource-based view~~ postulates that both orientations toward the environment and prevention of pollution are key for sustainable development (Hart, 1995). To be successful in this sustainable development, the government's involvement in implementing regulations (Fatimah *et al.*, 2020) and providing financial incentives is crucial (Botezat *et al.*, 2018). It means that GEI stimulates an organizational solution to increase ~~environmental commitment~~EC (Zhang *et al.*, 2013; Clemens, 2006). Furthermore, the important role of the government in making regulations related to providing green incentives will change the perspective of SME managers about the importance of contributing to saving the environment (Singh *et al.*, 2018). ~~Green economic incentive~~GEIs are allocated to build sustainable oriented innovation (Koval *et al.*, 2023), return on social investment, reduction of waste~~,~~ and the ability to produce environmentally friendly products (Shaikh *et al.*, 2023). Thus, green incentives have an impact on increasing ~~environmental commitment~~EC. Based on the above description, the following hypothesis is formulated:

H1. GEI has a significant positive effect on EC.

2.5.2 Green economic incentives and circular economy practices

Several studies revealed that green incentives provided through financial (Clemens, 2006) and non-financial (Ling and Xu, 2021) could be allocated to make the internal environment guidelines such as the procurement process or recruiting employees with environmental conservation knowledge (Marrucci *et al.*, 2021; Bag *et al.*, 2021), preparation of training and development programs aimed to save the environment (Persis *et al.*, 2021) and environmentally sustainable strategies (Green *et al.*, 2015). Furthermore, the ~~green economic incentive~~GEI is important in manufacturing of environmentally friendly products (Longo *et al.*, 2021; Lozano, 2012), enhancing environmental efficiency (Polverini, 2021). The green economy incentives increase the organization's internal capabilities for investment recovery (Schmidt *et al.*, 2021), reselling used materials and goods (Susanty *et al.*, 2020)~~,~~ and recycling materials (Zhu *et al.*, 2011), prolonging the product life cycle (Corona *et al.*, 2019). Consequently, the company adopts a better sustainability system (Lozano, 2012). Thus, by facilitating the adoption of ~~circular economy~~CE strategies, organizations will be able to meet growing consumer demands, balancing economic growth, profit orientation and sustainable environmental management (Appolloni *et al.*, 2021). This discussion leads to the following hypotheses in line with the NRBV~~natural resource-based view~~ (Hart, 1995).

H2. GEI positively affects IEM.

H3. GEI positively affects ED.

H4. GEI positively affects CAM&R.

2.5.3 Environmental commitment and circular economy practices

The NRBV~~natural resource-based view~~ (Hart, 1995) implies that ~~environmental commitment~~EC is considered the organization's first step in its role to save the environment for sustaining the development. It enhances the ~~circular economy~~CE, especially in the internal environmental management, including planning, drafting, implementing~~,~~ and evaluating the internal sustainable programs such as pollution prevention and waste reduction (Schmidt *et al.*, 2021) and quality environment management (Zhang and Ma, 2021; York, 2009). In addition, commitment to the environment triggers cross-functional collaboration for environmental improvement (Appolloni *et al.*, 2022; Parker *et al.*, 2009). The collaborative structure built aims to identify environmental needs and enhance strong interactions in the value chain (Shaikh *et al.*, 2023). Further, ~~environmental commitment~~EC is a starting point for SMEs to design energy-efficient products (Koval *et al.*, 2023), recyclable, safe raw materials~~,~~ and minimize waste (Schmidt *et al.*, 2021). Therefore, it can affect investment recovery, inventory effectiveness~~,~~ and sales of used goods and materials (Schmidt *et al.*, 2021). Based on the above description, the hypothesis is formulated as follows:

H5. EC positively affects IEM.

H6. EC positively affects ED.

H7. EC positively affects CAM&R.

2.5.4 Mediating role of environmental commitment

~~Green economy incentives (~~GEIs~~)~~ are significant in building organizational involvement and commitment to saving the environment. The government and non-governmental organizations benefit from adopting environmental initiatives (Singh *et al.*, 2018; Agnello *et al.*, 2015). Incentives include additional or financial rewards (Ling and Xu, 2021) that encourage organizations to design or implement environmental practices (Kahupi *et al.*, 2021). Previous studies stated that ~~green economic incentive~~GEIs are allocated to design policies related to sustainable innovation (Koval *et al.*, 2023), return on social investment, waste reduction~~,~~ and the ability to produce environmentally friendly products (Shaikh *et al.*, 2023) to provide added value economic, social and environmental (Gupta *et al.*, 2021; Yadegaridehkordi *et al.*, 2023). In addition, the incentive improves recycling techniques (Bag *et al.*, 2021) and facilitates the transition to a ~~circular economy~~CE (Ling and Xu, 2021). Also, green economy incentives enhance dynamic capabilities (Prieto-Sandoval *et al.*, 2019) that affect decision-making processes. However, some SMEs perceive that investing in the ~~circular economy~~CE increases costs more than the expected return (Rizos *et al.*, 2015). Consequently, the increasing ~~environmental commitment~~EC will motivate SME managers to implement a ~~circular economy~~CE (Kuo and Chang, 2021). Furthermore, the ~~environmental commitment~~EC will strengthen the internal capabilities of SMEs (Marrucci *et al.*, 2021; Bag *et al.*, 2021), manufacture environmentally-friendly designed products (Longo *et al.*, 2021)~~,~~ and improve asset recovery and investment capabilities (Schmidt *et al.*, 2021). Therefore, the green economy incentives will increase ~~environmental commitment~~EC and improve ~~circular economy~~CE practices in SMEs. This discussion suggests that, for sustaining the development using the natural resource-based (Hart, 1995), ~~environmental commitment~~EC has a key role in mediating the environmental effect on the circular practice modes. Thus, the following hypotheses are stated.

H8. ~~Environmental commitment~~EC partially mediates the relationship of ~~green economic incentive~~GEIs to internal environment management.

H9. ~~Environmental commitment~~EC partially mediates the relationship of ~~green economic incentive~~GEIs to eco-design.

H10. ~~Environmental commitment~~EC partially mediates the relationship between ~~green economic incentive~~GEIs on corporate asset management and recovery (CAM&R).

3. Methodology

The use of quantitative approaches such as surveys, statistics and structural modeling is intended to test the framework of the hypothesis or assess the relationship (correlation) between constructs (Appolloni *et al.*, 2022). In the social science context, this methodology has been used extensively, but a precise definition of the field of analysis is required (Sovacool *et al.*, 2018). Thus, to achieve the objectives of this study, a quantitative approach is relevant because it tests hypotheses based on structural equations.

3.1 Data and sampling method

The present study uses a quantitative approach by distributing questionnaires that focus on SME-producing companies (with 50–200 full-time employees), which are the essential sector of the Indonesian economy that still grows and develops (Arsawan *et al.*, 2022a; Parwita *et al.*, 2021). The population is 1,299 SMEs located in ~~9~~ nine regencies of Bali Province. A formula from Krejcie and Morgan (1970) was used to determine the sample frames, obtaining 297 SMEs. This selection was carried out using random sampling (lottery method). From the 297 SMEs, two respondents were recruited from each to fill out the research questionnaire. The total number of participants was 594 people including managers and assistant managers. The characteristics of SMEs were manufacturing, medical pharma/chemical, food, textile and woodcraft which is recommended by the government to reduce their production waste and carry out environmental conservation in a sustainable manner. Thus, the selection was triggered by assuming that they possess organizational characteristics and knowledge of ~~circular economy~~CE practices. Data were collected from March to June 2021 via email and Google Forms and direct visits by first sending email notifications on this study agenda. The 594 responses were analyzed to achieve the aims of the present study. Table 1 presents the population information, sample frame~~,~~ and the number of respondents.

Table 1

The table layout displayed in this section is not how it will appear in the final version. The representation below is solely purposed for providing corrections to the table. To preview the actual presentation of the table, please view the Proof.

Population and sample frame

No	SMEs business field (1)	Research population (2)	Population's percentage (3)	No of sample (4)	No of respondents (5)
1	Manufacturing	100	7.6	23	46
2	Medical pharma/chemical	171	13.2	39	78
3	Food	188	14.5	43	86
4	Textile	331	25.5	76	152
5	Woodcraft	405	31.2	92	184
6	Others	104	8.0	24	48
	Total	1.299	100	297	594

Table Footnotes

Source(s): Bali Central Bureau of Statistics, 2021

3.2 Measurement

The magnitude of the variable construct used was based on previous empirical studies. Therefore, the previous study measurement was adopted for the subject: SMEs in Bali Province over nine districts. The construct indicators assessment used a ~~7~~seven-point Likert scale, "1: strongly disagree to 7: strongly agree". In order to avoid ambiguity, the questionnaire (in Indonesian) was tested on 30 SME CEOs with knowledge of the ~~circular economy (~~CE~~)~~. The ~~green economic incentive (~~GEI~~)~~ variable was adopted from Singh *et al.* (2018) and Esfahbodi *et al.* (2016), consisting of 3 indicators. The ~~environmental commitment~~EC variable was adopted from Singh *et al.* (2018) and Liu and Bai (2014), consisting of ~~3~~ three indicators. In addition, the ~~circular economy~~CE-IEM was adopted from Schmidt *et al.* (2021) and Zhu *et al.* (2011), consisting of 8 indicators. The CE-ED variable was adopted from Schmidt *et al.* (2021) and Zhu *et al.* (2011) with ~~4~~ four indicators. Moreover, CE-CAM&R was adopted from Schmidt *et al.* (2021) and Zhu *et al.* (2011) with ~~3~~ three indicators.

The present study used the variance-based partial least squares to test the hypothesis (PLS-SEM) with Smart PLS 3.2.9 software. The PLS-SEM was used to assess the relationship between constructs and their predictive power on endogenous variables (Hair *et al.*, 2014). The present study validated the ~~circular economy~~CE practices model. The data ~~was~~ were not assessed as normally distributed data, making the ~~circular economy~~CE model assessment associated with ~~green economic incentive~~GEIs and ~~environmental commitment~~EC predictors using PLS-SEM appropriate (Hair *et al.*,2016a, b).

4. Results

Q7 Table 2 describes the characteristics of the 594 respondents (see Table 3).

Table 2

The table layout displayed in this section is not how it will appear in the final version. The representation below is solely purposed for providing corrections to the table. To preview the actual presentation of the table, please view the Proof.

Expand

Previous version

Characteristics of respondents

Criteria	Data	Frequency	Percentage

Updated version

Characteristics of respondents

Criteria	Data	Frequency	Percentage
Gender	Male	450	75.8
	Female	144	24.2
Age	21–30	39	6.6
	31–40	272	45.8
	41–50	238	40.1
	51–60	45	7.6
Educational level	Bachelor	550	92.6
	Master	38	6.4
	Doctoral	6	1.0
Experience (years)	<5	56	9.4
	6–10	157	26.4
	11–15	204	34.3
	16–20	134	22.6
	>21 or more	43	7.3
Position	General managers	305	51.3
	Assistant managers	289	48.7

Table Footnotes

Source(s): Authors calculation

Table 3

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Construct validity and reliability

Description	Loading	Cronbach's alpha	rho_A	Composite reliability	Average variance extracted (AVE)
Green Economic Incentives		0.848	0.847	0.908	0.768
The government provides subsidies and tax benefits for the implementation of CE practices (GSTB)	0.879				
Industrial/direct buyers are ready to pay a premium price for green products (PP)	0.930				
Availability of cheaper recycled raw material than virgin raw material (CP)	0.817				
Environmental Commitment		0.755	0.767	0.860	0.672

My firm considers the potential environmental consciousness of the product and production process (EPP)	0.877				
My firm reduces the use of virgin resources by emphasizing the reuse and recycling of EC resources (RRR)	0.821				
My firm values the environment and describes itself as an environmentally EC responsible firm (ER)	0.756				
Circular economy practices—Internal environmental management		0.860	0.873	0.891	0.507
Cross-functional cooperation for environmental improvements	0.803				
Special training for workers on environmental issues	0.762				
Total quality environmental management	0.671				
Existence of pollution prevention programs such as cleaner production	0.626				
Internal performance evaluation system incorporating environmental factors	0.652				
Generate environmental reports for internal evaluation	0.763				
Commitment to named practices from senior managers	0.773				
Support for named practices from mid-level managers	0.622				
Circular economy practices—Eco-design		0.839	0.850	0.892	0.675
Design of products for reduced consumption of materials/energy	0.761				
Design of products for reuse, recycling, and recovery of material parts	0.804				
Design of products to avoid or reduce the use of hazardous products	0.865				
Design of processes for minimization of waste	0.852				
Circular economy practices—Corporate asset management		0.777	0.782	0.871	0.693
Investment recovery (sale) of excess inventories/materials	0.886				
Sale of scrap and used materials	0.826				
Sale of excess capital equipment	0.782				

Table Footnotes

Source(s): Authors calculation

4.1 Measurement model

The VIFs test was used to evaluate the collinearity problem, scoring 2.872 (green economics incentives), 1.826 (~~environmental commitment~~EC), 3.558 (CE-Internal Environment Management), 1.832 (CE-Eco-Design)~~,~~ and 2.119 (CE-CAM&R~~Corporate Asset Management and Recovery~~). All VIF coefficients were lower than 5, which is the recommended limit value by Hair *et al.* (2016a) that the data do not have general variance problems. The outer model was tested to evaluate the reliability and validity of the construct variables. Table 2 shows that each item of factor loadings is more than 0.6. The convergent validity test explains that the validity requirements are met because the average extracted variance (AVE) is more than 0.5 and the factor loading is more than 0.6 (Hair *et al.*, 2016b). It shows that the discriminant validity conditions of all constructs have been met.

The Heterotrait-Monotrait Ratio (HTMT) assessed the discriminant constructs validity. According to Hair *et al.* (2016b) for this criteria, the value was lower than 0.9. Due to the values ranging from 0.384 to 0.701, the HTMT test showed

that discriminant validity was achieved. The composite reliability values in both samples were above the recommended level of 0.7; therefore, the construct was reliable.

4.2 Inner model measurement

The present study applied the bootstrap method with 5,000 samples to assess the research indicators and path coefficient's significance (Chin *et al.*, 2008). The results showed that the goodness-of-fit (GoF) model has a value of 0.367 which stated that the model is fit. In addition, testing on the standard residual root means square (SRMR) and normed fit index (NFI) shows that the SRMR value was 0.081 while the NFI was 0.716. The SRMR cut-off value was 0.8, and the NFI was below 0.9, which indicates that all criteria are met. The results showed that GEI explains EC by 0.268 (26.8%). The explanatory power of EC at CE-IEM was 0.347 (34.7%); at CE-ED, it was 0.224 (22.4%), and at CE-CAM&%R, it was 0.212 (21.2%). In addition, the value of Q^2 showed that all constructs have positive values and good predictive relevance (Chin, 2010).

4.3 Hypothesis testing

Table 4 shows the results of the relationship between green economics incentives (GEIs), environmental commitment (EC), internal environment management (CE-IEM), eco-design (CE-ED) and corporate asset management and recovery (CE-CAM&R). We use path coefficients (β), *t* values, and *p* values to test the hypotheses. According to Hair *et al.* (2016a,b), if the path coefficient is greater than 0.1, *t* value greater than 1.96, and 0.05 level of significance, the hypotheses are supported. The results support the significant role of GEI in achieving EC (H1) with CE-IEM (H2), CE-ED (H3), and CE-CAM&R (H4). Furthermore, EC has an important role in achieving CE-IEM (H5), CE-ED (H6), and CE-CAM&R (H7).

Table 4

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Path coefficients

Path (hypothesis)	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	*p* values	Remarks
- Green Economic Incentives → Environmental Commitment (H1)	0.518	0.520	0.036	14.202	0.000	Supported
- Green Economic Incentives → Internal environment management (H2)	0.326	0.326	0.048	6.795	0.000	Supported
- Green Economic Incentives → Eco Design (H3)	0.333	0.333	0.055	6.051	0.000	Supported
- Green Economic Incentives → Corporate Asset Management and Recovery (H4)	0.108	0.104	0.048	2.258	0.024	Supported
- Environmental Commitment → Internal Environment Management (H5)	0.351	0.353	0.042	8.292	0.000	Supported
- Environmental Commitment → Eco Design (H6)	0.205	0.207	0.042	4.855	0.000	Supported
- Environmental Commitment → Corporate Asset Management and Recovery (H7)	0.395	0.399	0.044	9.033	0.000	Supported

Table Footnotes

Source(s): Authors calculation

After examining the direct relationship, the next step was determining the mediating role as shown in Table 5. The present study tested three mediation patterns. According to Hair *et al.* (2014), the method used is to measure the VAF value < 0.20, meaning there is no mediation, while 0.20–0.80 indicates partial and the VAF value > 0.80 means full mediation. In order to test the model mediation effect, non-parametric bootstrap was used (Hair *et al.*, 2016a, b). Finally, variance values (VAF) were calculated to obtain indirect and total link sizes. When the VAF is greater than 80%, it shows full mediation; between 20 and 80% is partial; below 20% means no mediating effect (Hair *et al.*, 2013) (see Figure 1).

Table 5

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Testing of mediation effects

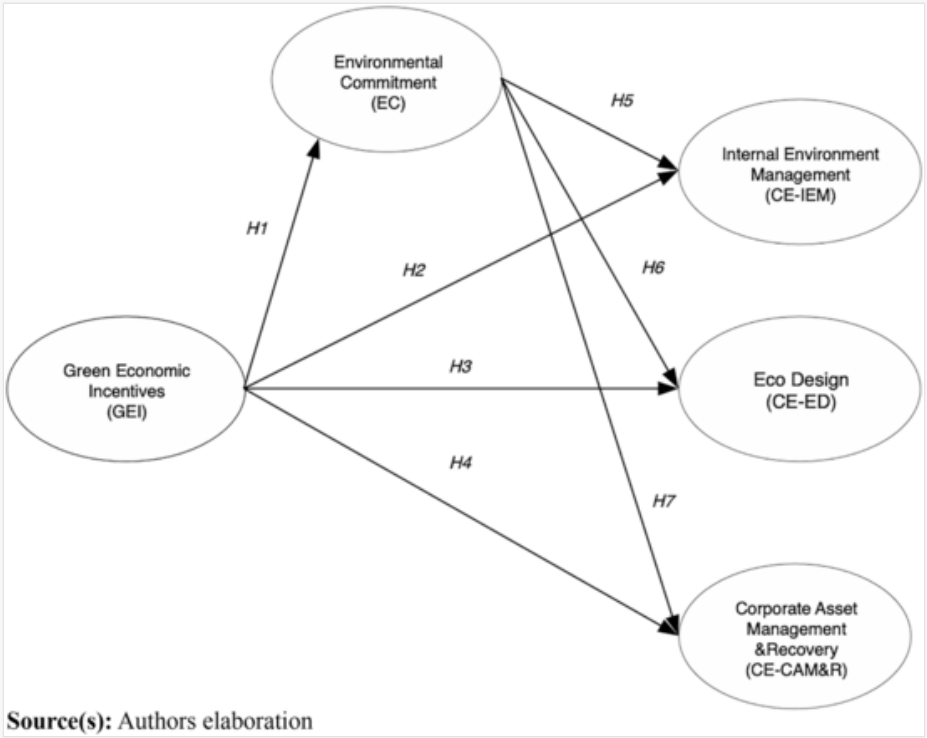
Link*	Mediator*	Independent variable-mediator	Mediator- dependent variable	Direct	Indirect	Total effect	VAF (%)	Decision
GEI-CE-IEM	EC	0.518	0.351	0.326	0.182	0.507	0.359	Partial mediation
GEI-CE-ED	EC	0.518	0.205	0.333	0.106	0.440	0.241	Partial mediation
GEI-CE-CAM&R	EC	0.518	0.395	0.108	0.205	0.313	0.655	Partial mediation

Table Footnotes

Source(s): Authors calculation

Images are optimised for fast web viewing. Click on the image to view the original version.

Figure 1



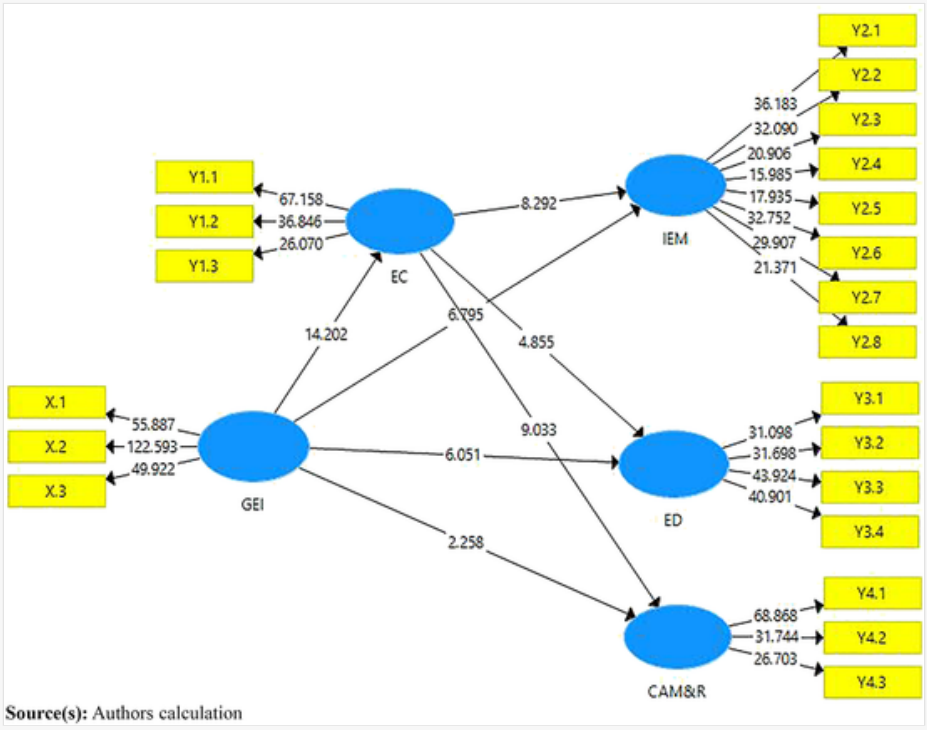
Source(s): Authors elaboration

Proposed conceptual framework

The mediating role in the causal relationship between GEI and CE-IEM, CE-ED, and CE-CAM&R was examined using VAF assays. This study tested three mediation pathways and concluded that ~~environmental commitment~~EC partially mediates the relationship between GEI and CE-IEM, where the VAF value is 35.90%, indicating that hypothesis 8 is accepted. EC also functions as a partial mediating relationship between GEI and CE-ED, with a VAF value of 24.10%, which means that hypothesis 9 is accepted. At the same time, EC functions as a partial mediating relationship between GEI and CE-CAM&R, with a VAF value of 65.50%, which means that hypothesis 10 is accepted (Figure 2).

Images are optimised for fast web viewing. Click on the image to view the original version.

Figure 2



Output analysis

4.4 Discussion and theoretical contribution

There is increased attention by policymakers, researchers, and practitioners, for ~~circular economy~~CE practices that can advance sustainable development goals (SDGs). Therefore, this study explained the mechanisms that SMEs can utilize to successfully implement ~~circular economy~~CE practices, including the role of GEI and EC. It complemented previous studies that failed to show antecedents for specific ~~circular economy~~CE practices (Green *et al.*, 2015; Liu *et al.*, 2018; Schmidt *et al.*, 2021). Furthermore, very few studies that exclusively focused on the direct relationship between GEI and the implementation of ~~circular economy~~CE practices. In contrast, this study showed that EC influences the relationship between GEI and three ~~circular economy~~CE practices in Indonesian SMEs, specifically internal environmental management, eco-design, and CAM&R.

This study contributed to the fourth folds' ~~circular economy~~CE literature and related theories. First, this study proposes and examines the supporting integration model of ~~green economic incentive~~GEIs and ~~environmental commitment~~EC in SMEs, where the combination of ~~green economic incentive~~GEIs and ~~environmental commitment~~EC is the key to building environmental sustainability. This new ~~circular economy~~CE practice model was found to have a good fit and explanatory power, so it confirms that the ~~green economic incentive~~GEIs and ~~environmental commitment~~EC constructs are generally accepted (Clemens, 2006; Lin *et al.*, 2015) is also an important driver of ~~circular economy~~CE practices for SMEs (Centobelli *et al.*, 2021). More specifically, ~~green economic incentive~~GEIs play an important role in

increasing ~~environmental commitment~~EC and, at the same time, encouraging SMEs to carry out ~~circular economy~~CE practices as an important activity in efforts to save the environment. Thus, the results prove that ~~green economic incentive~~GEIs and ~~environmental commitment~~EC form the basis for creating ~~circular economy~~CE practices in the SME sector.

This study assesses ~~circular economy~~CE practices by integrating ~~green economic incentive~~GEIs into the ~~circular economy~~CE practices model. The results of data analysis show that the ~~circular economy~~CE practices integration model for SMEs is appropriate. Furthermore, the inclusion of ~~environmental commitment~~EC in the ~~circular economy~~CE practices model increases the explanatory power of the ~~circular economy~~CE practices model. Conceptually, the results of this study strengthen the commitment-~~circular economy~~CE practices model (Saleem *et al.*, 2021; Schmidt *et al.*, 2021) in the SME sector. This finding shows that in SMEs, ~~green economic incentive~~GEIs can simultaneously strengthen the influence of ~~environmental commitment~~EC on ~~circular economy~~CE practices. Thus, the ~~circular economy~~CE practices model in the context of SMEs is conceptually expanded into a green incentives-commitment-~~circular economy~~CE practices model. Furthermore, these findings provide further evidence for the conclusions of previous studies (Galkina, 2021), which claim that ~~environmental commitment~~EC with environmentally oriented partner selection is an important determinant of strengthening future ~~circular economy~~CE practices for environmental saving efforts.

Second, the results revealed that ~~environmental commitment~~EC is a mediator of the relationship between ~~green economic incentive~~GEIs and internal environmental management (IEM), eco-design (ED)~~,~~ and ~~corporate asset management and recovery (~~CAM&R~~)~~. Although the three tested mediation relationships are significant, GEI-EC and asset management and recovery (CAM&R) have more influence. This result proved that SMEs strongly focus on resource recovery to develop enterprise asset management and recovery practices. It requires the involvement of purchasing managers in investment recovery practices (Betancourt Morales and Zartha Sossa, 2020) to recover investment (Schmidt *et al.*, 2021), resell (Susanty *et al.*, 2020)~~,~~ and recycle materials (Zhu *et al.*, 2011) through selective investment, excess inventory, sales of used goods and materials (Schmidt *et al.*, 2021). Thus, ~~small-medium enterprise~~SMEs must be concerned about inventory recovery practices and make it a serious concern for organizational sustainability, increasing productivity and innovation~~,~~ and environmental sustainability orientation.

Third, the ~~circular economy~~CE is an interesting topic for academics, policymakers~~,~~ and practitioners, but the literature is not thorough on how Indonesian SMEs can develop ~~circular economy~~CE practices. Most studies focused on the European context, whereas this study contributed to the ~~circular economy~~CE literature in developing countries and supported findings in the European context (Schmidt *et al.*, 2021). The results showed that GEI and EC influence the implementation of all three ~~circular economy~~CE practices. Furthermore, this is the first study linking GEI and EC as antecedents of ~~circular economy~~CE practice in an emerging country. In contrast, GEI is common in developed countries such as the USA (Clemens, 2006), India (Singh *et al.*, 2018)~~,~~ and Italy (Centobelli *et al.*, 2021). It is supported by Zhang *et al.* (2013), which stated that external references, such as financial incentives, affect organizational attitude and commitment to the ~~circular economy~~CE concept implementation (Centobelli *et al.*, 2021; Clemens, 2006). However, Singh *et al.* (2018) established that GEI does not affect building ~~environmental commitment~~EC. Overall, these findings have helped to the theory and generated evidence that incorporating the sub-constructs of ~~circular economy~~CE practice may not always work, especially for developed countries like Germany. In addition, these results provided practitioners with insights for implementing ~~circular economy~~CE practices in their companies.

Fourth, the present study enhanced the ~~natural resource-based view (~~NRBV~~)~~, describing the mechanisms that view GEI and EC as pollution prevention in ~~circular economy~~CE practices. The results showed that GEI and EC are translated in strategic orientation. The implementation of ~~circular economy~~CE practices can be affected by an organization's failure to commit to the environment. This study examined antecedents used to overcome these barriers (de Oliveira *et al.*, 2018). The finding contributed to the literature by integrating previous research on GEI (Centobelli *et al.*, 2021) and ~~environmental commitment~~EC (Galkina, 2021) as ~~circular economy~~CE practice implementation drivers. Notably, it showed that GEI could trigger the emergence of EC in ~~circular economy~~CE practices, positively affecting internal environmental management and eco-design and strengthening asset management and recovery. From a natural resource-based perspective, the results demonstrated the importance of companies building a commitment culture to implement ~~circular economy~~CE practices.

4.5 Managerial contribution

The governments and countries concerned about saving the environment must provide green economy subsidies, tax incentives, soft loans~~,~~ and subsidized materials to increase sustainable waste management strategies (Singh *et al.*, 2018; Mölemann, 2016). First, the regulations can strengthen the commitment and consistency of SMEs to saving the environment efforts (Kahupi *et al.*, 2021; Lin *et al.*, 2015; Roxas and Coetzer, 2012). Second, proper utilization of the government's ~~green economic incentive~~GEIs by SMEs managers will increase commitment to the environment. The GEI enabled SMEs to build a strong culture with higher trust in the environment, implement green actions for sustainable development~~,~~ and create innovative sustainable business models to increase economic growth. The incentives also influence the implementation of environmentally oriented standards and building environmental ethics. Furthermore, ~~green economic incentive~~GEIs facilitate SMEs' collaboration with large companies to achieve organizational sustainability, especially in the provision of raw materials~~,~~ and supply chains management. Such actions develop a strong attitude and increase the company's ~~environmental commitment~~EC to the ~~circular economy~~CE implementation.

4.6 Conclusion, limitations~~,~~ and further study

Most previous studies examined the ~~circular economy~~CE practices but did not focus on combining ~~green economic incentives (~~GEIs~~)~~ and ~~environmental commitment (~~EC~~)~~, especially in the SMEs sector. The ~~circular economy~~CE practice provides opportunities and encourages every country, industry~~,~~ and business entity to maintain sustainability and protect the environment jointly. The present study examines the role of ~~green economic incentive (~~GEI~~)~~ and ~~environmental commitment (~~EC~~)~~ on ~~circular economy~~CE practices (CE) in the SMEs sector.

Three important conclusions can be drawn from this study. First, ~~circular economy~~CE practices are complex constructions, which consist not only internal environmental management (IEM) and eco-design (ED), but also ~~corporate asset management and recovery (~~CAM&R~~)~~. Second, the role of the government in providing ~~green economic incentives (~~GEI~~)~~ has been proven to increase ~~environmental commitment~~EC, which in turn increases the practice of ~~circular economy~~CE as an effort to preserve the environment. Finally, ~~environmental commitment~~EC is a mediator of the relationship between GEI and CEP, where the most important path is through ~~corporate asset management and recovery (~~CAM&R~~)~~.

This study broadens our understanding of how GEI and EC impact ~~circular economy~~CE practices, especially in the SME sector, which can help SME managers, the government and related stakeholders to develop strategies for providing green incentives, both financial and non-financial. When we begin to study ~~circular economy~~CE practices in SMEs and the interest of ~~circular economy~~CE stakeholders in this issue will increase, further assessment of the ~~circular economy~~CE in SMEs is critical.

This study identified several limitations causing a gap for future studies. First, the study design used assistant managers and managers for information. Future studies can overcome this common method bias and choose a proper design. Second, this study focused on the mechanisms influencing the development of CE practices and assumed that GEI and EC are prerequisites for companies to implement this. Meanwhile, future studies can establish additional aspects that influence the proposed mechanism, such as environmental supply chain collaboration, or green strategies and green innovation. Third, previous studies, including this, focused on the antecedents of ~~circular economy~~CE practice in developed and developing countries. Therefore, future studies can therefore make comparisons to expand and generalize these findings by considering the differences in institutional contexts between countries.

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Circular Economy Practices in SMEs: Aligning Model of Green Economic Incentives and Environmental Commitment

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Circular Economy Practices in SMEs: Aligning Model of Green Economic Incentives and Environmental Commitment

Abstract

Purpose - The present study aimed to examine the relationship between green economic incentives and environmental commitment as drivers of the circular economy practices in Small and Medium Enterprises.

Design/methodology/approach -A cross-sectional study of 594 assistant managers and SME managers was used while data was analyzed through Smart PLS.

Findings - The results showed that green economic incentives positively affect the SMEs' environmental commitment and the circular economy practice model. Furthermore, environmental commitment is the mediator between green economic incentives and the three circular economy practices: internal environmental management, eco-design, and corporate asset management and recovery.

Originality - This study enhanced the natural resource-based view (NRBV), describing the mechanisms that view green economic incentives (GEI) and environmental commitment (EC) as pollution prevention in circular economy practice.

Practical implications - The present study provided a basis for understanding the relevance of SMEs' circular economy practices and designing a strategic plan for its implementation. Also, it provides insight into that collaboration between triple helix (the government, SMEs, and the community) is needed in increasing environmental awareness towards sustainability.

Keywords - Green economic incentives, environmental commitment, internal environmental management, eco-design, corporate asset management and recovery, circular economy practices

Paper type - Research paper

1 Introduction

The circular economy (CE) is an essential environmental strategy concept for waste minimization, nature recuperation (Bag *et al.*, 2021), sharpening environmental conservation, and efficient energy consumption for a sustainable business (Gupta et al., 2021; Arsawan et al., 2021) by paying

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great attention to the environment and resources (Korhonen *et al.*, 2018). As a result, industrial waste is a valuable input that can be repaired, reused, and recycled (Bag et al., 2021; Yadav et al., 2020). It leads to oriented and environmental value products, methods, and processes (Schroeder *et al.*, 2019). A circular economy approach benefits businesses and society with improved environmental awareness (Khan et al., 2021; Centobelli et al., 2021), lower resource price volatility, better customer relations, and job opportunities (Ellen MacArthur Foundation, 2013).

The circular economy is affected by the internal and external environment. Internal factors include behavior (Ling and Xu, 2021;Saleem et al., 2021), environmental commitment (Galkina, 2021;Lin et al., 2015), and organizational capabilities (Prieto-Sandoval et al., 2019;Singh et al., 2018). Meanwhile, government pro-environmental regulations and support are considered external factors for CE practices (Bhupendra and Sangle, 2016; Lozano, 2012). The present study aimed to address various gaps, including the unavailability of studies on the SMEs' readiness for the circular economy (Singh *et al.*, 2018). First, although it affects economic growth (Suryantini *et al.*, 2021), the role of SMEs in saving the environment needs to be examined (Saleem *et al.*, 2021). A supportive ecosystem should be maintained to build sustainability (Koval *et al.*, 2021) through green-oriented strategies and innovation optimization (Arsawan *et al.*, 2021). Second, CE has not been comprehensively studied, especially in the SMEs sector, due to limited behavior and internal resource capabilities (Luthra et al., 2022; Temminck et al., 2015). It can be an opportunity for SMEs to improve internal capabilities (Centobelli *et al.*, 2021) for effective green marketing and new markets creation and design process, and circular products and attract a value-oriented talent environment (Barros et al., 2021;Diaz et al., 2021). Third, Singh et al., (2018) showed that green economic incentives (GEI) do not contribute to building environmental commitment. However, the importance of green incentives in building environmental commitment was demonstrated by Centobelli et al., (2021). This divergence shows the need for more research on green economic incentives and environmental commitment to support SMEs' need for environmental self-regulation for environmental improvements (Lin et al., 2015; Ling and Xu, 2021).

The present study was motivated by the research gaps and examined the relationship between green economic incentives, environmental commitment, internal environmental management (CE-IEM), eco-design (CE-ED), corporate asset management, and recovery (CE-CAM&R) on SMEs in Indonesia for three reasons. First, Indonesia is a developing country with 63 million SMEs

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continuously growing, classified as 62 million medium enterprises and 750.000 small businesses, potentially boosting national economic growth (Surya *et al.*, 2021). Consequently, government regulations must sustain environmental attention (Nurdiana *et al.*, 2021). Second, CE is at an early implementation stage and faces many challenges, particularly infrastructure and regulation (Fatimah et al., 2020; Nurdiana et al., 2021). For that reason, the government's role and efforts are crucial in making consistent regulations (Rizos *et al.*, 2015), increasing commitment environment (Singh et al., 2016; Lin et al., 2015), and providing green economic incentives for its implementation (Centobelli et al., 2021; Singh et al., 2018). Three, data from Schwab and World Economic Forum-WEF, (2019) stated that this country lacks internal resources, particularly business dynamics capability, developing a sustainable innovation (Arsawan *et al.*, 2020). However, the innovations should be environmentally oriented and environmentally friendly technologies (Agnello *et al.*, 2015). Furthermore, the second part of this study is the literature review, which includes the hypotheses formulation, while the third and fourth describes the method and the analysis, respectively. Finally, the last part contains a discussion, theoretical and managerial contributions, conclusions, research limitations, and suggestions for further research.

2. Literature Review and Hypothesis Development

2.1 Natural Resource-Based View

Hart (1995) coined the natural resource-based view to extend the resource-based view (Barney, 1991). Three additions were suggested, including 1) environmental-oriented capabilities for enhanced organizational profitability, 2) pollution preventive action, and 3) product stewardship for reaching sustainable development (Hart, 1995). Pollution preventive action refers to effective waste and emissions management during the production process (Hart and Dowell, 2011). On the other side, product stewardship refers to the development of integrated design (Hart, 1995). Finally, sustainable development refers to a production configuration "sustained indefinitely into the future" (Hart and Dowell, 2011). The influence of NRBV was tested by Hart and Dowell (2011) and found that previous research only focused on pollution prevention capabilities, leaving the other two capabilities unexplored. Based on this, this study examined the three NRBV capabilities role, namely green economic incentives as an effort to take precautions (Hart and Dowell, 2011), environmental commitment, also known as an effort to build environmentally oriented products, product life cycle strategies for enhanced product stewardship (Green *et al.*, 2015) while the circular economy is a sustainable development implementation (Liu et al., 2018; Sarkis, 2012).

2.2 Circular Economy Practices in Small and Medium Enterprises

The present study considered circular economy practices that require SMEs to integrate ecological requirements, including efficiency and reduction of raw, recycling, reuse, and replacement of materials into organizational routine activities (Botezat et al., 2018;Masi *et al.*, 2017). Circular economy practices are divided into 3 main dimensions, including internal environmental management (Schmidt *et al.*, 2021), environmentally friendly design (Zhu *et al.*, 2011), and company assets management and recovery (Zhu *et al.*, 2011). First, internal environmental management is the preparation of environmentally-oriented procedures, such as green human resource management practices (Marrucci *et al.*, 2021;Bag *et al.*, 2021), training and development programs (Persis *et al.*, 2021), and environmental-based performance evaluation systems (Zhu *et al.*, 2011), and supporting organizational environmental objectives (Koval *et al.*, 2021), building environmental ethics (York, 2009) and improving ecological performance (Lin *et al.*, 2015; Parker *et al.*, 2009; Pimenova and Van der Vorst, 2004). Second, eco-design describes the product design process considering environmental impacts (Lozano, 2012) and is an effective strategy to achieve eco-efficiency (Polverini, 2021; Dalhammar *et al.*, 2021). Therefore, product design must be environmentally oriented (Longo *et al.*, 2021). Apart from environmental efficiency, environmentally friendly design practices help companies to provide different products in the market (Dalhammar, 2016) and increase the global value proposition (Blévennec *et al.*, 2022). Third, the organizational assets management and recovery refers to the capability to recover investment (Schmidt *et al.*, 2021), resell (Susanty *et al.*, 2020), and recycle materials (Zhu *et al.*, 2011). For this reason, companies are required to implement strategies that mitigate emerging issues to gain greater value (Jain *et al.*, 2022), and it is a CEs substantial objective to be reached (Lieder and Rashid, 2016).

2.3 Green Economic Incentives (GEI)

Green economy incentives (GEI) from the government are needed by the organization to build and motivate pro-environmental behavior (Clemens, 2006) through financial (Ling and Xu, 2021) and supporting regulations (Parker *et al.*, 2009). Financial rewards support waste management (Ling and Xu, 2021), recycling, and resource efficiency (Rizos *et al.*, 2015), as well as environmentally oriented innovations (Pieroni *et al.*, 2019). Supporting regulatory incentives enhances environmentally-oriented products creation (Agustiono *et al.*, 2020) and promotes self-regulation

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(Lin *et al.*, 2015). Meanwhile, GEI strengthens internal capabilities (Singh *et al.*, 2018) and positively influences the internal organizational decision-making processes (Rizos *et al.*, 2015). Incentives through subsidies, environmental grants, loans, and tax concessions influence the behavior of owners/managers (Bradford and Fraser, 2008; Chang *et al.*, 2011) toward a circular economy (Roxas and Coetzer, 2012). Similarly, the government, supported by marketing and procurement of recycled raw materials helps SMEs ~~to~~ enhance in pro-environmental practices (Pimenova and Van der Vorst, 2004; Tsimoshynska *et al.*, 2021). Therefore, economic support strengthens internal capabilities (Prieto-Sandoval *et al.*, 2019), stimulating green-oriented commitments (Sezen and Çankaya, 2013; Chang *et al.*, 2011). The present study considered three indicators as green economy incentives determinants, namely 1) government subsidies and tax benefits (GSTB), 2) premium prices for green products (PP), and 3) cheaper recycled raw materials (CP).

2.4 Environmental Commitment

A company must have an internal and external environmental orientation to protect the environment (Saleem *et al.*, 2021) and to design green strategies (Arsawan *et al.*, 2021;Bradford and Fraser, 2008), as evidenced in environmental saving actions (Singh *et al.*, 2014). In this case, environmental commitment is an organization's ethical value in protecting the environment (Chang *et al.*, 2011) and green activities to reduce environmental degradation (Suryantini *et al.*, 2021), protecting business, society, and its ecology (York, 2009). It is viewed as a strategic business orientation (Singh *et al.*, 2014) which reflects the company's sustainable business attitude (Green *et al.*, 2015). Environmental commitment involves manner, behavior, perspectives, and economic benefits (Saleem *et al.*, 2021). Furthermore, Stone (2006) revealed the environmental commitment role in increasing green awareness and responsibility (Saleem *et al.*, 2021), which led to organizational pro-environmental sustainability, enhanced business performance, and effective waste management (Singh *et al.*, 2016). However, considering the diversity of SMEs' effective implementation commitments (Parker *et al.*, 2009), environmental awareness is still low (Singh *et al.*, 2018) due to the assumption that waste management is not related to productivity (Saleem *et al.*, 2021;Parker *et al.*, 2009) and organizational profits (Bhupendra and Sangle, 2016). Therefore, the present study considered environmental products and processes awareness (EPP), resource reuse and recycling (RRR), and environmental responsibility (ER) to measure the company's environmental commitments.

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2.4 Hypothesis Development

The natural resource-based view (NRBV) postulates that both orientations toward the environment and prevention of pollution are key for sustainable development (Hart, 1995). To be successful in this sustainable development, the government's involvement in implementing regulations (Fatimah *et al.*, 2020) and providing financial incentives (Botezat *et al.*, 2018) is crucial. It means that GEI stimulates an organizational solution to increase environmental commitment (Zhang *et al.*, 2013);(Clemens, 2006). Furthermore, the important role of the government in making regulations related to providing green incentives will change the perspective of SME managers about the importance of contributing to saving the environment (Singh *et al.*, 2018). Thus, green incentives have an impact on increasing environmental commitment. Based on the above description, the following hypothesis is formulated:

H1: GEI has a significant positive effect on EC

Several studies revealed that green incentives provided through financial (Clemens, 2006) and non-financial (Ling and Xu, 2021) could be allocated to make the internal environment guidelines such as the procurement process or recruiting employees with environmental conservation knowledge (Marrucci *et al.*, 2021;Bag *et al.*, 2021), preparation of training and development programs aimed to save the environment (Persis *et al.*, 2021) and environmentally sustainable strategies (Green *et al.*, 2015). Furthermore, the green economic incentive is important in manufacturing of environmentally friendly products (Longo *et al.*, 2021; Lozano, 2012), enhancing environmental efficiency (Polverini, 2021). The green economy incentives increase the organization's internal capabilities for investment recovery (Schmidt *et al.*, 2021), reselling used materials and goods (Susanty *et al.*, 2020), and recycling materials (Zhu *et al.*, 2011), prolonging the product life cycle (Corona *et al.*, 2019). Consequently, the company adopts a better sustainability system (Lozano, 2012). This discussion leads to the following hypotheses in line with the natural resource-based view (Hart, 1995).

H2: GEI positively affects IEM

H3: GEI positively affects ED

H4: GEI positively affects CAM&R

The natural resource-based view (Hart, 1995) implies that environmental commitment is considered the organization's first step in its role to save the environment for sustaining the development. It enhances the circular economy, especially in the internal environmental management, including planning, drafting, implementing, and evaluating the internal sustainable programs such as pollution prevention and waste reduction (Schmidt *et al.*, 2021), building cross-functional collaboration for environmental improvement (Parker *et al.*, 2009), and quality environment management (Zhang and Ma, 2021; York, 2009). Further, environmental commitment is a starting point for SMEs to design energy-efficient products, recyclable, safe raw materials, and minimize waste (Schmidt *et al.*, 2021). Therefore, it can affect investment recovery, inventory effectiveness, and sales of used goods and materials (Schmidt *et al.*, 2021). Based on the above description, the hypothesis is formulated as follows:

H5: EC positively affects IEM.

H6: EC positively affects ECO

H7: EC positively affects CAM&R

Green economy incentives (GEI) are significant in building organizational involvement and commitment to saving the environment. The government and non-governmental organizations benefit from adopting environmental initiatives (Singh *et al.*, 2018;Agnello *et al.*, 2015). Incentives include additional or financial rewards (Ling and Xu, 2021) that encourage organizations to design or implement environmental practices (Kahupi *et al.*, 2021). In addition, the incentive improves recycling techniques (Bag *et al.*, 2021) and facilitates the transition to a circular economy (Ling and Xu, 2021). Also, green economy incentives enhance dynamic capabilities (Prieto-Sandoval *et al.*, 2019) that affect decision-making processes (Diaz *et al.*, 2021). However, some SMEs perceive that investing in the circular economy increases costs more than the expected return (Rizos *et al.*, 2015). Consequently, the increasing environmental commitment will motivate SME managers to implement a circular economy (Kuo and Chang, 2021). Furthermore, the environmental commitment will strengthen the internal capabilities of SMEs (Marrucci *et al.*, 2021; Bag *et al.*, 2021), manufacture environmentally-friendly designed products (Longo *et al.*, 2021), and improve asset recovery and investment capabilities (Schmidt *et al.*, 2021). Therefore, the green economy incentives will increase environmental commitment and improve circular economy practices in SMEs. This discussion suggests that, for sustaining the development using the natural resource-

based (Hart, 1995), environmental commitment has a key role in mediating the environmental effect on the circular practice modes. Thus, the following hypotheses are stated.

H8: Environmental commitment partially mediates the relationship of green economic incentives to internal environment management

H9: Environmental commitment partially mediates the relationship of green economic incentives to eco-design

H10: Environmental commitment partially mediates the relationship between green economic incentives on corporate asset management and recovery

Insert Figure 1

3 Methodology

3.1 Data and Sampling Method

The present study uses a quantitative approach by distributing questionnaires that focus on SME-producing companies (with 50–200 full-time employees), which are the essential sector of the Indonesian economy that still-grows and develops (Surya *et al.*, 2021). The population is 1,299 SMEs located in 9 regencies of Bali Province. A formula from Krejcie and Morgan (1970) was used to determine the sample frames, obtaining 297 SMEs. This selection was carried out using random sampling (lottery method). From the 297 SMEs, two respondents were recruited from each to fill out the research questionnaire. The total number of participants was 594 people including managers and assistant managers. Their selection was triggered by assuming that they possess organizational characteristics and knowledge of circular economy practices. Data were collected from March to June 2021 via email and Google Forms and direct visits by first sending email notifications on this study agenda. The 594 responses were analyzed to achieve the aims of the present study. Table 1 presents the population information, sample frame, and the number of respondents.

Insert Table 1

3.2 Measurement

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The magnitude of the variable construct used was based on previous empirical studies. Therefore, the previous study measurement was adopted for the subject: SMEs in Bali Province over nine districts. The construct indicators assessment used a 7-point Likert scale, "1: strongly disagree to 7: strongly agree". In order to avoid ambiguity, the questionnaire (in Indonesian) was tested on 30 SME CEOs with knowledge of the circular economy (CE). The green economic incentive (GEI) variable was adopted from Singh *et al.*, (2018); Esfahbodi *et al.*, (2016), consisting of 3 indicators. The environmental commitment variable was adopted from Singh *et al.*, 2018; Liu and Bai, 2014, consisting of 3 indicators. In addition, the circular economy-IEM was adopted from Schmidt *et al.*, 2021) and Zhu *et al.*, (2011), consisting of 8 indicators. The CE-ED variable was adopted from Schmidt *et al.*, (2021); Zhu *et al.*, (2011) with 4 indicators. Moreover, CE-CAM&R was adopted from Schmidt *et al.*, (2021) and Zhu *et al.*, (2011) with 3 indicators.

The present study used the variance-based partial least squares to test the hypothesis (PLS-SEM) with Smart PLS 3.2.9 software. The PLS-SEM was used to assess the relationship between constructs and their predictive power on endogenous variables (Hair *et al.*, 2014). The present study validated the circular economy practices model. The data was not assessed as normally distributed data, making the circular economy model assessment associated with green economic incentives and environmental commitment predictors using PLS-SEM appropriate (Hair *et al.*, 2016).

4. Results

Table 2 describes the characteristics of the 594 respondents.

Insert Table 2

4.1 Measurement Model

The VIFs test was used to evaluate the collinearity problem, scoring 2.872 (green economics incentives), 1.826 (environmental commitment), 3,558 (CE-Internal Environment Management), 1.832 (CE-Eco-Design), and 2.119 (CE-Corporate Asset Management and Recovery). All VIF coefficients were lower than 5, which is the recommended limit value by Hair *et al.*, (2016) that

the data do not have general variance problems. The outer model was tested to evaluate the reliability and validity of the construct variables. Table 2 shows that each item of factor loadings is more than 0.6. The convergent validity test explains that the validity requirements are met because the average extracted variance (AVE) is more than 0.5 and the factor loading is more than 0.6 (Hair Jr *et al.*, 2016). It shows that the discriminant validity conditions of all constructs have been met.

Insert Table 3

The Heterotrait-Monotrait Ratio (HTMT) assessed the discriminant constructs validity. According to Hair Jr *et al.*, (2016), for this criteria, the value was lower than 0.9. Due to the values ranging from 0.384 to 0.701, the HTMT test showed that discriminant validity was achieved. The composite reliability values in both samples were above the recommended level of 0.7; therefore, the construct was reliable.

4.2 Inner Model Measurement

The present study applied the bootstrap method with 5000 samples to assess the research indicators and path coefficient's significance (Chin *et al.*, 2008). The results showed that the goodness-of-fit (GoF) model has a value of 0.367 which stated that the model is fit. In addition, testing on the standard residual root means square (SRMR) and normed fit index (NFI) shows that the SRMR value was 0.081 while the NFI was 0.716. The SRMR cut-off value was 0.8, and the NFI was below 0.9, which indicates that all criteria are met. The results showed that GEI explains EC by 0.268 (26.8%). The explanatory power of EC at CE-IEM was 0.347 (34.7%); at CE-ED, it was 0.224 (22.4%), and at CE-CAM%R, it was 0.212 (21.2%). In addition, the value of Q^2 showed that all constructs have positive values and good predictive relevance (Chin, 2010).

4.3 Hypothesis Testing

Table 4 shows the results of the relationship between green economics incentives (GEI), environmental commitment (EC), internal environment management (CE-IEM), eco-design (CE-ED) and corporate asset management and recovery (CE-CAM&R). We use path coefficients (β), t values, and p values to test the hypotheses. According to Hair *et al.*, (2016), if the path coefficient is greater than 0.1, t value greater than 1.96, and 0.05 level of significance, the hypotheses are

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supported. The results support the significant role of GEI in achieving EC (H_1) with CE-IEM (H_2), CE-ED (H_3), and CE-CAM&R (H_4). Furthermore, EC has an important role in achieving CE-IEM (H_5), CE-ED (H_6), and CE-CAM&R (H_7).

Insert Table 4

Insert Table 5

After examining the direct relationship, the next step was determining the mediating role as shown in Table 5. The present study tested three mediation patterns. According to Hair *et al.*, (2014), the method used is to measure the VAF value < 0.20, meaning there is no mediation, while 0.20-0.80 indicates partial and the VAF value > 0.80 means full mediation. In order to test the model mediation effect, non-parametric bootstrap was used (Hair *et al.*, 2016). Finally, variance values (VAF) were calculated to obtain indirect and total link sizes. When the VAF is greater than 80%, it shows full mediation; between 20 and 80% is partial; below 20% means no mediating effect (Hair *et al.*, 2013).

The mediating role in the causal relationship between GEI and CE-IEM, CE-ED, and CE-CAM&R was examined using VAF assays. This study tested three mediation pathways and concluded that environmental commitment partially mediates the relationship between GEI and CE-IEM, where the VAF value is 35.90%, indicating that hypothesis 8 is accepted. EC also functions as a partial mediating relationship between GEI and CE-ED, with a VAF value of 24.10%, which means that hypothesis 9 is accepted. At the same time, EC functions as a partial mediating relationship between GEI and CE-CAM&R, with a VAF value of 65.50%, which means that hypothesis 10 is accepted (Figure 2).

Insert Figure 2

5.1 Discussion and Theoretical Contribution

There is increased attention by policymakers, researchers, and practitioners, for circular economy practices that can advance sustainable development goals (SDGs). Therefore, this study explained

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the mechanisms that SMEs can utilize to successfully implement circular economy practices, including the role of GEI and EC. It complemented previous studies that failed to show antecedents for specific circular economy practices (Green *et al.*, 2015); (Schmidt *et al.*, 2021); (Liu *et al.*, 2018). Furthermore, very few studies that exclusively focused on the direct relationship between GEI and the implementation of circular economy practices. In contrast, this study showed that EC influences the relationship between GEI and three circular economy practices in Indonesian SMEs, specifically internal environmental management, eco-design, and CAM&R.

This study contributed to the fourth folds' circular economy literature and related theories. First, this study proposes and examines the supporting integration model of green economic incentives and environmental commitment in SMEs, where the combination of green economic incentives and environmental commitment is the key to building environmental sustainability. This new circular economy practice model was found to have a good fit and explanatory power, so it confirms that the green economic incentives and environmental commitment constructs are generally accepted (Clemens, 2006; Lin *et al.*, 2015) is also an important driver of circular economy practices for SMEs (Centobelli *et al.*, 2021). More specifically, green economic incentives play an important role in increasing environmental commitment and, at the same time, encouraging SMEs to carry out circular economy practices as an important activity in efforts to save the environment. Thus, the results prove that green economic incentives and environmental commitment form the basis for creating circular economy practices in the SME sector.

This study assesses circular economy practices by integrating green economic incentives into the circular economy practices model. The results of data analysis show that the circular economy practices integration model for SMEs is appropriate. Furthermore, the inclusion of environmental commitment in the circular economy practices model increases the explanatory power of the circular economy practices model. Conceptually, the results of this study strengthen the commitment-circular economy practices model (Saleem *et al.*, 2021; Schmidt *et al.*, 2021) in the SME sector. This finding shows that in SMEs, green economic incentives can simultaneously strengthen the influence of environmental commitment on circular economy practices. Thus, the circular economy practices model in the context of SMEs is conceptually expanded into a green incentives-commitment-circular economy practices model. Furthermore, these findings provide further evidence for the conclusions of previous studies (Galkina, 2021), which claim that

environmental commitment with environmentally oriented partner selection is an important determinant of strengthening future circular economy practices for environmental saving efforts.

Second, the results revealed that environmental commitment is a mediator of the relationship between green economic incentives and internal environmental management (IEM), eco-design (ED), and corporate asset management and recovery (CAM&R). Although the three tested mediation relationships are significant, GEI-EC and asset management and recovery (CAM&R) have more influence. This result proved that SMEs strongly focus on resource recovery to develop enterprise asset management and recovery practices. It requires the involvement of purchasing managers in investment recovery practices (Betancourt Morales and Zartha Sossa, 2020) to recover investment (Schmidt *et al.*, 2021), resell (Susanty *et al.*, 2020), and recycle materials (Zhu *et al.*, 2011) through selective investment, excess inventory, sales of used goods and materials (Schmidt *et al.*, 2021). Thus, small-medium enterprises must be concerned about inventory recovery practices and make it a serious concern for organizational sustainability, increasing productivity and innovation, and environmental sustainability orientation.

Third, the circular economy is an interesting topic for academics, policymakers, and practitioners, but the literature is not thorough on how Indonesian SMEs can develop circular economy practices. Most studies focused on the European context, whereas this study contributed to the circular economy literature in developing countries and supported findings in the European context (Schmidt *et al.*, 2021). The results showed that GEI and EC influence the implementation of all three circular economy practices. Furthermore, this is the first study linking GEI and EC as antecedents of circular economy practice in an emerging country. In contrast, GEI is common in developed countries such as the US (Clemens, 2006), India (Singh *et al.*, 2018), and Italy (Centobelli *et al.*, 2021). It is supported by Zhang *et al.*, (2013), which stated that external references, such as financial incentives, affect organizational attitude and commitment to the circular economy concept implementation (Centobelli *et al.*, 2021; Clemens, 2006). However, Singh *et al.*, (2018) established that GEI does not affect building environmental commitment. Overall, these findings have helped to the theory and generated evidence that incorporating the sub-constructs of circular economy practice may not always work, especially for developed countries like Germany. In addition, these results provided practitioners with insights for implementing circular economy practices in their companies.

Fourth, the present study enhanced the natural resource-based view (NRBV), describing the mechanisms that view GEI and EC as pollution prevention in circular economy practice. The results showed that GEI and EC are translated in strategic orientation. The implementation of circular economy practices can be affected by an organization's failure to commit to the environment. This study examined antecedents used to overcome these barriers (de Oliveira *et al.*, 2018). The finding contributed to the literature by integrating previous research on GEI (Centobelli *et al.*, 2021) and environmental commitment (Galkina, 2021) as circular economy practice implementation drivers. Notably, it showed that GEI could trigger the emergence of EC in circular economy practices, positively affecting internal environmental management and eco-design and strengthening asset management and recovery. From a natural resource-based perspective, the results demonstrated the importance of companies building a commitment culture to implement circular economy practices.

5.2 Managerial Contribution

The governments and countries concerned about saving the environment must provide green economy subsidies, tax incentives, soft loans, and subsidized materials to increase sustainable waste management strategies (Singh *et al.*, 2018; Möllemann, 2016). First, the regulations can strengthen the commitment and consistency of SMEs to saving the environment efforts (Kahupi *et al.*, 2021;Lin *et al.*, 2015; Roxas and Coetzer, 2012). Second, proper utilization of the government's green economic incentives by SMEs managers will increase commitment to the environment. The GEI enabled SMEs to build a strong culture with higher trust in the environment, implement green actions for sustainable development, and create innovative sustainable business models to increase economic growth. The incentives also influence the implementation of environmentally oriented standards and building environmental ethics. Furthermore, green economic incentives facilitate SMEs' collaboration with large companies to achieve organizational sustainability, especially in the provision of raw materials, and supply chains management. Such actions develop a strong attitude and increases the company's environmental commitment to the circular economy implementation.

5.3 Conclusion, Limitations, and Further Study

Most previous studies examined the circular economy practices but did not focus on combining green economic incentives (GEI) and environmental commitment (EC), especially in the SMEs sector. The circular economy practice provides opportunities and encourages every country, industry, and business entity to maintain sustainability and protect the environment jointly. The present study examines the role of green economic incentive (GEI) and environmental commitment (EC) on circular economy practices (CE) in the SMEs sector.

Three important conclusions can be drawn from this study. First, circular economy practices are complex constructions, which consist not only internal environmental management (IEM) and eco-design (ED), but also corporate asset management and recovery (CAM&R). Second, the role of the government in providing green economic incentives (GEI) has been proven to increase environmental commitment, which in turn increases the practice of circular economy as an effort to preserve the environment. Finally, environmental commitment is a mediator of the relationship between GEI and CEP, where the most important path is through corporate asset management and recovery (CAM&R).

This study broadens our understanding of how GEI and EC impact ~~on~~ circular economy practices, especially in the SME sector, which can help SME managers, the government and related stakeholders to develop strategies for providing green incentives, both financial and non-financial. When we begin to study circular economy practices in SMEs and the interest of circular economy stakeholders in this issue will increase, further assessment of the circular economy in SMEs is critical.

This study identified several limitations causing a gap for future studies. First, the study design used assistant managers and managers for information. Future studies can overcome this common method bias and choose a proper design. Second, this study focused on the mechanisms influencing the development of CE practices and assumed that GEI and EC are prerequisites for companies to implement this. Meanwhile, future studies can establish additional aspects that influence the proposed mechanism, such as environmental supply chain collaboration, or green strategies and green innovation. Third, previous studies, including this, focused on the antecedents of circular economy practice in developed and developing countries. Therefore, future studies can

therefore make comparisons to expand and generalize these findings by considering the differences in institutional contexts between countries.

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Table

Table 1. Population and Sample Frame

No	SMEs Business Field (1)	Research Population (2)	Population's percentage (3)	No. of Sample (4)	No. of Respondents (5)
1	Manufacturing	100	7.6	23	46
2	Medical pharma/chemical	171	13.2	39	78
3	Food	188	14.5	43	86
4	Textile	331	25.5	76	152
5	Woodcraft	405	31.2	92	184
6	Others	104	8.0	24	48
	Total	1.299	100	297	594

Table 2. Characteristics of Respondents

Criteria	Data	Frequency	Percentage
Gender	Male	450	75,8
	Female	144	24,2
Age	21-30	39	6,6
	31-40	272	45,8
	41-50	238	40,1
	51-60	45	7,6
Educational level	Bachelor	550	92,6
	Master	38	6,4
	Doctoral	6	1,0
Experience (years)	<5	56	9,4
	6-10	157	26,4
	11-15	204	34,3
	16-20	134	22,6
	>21 or more	43	7,3
Position	General managers	305	51,3
	Assistant managers	289	48,7

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Table 3. Construct Validity and Reliability

Description	Loading	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Green Economic Incentives		0.848	0.847	0,908	0,768
The government provides subsidies and tax benefits for the implementation of CE practices (GSTB).	0,879				
Industrial/direct buyers are ready to pay a premium price for green products (PP)	0,930				
Availability of cheaper recycled raw material than virgin raw material (CP)	0,817				
Environmental Commitment		0.755	0.767	0,860	0,672
My firm considers the potential environmental consciousness of the product and production process (EPP).	0,877				
My firm reduces the use of virgin resources by emphasizing the reuse and recycling of EC resources (RRR).	0,821				
My firm values the environment and describes itself as an environmentally EC responsible firm (ER).	0,756				
Circular economy practices—Internal environmental management		0.860	0.873	0,891	0,507
Cross-functional cooperation for environmental improvements	0,803				
Special training for workers on environmental issues	0,762				
Total quality environmental management	0,671				
Existence of pollution prevention programs such as cleaner production	0,626				
Internal performance evaluation system incorporating environmental factors	0,652				
Generate environmental reports for internal evaluation	0,763				
Commitment to named practices from senior managers	0,773				
Support for named practices from mid-level managers	0,622				
Circular economy practices—Eco-design		0.839	0.850	0,892	0,675
Design of products for reduced consumption of materials/energy	0,761				
Design of products for reuse, recycling, and recovery of material parts	0,804				
Design of products to avoid or reduce the use of hazardous products	0,865				
Design of processes for minimization of waste	0,852				
Circular economy practices—Corporate asset management		0.777	0.782	0,871	0,693
Investment recovery (sale) of excess inventories/materials	0,886				
Sale of scrap and used materials	0,826				
Sale of excess capital equipment	0,782				

Table 4. Path Coefficients

Path (Hypothesis)	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Remarks
- Green Economic Incentives -> Environmental Commitment (H1)	0.518	0.520	0.036	14.202	0.000	Supported
- Green Economic Incentives -> Internal environment management (H2)	0.326	0.326	0.048	6.795	0.000	Supported
- Green Economic Incentives -> Eco Design (H3)	0.333	0.333	0.055	6.051	0.000	Supported

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- Green Economic Incentives -> Corporate Asset Management and Recovery (H4)	0.108	0.104	0.048	2.258	0.024	Supported
- Environmental Commitment -> Internal Environment Management (H5)	0.351	0.353	0.042	8.292	0.000	Supported
- Environmental Commitment -> Eco Design (H6)	0.205	0.207	0.042	4.855	0.000	Supported
- Environmental Commitment -> Corporate Asset Management and Recovery (H7)	0.395	0.399	0.044	9.033	0.000	Supported

Table 5. Testing of mediation effects

Link*	Mediator*	Independent Variable-Mediator	Mediator-Dependent Variable	Direct	Indirect	Total effect	VAF (%)	Decision
GEI-CE-IEM	EC	0.518	0.351	0.326	0.182	0.507	0.359	Partial mediation
GEI-CE-ED	EC	0.518	0.205	0.333	0.106	0.440	0.241	Partial mediation
GEI-CE-CAM&R	EC	0.518	0.395	0.108	0.205	0.313	0.655	Partial mediation

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Figure

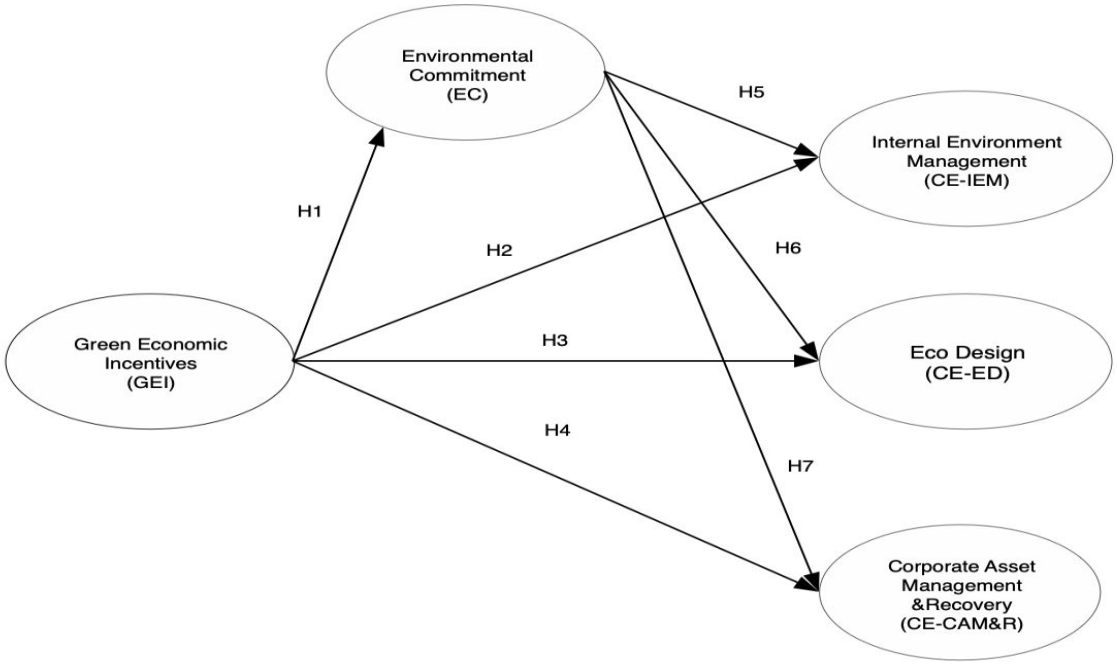

Figure 1. Proposed Conceptual Framework

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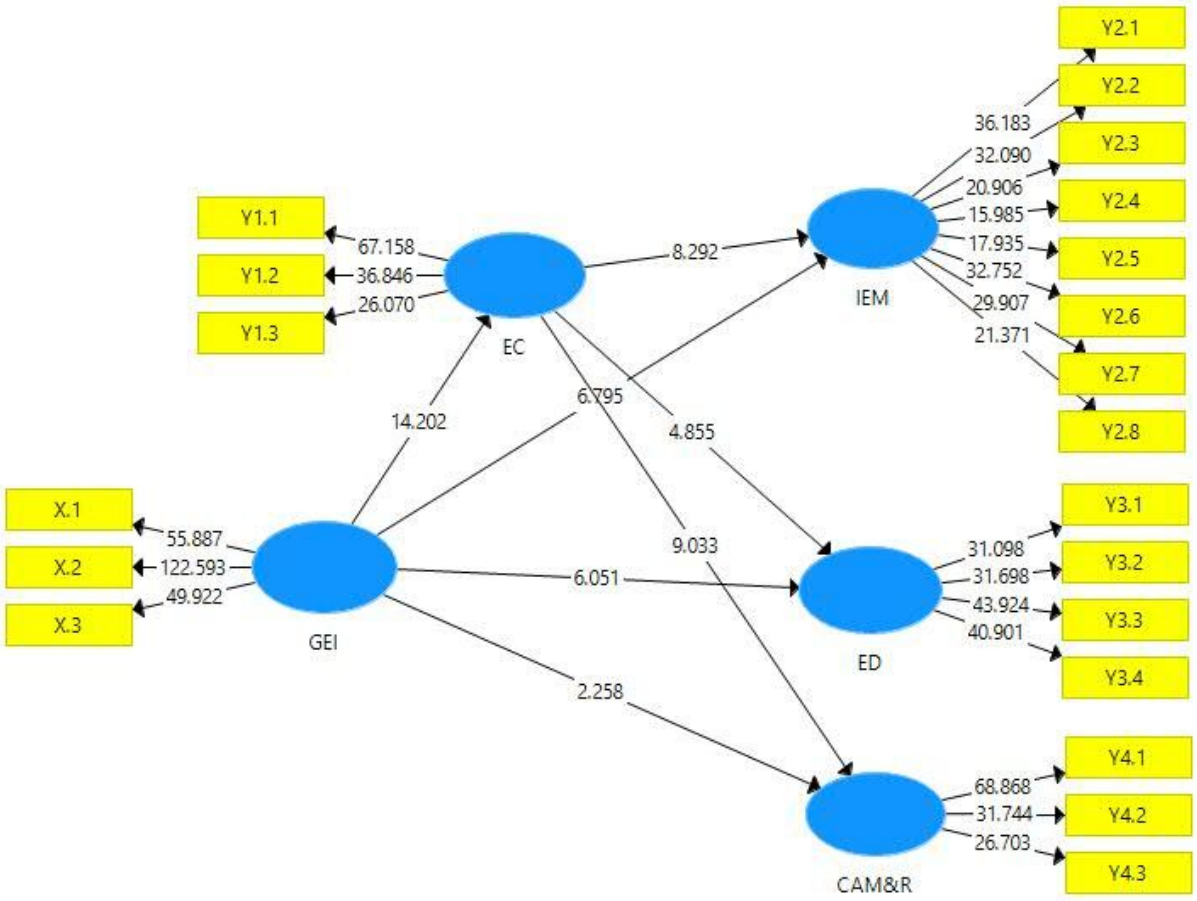

Figure 2. Output analysis

and Performance Management

Circular Economy Practices in SMEs: Aligning Model of Green Economic Incentives and Environmental Commitment

Abstract

Purpose - The present study aimed to examine the relationship between green economic incentives and environmental commitment as drivers of the circular economy practices in Small and Medium Enterprises.

Design/methodology/approach -A cross-sectional study of 594 assistant managers and SME managers was used while data was analyzed through Smart PLS.

Findings - The results showed that green economic incentives positively affect the SMEs' environmental commitment and the circular economy practice model. Furthermore, environmental commitment is the mediator between green economic incentives and the three circular economy practices: internal environmental management, eco-design, and corporate asset management and recovery.

Originality - This study enhanced the natural resource-based view (NRBV), describing the mechanisms that view green economic incentives (GEI) and environmental commitment (EC) as pollution prevention in circular economy practice.

Practical implications - The present study provided a basis for understanding the relevance of SMEs' circular economy practices and designing a strategic plan for its implementation. Also, it provides insight into that collaboration between triple helix (the government, SMEs, and the community) is needed in increasing environmental awareness towards sustainability.

Keywords - Green economic incentives, environmental commitment, internal environmental management, eco-design, corporate asset management and recovery, circular economy practices

Paper type - Research paper

1 Introduction

The circular economy (CE) is an essential environmental strategy concept for waste minimization, nature recuperation (Bag *et al.*, 2021), sharpening environmental conservation, and efficient energy consumption for a sustainable business (Gupta et al., 2021; Arsawan et al., 2021) by paying

great attention to the environment and resources (Korhonen *et al.*, 2018). As a result, industrial waste is a valuable input that can be repaired, reused, and recycled (Bag et al., 2021; Yadav et al., 2020). It leads to oriented and environmental value products, methods, and processes (Schroeder *et al.*, 2019). A circular economy approach benefits businesses and society with improved environmental awareness (Khan et al., 2021; Centobelli et al., 2021), lower resource price volatility, better customer relations, and job opportunities (Ellen MacArthur Foundation, 2013).

The circular economy is affected by the internal and external environment. Internal factors include behavior (Ling and Xu, 2021;Saleem et al., 2021), environmental commitment (Galkina, 2021;Lin et al., 2015), and organizational capabilities (Prieto-Sandoval et al., 2019;Singh et al., 2018). Meanwhile, government pro-environmental regulations and support are considered external factors for CE practices (Bhupendra and Sangle, 2016; Lozano, 2012). The present study aimed to address various gaps, including the unavailability of studies on the SMEs' readiness ~~of~~ for the circular economy (Singh *et al.*, 2018). First, although it affects economic growth (Suryantini *et al.*, 2021), the role of SMEs in saving the environment needs to be examined (Saleem *et al.*, 2021). A supportive ecosystem should be maintained to build sustainability (Koval *et al.*, 2021) through green-oriented strategies and innovation optimization (Arsawan *et al.*, 2021). Second, CE has not been comprehensively studied, especially in the SMEs sector, due to limited behavior and internal resource capabilities (Luthra et al., 2022; Temminck et al., 2015). It can be an opportunity for SMEs to improve internal capabilities (Centobelli *et al.*, 2021) for effective green marketing and new markets creation and design process, and circular products and attract a value-oriented talent environment (Barros et al., 2021;Diaz et al., 2021). Third, ~~the results from~~ Singh et al., (2018) showed that green economic incentives (GEI) do not contribute to building environmental commitment. However, the importance of green incentives in building environmental commitment was demonstrated by Centobelli et al., (2021). This divergence shows the need for more research on green economic incentives and environmental commitment to support SMEs' need for environmental self-regulation for environmental improvements (Lin et al., 2015; Ling and Xu, 2021).

The present study was motivated by the research gaps and examined the relationship between green economic incentives, environmental commitment, internal environmental management (CE-IEM), eco-design (CE-ED), corporate asset management, and recovery (CE-CAM&R) on SMEs

in Indonesia for three reasons. First, Indonesia is a developing country with 63 million SMEs continuously growing, classified as 62 million medium enterprises and 750.000 small businesses, potentially boosting national economic growth (Surya *et al.*, 2021). Consequently, government regulations ~~are needed to~~ must sustain environmental attention (Nurdiana *et al.*, 2021). Second, CE is at an early implementation stage and faces many challenges, particularly infrastructure and regulation (Fatimah et al., 2020; Nurdiana et al., 2021). For that reason, the government's role and efforts are crucial in making consistent regulations (Rizos *et al.*, 2015), increasing commitment environment (Singh et al., 2016; Lin et al., 2015), and providing green economic incentives for its implementation (Centobelli et al., 2021; Singh et al., 2018). Three, data from Schwab and World Economic Forum-WEF, (2019) stated that this country lacks internal resources, particularly business dynamics capability, developing a sustainable innovation (Arsawan *et al.*, 2020). However, the innovations should be environmentally oriented and environmentally friendly technologies (Agnello *et al.*, 2015). Furthermore, the second part of this study is the literature review, which includes the hypotheses formulation, while the third and fourth describes the method and the analysis, respectively. Finally, t~~T~~he last part contains a discussion, theoretical and managerial contributions, conclusions, research limitations, and suggestions for further research.

2. Literature Review and Hypothesis Development

2.1 Natural Resource-Based View

~~The natural resource-based view was coined by~~ Hart~~,~~ (1995) coined the natural resource-based view ~~as an extension~~to extend ~~of~~ the resource-based view (Barney, 1991). Three additions were suggested, including 1) environmental-oriented capabilities for enhanced organizational profitability, 2) pollution preventive action, and 3) product stewardship for reaching sustainable development (Hart, 1995). Pollution preventive action refers to effective waste and emissions management during the production process (Hart and Dowell, 2011). O~~and~~ n the other side, product stewardship refers to the development ~~for~~ of integrated design (Hart, 1995). Finally, s~~S~~ustainable development refers to a production configuration "sustained indefinitely into the future" (Hart and Dowell, 2011). The influence of NRBV was tested by Hart and Dowell~~,~~ (2011) and found that previous research only focused on pollution prevention capabilities, leaving the other two capabilities unexplored. Based on this, this study examined the three NRBV capabilities role, namely green economic incentives as an effort to take precautions (Hart and Dowell, 2011), environmental commitment, also known as an effort to build environmentally oriented products,

product life cycle strategies for enhanced product stewardship (Green *et al.*, 2015) while the circular economy is a sustainable development implementation (Liu et al., 2018; Sarkis, 2012).

2.2 Circular Economy Practices in Small and Medium Enterprises

The present study considered circular economy practices that require SMEs to integrate ecological requirements, including ~~-~~efficiency and reduction of raw~~-~~, recycling, reuse, and replacement of materials into organizational routine activities (Botezat et al., 2018;Masi *et al.*, 2017). CE Practices are divided into ~~3~~ three main dimensions, including internal environmental management (Schmidt *et al.*, 2021), environmentally friendly design (Zhu *et al.*, 2011), and company assets management and recovery (Zhu *et al.*, 2011). First, internal environmental management is the preparation of environmentally-oriented procedures, such as green human resource management practices (Marrucci *et al.*, 2021;Bag *et al.*, 2021), training and development programs (Persis *et al.*, 2021), and environmental-based performance evaluation systems (Zhu *et al.*, 2011), ~~in~~ and supporting organizational environmental objectives (Koval *et al.*, 2021), building environmental ethics (York, 2009) and improving ecological performance (Lin *et al.*, 2015; Parker *et al.*, 2009; Pimenova and Van der Vorst, 2004). Second, eco-design describes the product design process considering environmental impacts (Lozano, 2012)~~,~~ and is an effective strategy to achieve eco-efficiency (Polverini, 2021; Dalhammar *et al.*, 2021). Therefore, product design must be environmentally oriented (Longo *et al.*, 2021). Apart from environmental efficiency, environmentally friendly design practices help companies to provide different products in the market (Dalhammar, 2016) and increase the global value proposition (Blévennec *et al.*, 2022). Third, the organizational~~'s~~ assets management and recovery refers to the capability to recover investment (Schmidt *et al.*, 2021), resell (Susanty *et al.*, 2020), and recycle materials (Zhu *et al.*, 2011). For this reason, companies are required to implement strategies that mitigate emerging issues to gain greater value (Jain *et al.*, 2022), and it is a CEs substantial objective to be reached (Lieder and Rashid, 2016).

2.3 Green Economic Incentives (GEI)

Green economy incentives (GEI) from the government are needed by the organization to build and motivate pro-environmental behavior (Clemens, 2006) through financial (Ling and Xu, 2021) and supporting regulations (Parker *et al.*, 2009). Financial rewards support waste management (Ling and Xu, 2021), recycling, and resource efficiency (Rizos *et al.*, 2015), as well as environmentally oriented innovations (Pieroni *et al.*, 2019). Supporting regulatory incentives enhances

environmentally-oriented products creation (Agustiono *et al.*, 2020) and promotes self-regulation (Lin *et al.*, 2015). Meanwhile, GEI strengthens internal capabilities (Singh *et al.*, 2018) and positively influences the internal organizational's internal decision-making processes (Rizos *et al.*, 2015). Incentives through subsidies, environmental grants, loans, and tax concessions influence the behavior of owners/managers (Bradford and Fraser, 2008; Chang *et al.*, 2011) towards a circular economy (Roxas and Coetzer, 2012). Similarly, the government, supported by marketing and procurement of recycled raw materials helps SMEs to enhance in pro-environmental practices (Pimenova and Van der Vorst, 2004; Tsimoshynska *et al.*, 2021). Therefore, economic support strengthens internal capabilities (Prieto-Sandoval *et al.*, 2019), stimulating green-oriented commitments (Sezen and Çankaya, 2013; Chang *et al.*, 2011). The present study considered three indicators as green economy incentives determinants, namely 1) government subsidies and tax benefits (GSTB), 2) premium prices for green products (PP), and 3) cheaper recycled raw materials (CP).

2.4 Environmental Commitment

A company must have an internal and external environmental orientation to protect the environment (Saleem *et al.*, 2021) ,and to design green strategies (Arsawan *et al.*, 2021;Bradford and Fraser, 2008), as evidenced in environmental saving actions (Singh *et al.*, 2014). In this case, environmental commitment is an organization's ethical value in protecting the environment (Chang *et al.*, 2011) and green activities to reduce environmental degradation (Suryantini *et al.*, 2021), protecting business, society, and its ecology (York, 2009). This It is viewed as a strategic business orientation (Singh *et al.*, 2014) which reflects the company's sustainable business attitude (Green *et al.*, 2015). Environmental commitment involves manner, behavior, perspectives, and economic benefits (Saleem *et al.*, 2021). Furthermore, Stone, (2006) revealed the environmental commitment role in increasing green awareness and responsibility (Saleem *et al.*, 2021), which led to organizational pro-environmental sustainability, enhanced business performance, and effective waste management (Singh *et al.*, 2016). However, cConsidering the diversity of SMEs' effective implementation commitments (Parker *et al.*, 2009), environmental awareness is still low (Singh *et al.*, 2018) due to the assumption that waste management is not related to productivity (Saleem *et al.*, 2021;Parker *et al.*, 2009) and organizational profits (Bhupendra and Sangle, 2016). Therefore, the present study considered the environmental products and processes awareness (EPP), resource

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reuse and recycling (RRR), and environmental responsibility (ER) to measure the company's environmental commitments.

2.4 Hypothesis Development

The natural resource-based view (NRBV) postulates that both orientations ~~on~~ toward the environment and prevention ~~on~~ of pollution are key for sustainable development (Hart, 1995). To be successful ~~on~~ in this ~~sustainably~~ sustainable development, the government's involvement ~~by~~ in implementing regulations (Fatimah *et al.*, 2020) and providing financial incentives (Botezat *et al.*, 2018) ~~are~~ is crucial. ~~This~~ It means that GEI stimulates an organizational solution to increase environmental commitment (Zhang *et al.*, 2013);(Clemens, 2006). Furthermore, t~~T~~he important role of the government in making regulations related to providing green incentives will change the perspective of SME managers about the importance of contributing to saving the environment (Singh *et al.*, 2018). Thus, green incentives have an impact on increasing environmental commitment. Based on the above description, the following hypothesis is formulated:

H1: GEI has a significant positive effect on EC

Several studies revealed that green incentives provided through financial (Clemens, 2006) and non-financial (Ling and Xu, 2021) ~~can~~ could be allocated to make the internal environment guidelines such as the procurement process or recruiting employees with environmental conservation knowledge (Marrucci *et al.*, 2021;Bag *et al.*, 2021), preparation of training and development programs aimed to save the environment (Persis *et al.*, 2021) and environmentally sustainable strategies (Green *et al.*, 2015). Furthermore, the green economic incentive is important in ~~the~~ manufactureing of environmentally friendly products (Longo *et al.*, 2021; Lozano, 2012), enhancing environmental efficiency (Polverini, 2021). The green economy incentives increase the organization's internal capabilities for investment recovery (Schmidt *et al.*, 2021), reselling used materials and goods (Susanty *et al.*, 2020), and recycling materials (Zhu *et al.*, 2011), prolonging the product life cycle (Corona *et al.*, 2019). Consequently, the company adopts a better sustainability system (Lozano, 2012). This discussion leads to the following hypotheses i~~I~~n line with the natural resource-based view (Hart, 1995), ~~this discussion leads to the following hypotheses.~~

H2: GEI positively affects IEM

H3: GEI positively affects ED

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H4: GEI positively affects CAM&R

The natural resource-based view (Hart, 1995) implies that ~~for sustaining the development~~, environmental commitment is considered ~~as~~ the organization's first step in its role to save the environment for sustaining the development. It enhances the circular economy, especially in the internal environmental management, including planning, drafting, implementing, and evaluating the internal sustainable programs such as pollution prevention and waste reduction (Schmidt *et al.*, 2021), building cross-functional collaboration for environmental improvement (Parker *et al.*, 2009), and quality environment management (Zhang and Ma, 2021; York, 2009). Further, environmental commitment is a starting point for SMEs to design energy-efficient products, recyclable, safe raw materials, and minimize waste (Schmidt *et al.*, 2021). Therefore, it can affect investment recovery, inventory effectiveness, and sales of used goods and materials (Schmidt *et al.*, 2021). Based on the above description, the hypothesis is formulated as follows:

H5: EC positively affects IEM.

H6: EC positively affects ECO

H7: EC positively affects CAM&R

Green economy incentives (GEI) ~~is~~ are significant in building organizational involvement and commitment to saveing the environment. ~~It is~~ T~~t~~he government and non-governmental organizations benefit ~~to adopt~~ from adopting environmental initiatives (Singh *et al.*, 2018;Agnello *et al.*, 2015). Incentives include additional or financial rewards (Ling and Xu, 2021) that encourage organizations to design or implement environmental practices (Kahupi *et al.*, 2021). In addition, t~~T~~he incentive improves recycling techniques (Bag *et al.*, 2021) and facilitates the transition to a circular economy (Ling and Xu, 2021). Also, green economy incentives enhance~~s~~ dynamic capabilities (Prieto-Sandoval *et al.*, 2019) that affect decision-making processes (Diaz *et al.*, 2021). However, ~~although~~ some SMEs perceive that investing in the circular economy increases cost~~s~~ more than the expected return (Rizos *et al.*, 2015). Consequently, the increasing environmental commitment will motivate SME managers to implement a circular economy (Kuo and Chang, 2021). Furthermore, t~~T~~he environmental commitment will strengthen the internal capabilities of SMEs (Marrucci *et al.*, 2021; Bag *et al.*, 2021), manufacture environmentally-friendly designed products (Longo *et al.*, 2021), and improve asset recovery and investment capabilities (Schmidt *et*

al., 2021). Therefore, the green economy incentives will increase environmental commitment and improve circular economy practices in SMEs. This discussion suggests that, for sustaining the development using the natural resource-based (Hart, 1995), environmental commitment has a key role ~~as the~~ in mediating ~~on~~ the ~~effect of~~ environmental effect on the circular practice modes. Thus, the following hypotheses are stated.

H8: Environmental commitment partially mediates the relationship of green economic incentives to internal environment management

H9: Environmental commitment partially mediates the relationship of green economic incentives to eco-design

H10: Environmental commitment partially mediates the relationship between green economic incentives on corporate asset management and recovery

Insert Figure 1

3 Methodology

3.1 Data and Sampling Method

The present study uses a quantitative approach ~~through the distribution of~~ by distributing questionnaires ~~which~~ that focus~~ed~~ on SME-producing companies (with 50–200 full-~~-~~time employees), which are the essential sector of the Indonesian economy that still ~~growth and develop~~ grows and develops (Surya *et al.*, 2021). The p~~P~~opulation is 1,299 SMEs located in 9 regencies of Bali Province. A f~~F~~ormula from Krejcie and Morgan~~,~~ (1970) ~~were~~ was used to determine the sample frames, obtaining ~~a total of~~ 297 SMEs. This selection was carried out using random sampling (lottery method). From the 297 SMEs, two respondents were recruited from each to fill out the research questionnaire. The total number of ~~the~~ participants was 594 people ~~which~~ include~~ing~~ managers and assistant managers. Their selection was triggered by ~~the assumption~~ assuming that they possess organizational characteristics and knowledge ~~on~~ of circular economy practices. Data were collected from March to June 2021 via email and Google Forms and direct visits by first sending email notification~~s~~ on this study agenda. The 594 responses were analyzed to achieve the aims of the present study. Table 1 presents the population information, sample frame, and the number of respondents.

Insert Table 1

3.2 Measurement

The magnitude of the variable construct used was based on ~~the~~ previous empirical studies. Therefore, t~~T~~he previous study measurement was adopted ~~to~~ for the subject~~:~~ ~~namely~~, SMEs in Bali Province over ~~9~~ nine districts. The construct indicators assessment used a 7-point Likert scale, "1: strongly disagree to 7: strongly agree". In order ~~To~~ to avoid ambiguity, the questionnaire (in Indonesian) was tested on 30 SME CEOs with knowledge of the circular economy (CE). The green economic incentive (GEI) variable was adopted from Singh *et al.*, (2018); Esfahbodi *et al.*, (2016), consisting of 3 indicators. The environmental commitment variable was adopted from Singh *et al.*, 2018; Liu and Bai, 2014, consisting of 3 indicators. ~~While~~In addition, the circular economy-IEM was adopted from Schmidt *et al.*, 2021) and Zhu *et al.*, (2011), consisting of 8 indicators. The CE-ED variable was adopted from Schmidt *et al.*, (2021); Zhu *et al.*, (2011) with 4 indicators. Moreover, CE-CAM&R was adopted from Schmidt *et al.*, (2021) and Zhu *et al.*, (2011) with 3 indicators.

The present study used the variance-based partial least squares to test the hypothesis (PLS-SEM) with Smart PLS 3.2.9 software. The PLS-SEM was used to assess the relationship between constructs and their predictive power on endogenous variables (Hair *et al.*, 2014). The present study validated the circular economy practices model. ~~and~~ T~~t~~he data was not assessed as normally distributed data, making the circular economy model assessment associated with green economic incentives and environmental -commitment predictors using PLS-SEM appropriate (Hair *et al.*, 2016).

4. Results

Table 2 describes the characteristics of the 594 respondents.

Insert Table 2

4.1 Measurement Model

The VIFs test was used to evaluate the collinearity problem, scoring 2.872 (green economics incentives), 1.826 (environmental commitment), 3,558 (CE-Internal Environment Management), 1.832 (CE-Eco-Design), and 2.119 (CE-Corporate Asset Management and Recovery). All VIF coefficients were lower than 5, which is the recommended limit value by Hair *et al.*, (2016) that the data do not have general variance problems. The outer model was tested to evaluate the reliability and validity of the construct variables. Table 2 shows ~~the results~~ that each item of factor loadings is more than 0.6. The convergent validity test explains that the validity requirements are met because the average extracted variance (AVE) is more than 0.5 and the factor loading is more than 0.6 (Hair Jr *et al.*, 2016). ~~This~~ It shows that the discriminant validity conditions of all constructs have been met.

Insert Table 3

The Heterotrait-Monotrait Ratio (HTMT) ~~was used to~~ assessed the discriminant constructs validity. ~~For this criteria~~ Aaccording to Hair Jr *et al.*, (2016), for this criteria, the value was lower than 0.9. Due to the values ranging from 0.384 to 0.701, the HTMT test showed that discriminant validity was achieved. The composite reliability values in both samples were above the recommended level of 0.7; therefore, the construct was reliable.

4.2 Inner Model Measurement

The present study applied the bootstrap method with 5000 samples to assess the research indicators and path coefficient's significance (Chin *et al.*, 2008). The results showed that the goodness-of-fit (GoF) model has a value of 0.367 which stated that the model is fit. In addition, testing on the standard residual root means square (SRMR) and normed fit index (NFI) shows that the SRMR value was 0.081 while the NFI was 0.716. The SRMR cut-off value was 0.8, and the NFI was below 0.9, which indicates that all criteria are met. The results showed that GEI explains EC by 0.268 (26.8%). The explanatory power of EC at CE-IEM was 0.347 (34.7%); ~~,~~ at CE-ED, it was 0.224 (22.4%), and at CE-CAM%R, it was 0.212 (21.2%). In addition, the value of Q^2 showed that all constructs have positive values and good predictive relevance (Chin, 2010).

4.3 Hypothesis Testing

Table 4 shows the results of the relationship between green economics incentives (GEI), environmental commitment (EC), and internal environment management (CE-IEM), eco-design (CE-ED) and corporate asset management and recovery (CE-CAM&R). To test the hypotheses, We use path coefficients (β), t values, and p values to test the hypotheses. According to Hair *et al.*, (2016), if the path coefficient is greater than 0.1, t value greater than 1.96, and 0.05 level of significance, thats means the hypotheses are supported. The results support the significant role of GEI in achieving EC (H_1) with, CE-IEM (H_2), CE-ED (H_3), and CE-CAM&R (H_4). Furthermore, EC has an important role in achieving CE-IEM (H_5), CE-ED (H_6), and CE-CAM&R (H_7).

Insert Table 4

Insert Table 5

After examining the direct relationship, the next step was to determineing the mediating role as shown in Table 5. The present study tested three mediation patterns. According to Hair *et al.*, (2014), the method used is to measure the VAF value < 0.20, meaning there is no mediation, while 0.20-0.80 indicates partial and the VAF value > 0.80 means full mediation. In order tTo test the model mediation effect, non-parametric bootstrap was used (Hair *et al.*, 2016). Finally, variance values (VAF) were calculated to obtain indirect and total link sizes. When the VAF is greater than 80%, it shows full mediation; between 20 and 80% is partial; and below 20% means no mediating effect (Hair *et al.*, 2013).

The mediating role in the causal relationship between GEI and CE-IEM, CE-ED, and CE-CAM&R was examined using VAF assays. This study tested three mediation pathways and concluded that environmental commitment partially mediates the relationship between GEI and CE-IEM, where the VAF value is 35.90%, indicating that hypothesis 8 is accepted. EC also functions as a partial mediating relationship between GEI and CE-ED, with a VAF value of 24.10%, which means that hypothesis 9 is accepted. At the same time, EC functions as a partial mediating relationship between GEI and CE-CAM&R, with a VAF value of 65.50%, which means that hypothesis 10 is accepted (Figure 2).

Insert Figure 2

5.1 Discussion and Theoretical Contribution

There is increased attention by policymakers, researchers, and practitioners, for circular economy practices that can advance sustainable development goals (SDGs). Therefore, this study explained the mechanisms that SMEs can utilize to successfully implement circular economy practices, including the role of GEI and EC. It complemented previous studies that failed to show antecedents for specific circular economy practices (Green *et al.*, 2015); (Schmidt *et al.*, 2021); (Liu *et al.*, 2018). ~~There are~~ Furthermore, v~~v~~ery few studies that exclusively focused on the direct relationship between GEI and the implementation of circular economy practices. In contrast, this study showed that EC influences the relationship between GEI and three circular economy practices in Indonesian SMEs, specifically internal environmental management, eco-design, and CAM&R.

This study contributed to the fourth folds' circular economy literature and related theories ~~in fourth folds~~. First, this study proposes and examines the supporting integration model of green economic incentives and environmental commitment in ~~the context of~~ SMEs, where the combination of green economic incentives and environmental commitment is the key ~~in~~ to building environmental sustainability. This new circular economy practice model was found to have a good fit and explanatory power, so it confirms that the green economic incentives and environmental commitment constructs are generally accepted (Clemens, 2006; Lin *et al.*, 2015) is also an important driver of circular economy practices for SMEs (Centobelli *et al.*, 2021). More specifically, green economic incentives plays an important role in increasing environmental commitment and, at the same time, encouraging SMEs to carry out circular economy practices as an important activity in efforts to save the environment. Thus, the results ~~provide evidence~~ prove that green economic incentives and environmental commitment form the basis for creating circular economy practices in the SME sector.

This study assesses circular economy practices by integrating green economic incentives into the circular economy practices model. The results of data analysis show that the circular economy practices integration model for SMEs is appropriate. Furthermore, t~~T~~he inclusion of environmental commitment in the circular economy practices model increases the explanatory power of the circular economy practices model. Conceptually, the results of this study strengthen the

commitment-circular economy practices model (Saleem *et al.*, 2021; Schmidt *et al.*, 2021) in the SME sector. This finding shows that in SMEs, ~~the existence of~~ green economic incentives can simultaneously strengthen the influence of environmental commitment on circular economy practices. Thus, the circular economy practices model in the context of SMEs is conceptually expanded into a green incentives-commitment-circular economy practices model. Furthermore, these findings provide further evidence for the conclusions of previous studies (Galkina, 2021), whoich claim that environmental commitment with environmentally oriented partner selection is an important determinant of strengthening future circular economy practices for environmental saving efforts.

Second, the results revealed that environmental commitment as is a mediator of the relationship between green economic incentives and internal environmental management (IEM), eco-design (ED), and corporate asset management and recovery (CAM&R). Although the three tested mediation relationships are significant, GEI-EC and asset management and recovery (CAM&R) have more influence. This result proved that SMEs strongly focus on resource recovery to develop enterprise asset management and recovery practices. It requires the involvement of purchasing managers in investment recovery practices (Betancourt Morales and Zartha Sossa, 2020) to recover investment (Schmidt *et al.*, 2021), resell (Susanty *et al.*, 2020), and recycle materials (Zhu *et al.*, 2011) through selective investment, excess inventory, sales of used goods and materials (Schmidt *et al.*, 2021). Thus, small-–medium enterprises must be concerned about ~~on~~ inventory recovery practices and makinge it a serious concern for organizational sustainability, increasing productivity and innovation, and environmental sustainability orientation.

Third, the circular economy is an interesting topic for academics, policymakers, and practitioners, but the literature is not thorough on how Indonesian SMEs can develop circular economy practices. Most studies focused on the European context, whereas this study contributed to the circular economy literature in developing countries and supported findings in the European context (Schmidt *et al.*, 2021). The results showed that GEI and EC influence the implementation of all three circular economy practices. Furthermore, this is the first study linking GEI and EC as antecedents of circular economy practice in an emerging country. ~~Whereas~~In contrast, GEI is common in developed countries such as the US (Clemens, 2006), India (Singh *et al.*, 2018), and Italy (Centobelli *et al.*, 2021). ~~This~~ It is supported by ~~study by~~ Zhang *et al.*, (2013), which stated

that external references, such as financial incentives, affect organizational attitude and commitment ~~in~~ to the circular economy concept implementation (Centobelli *et al.*, 2021; Clemens, 2006). However, Singh *et al.*, (2018) established that GEI does not affect building environmental commitment. Overall, these findings have helped ~~academics by contributing~~ to the theory and generat~~ing~~ed evidence that incorporating the sub-constructs of circular economy practice may not always work, especially for developed countries like Germany. In addition, t~~T~~hese results provided practitioners with insights for implementing circular economy practices in their companies.

Fourth, the present study ~~contributed to~~ enhanced the natural resource-based view (NRBV), describing the mechanisms that view GEI and EC as pollution prevention in circular economy practice. The results showed that GEI and EC are translated in ~~a~~ strategic orientation. The implementation of circular economy practices ~~implementation~~ can be affected by an organization's failure to commit to the environment. This study examined antecedents used to overcome these barriers (de Oliveira *et al.*, 2018). The finding contributed to the literature by integrating previous research on GEI (Centobelli *et al.*, 2021) and environmental commitment (Galkina, 2021) as circular economy practice implementation drivers. ~~Particularly~~ Notably, it showed that GEI ~~can~~ could trigger the emergence of EC in circular economy practices, positively affecting internal environmental management and eco-design ~~,~~ and strengthens~~ing~~ asset management and recovery. From a natural resource-based perspective, the results demonstrated the importance of companies building a commitment culture to implement circular economy practices.

5.2 Managerial Contribution

The governments and countries concerned about saving the environment must provide green economy subsidies, tax incentives, soft loans, and subsidized materials~~,~~ to increase sustainable waste management strategies (Singh *et al.*, 2018; Möllemann, 2016). First, t~~T~~he regulations can strengthen the commitment and consistency of SMEs to saving the environment efforts (Kahupi *et al.*, 2021;Lin *et al.*, 2015; Roxas and Coetzer, 2012). Second, proper utilization of the government's green economic incentives by SMEs managers will increase commitment to the environment. The GEI enabled SMEs to build a strong culture with higher trust in the environment, implement~~ing~~ green actions for sustainable development, and creat~~ing~~e innovative sustainable business models to increase economic growth. The incentives also influence the implementation of environmentally oriented standards and building environmental ethics. Furthermore, green

economic incentives facilitate SMEs' collaboration with large companies to achieve organizational sustainability, especially in the provision of raw materials ~~provision,~~ and supply chains management. Such actions develop a strong attitude and increases the company's environmental commitment to the circular economy implementation.

5.3 Conclusion, Limitations, and Further Study

Most previous studies examined the circular economy practices but did not focus on combining green economic incentives (GEI) and environmental commitment (EC), especially in the SMEs sector. The circular economy practice provides opportunities and encourages every country, industry, and business entity to ~~jointly~~ maintain sustainability and protect the environment jointly. The present study examines the role of green economic incentive (GEI) and environmental commitment (EC) on circular economy practices (CE) in the SMEs sector.

Three important conclusions can be drawn from this study. First, circular economy practices are complex constructions, which ~~not only~~ consist not only ~~of~~ internal environmental management (IEM) and eco-design (ED), but also corporate asset management and recovery (CAM&R). Second, the role of the government in providing green economic incentives (GEI) has been proven to increase environmental commitment, which in turn increases the practice of circular economy as an effort to preserve the environment. Finally, environmental commitment is a mediator of the relationship between GEI and CEP, where the most important path is through corporate asset management and recovery (CAM&R).

This study broadens our understanding of how GEI and EC impact ~~on~~ circular economy practices, especially in the SME sector, which can help SME managers, the government and related stakeholders to develop strategies for providing green incentives, both financial and non-financial. When we begin to study circular economy practices in SMEs and the interest of circular economy stakeholders ~~about~~ in this issue will increase, further assessment of the circular economy in SMEs is ~~very important~~ critical.

Commented [MOU3]: Consider changing the word 'important'. I found that this word is overused in this article. Here are some alternatives: fundamental, essential, vital, crucial, principal that may suit your paper.

This study identified several limitations causing a gap for future studies. First, the study design used assistant managers and managers for information. Future studies can overcome this common method bias and choose a proper design. Second, this study focused on the mechanisms

influencing the development of CE practices and assumed that GEI and EC are prerequisites for companies to implement this. Meanwhile, future studies can establish additional aspects that influence the proposed mechanism, such as environmental supply chain collaboration, or green strategies and green innovation. Third, previous studies, including this, focused on the antecedents of circular economy practice in developed and developing countries. Therefore, fFuture studies can therefore make comparisons to expand and generalize these findings by considering the differences in institutional contexts between countries.

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International Journal of Productivity and Performance Management

Dear Editor and Reviewer (s)
International Journal of Productivity and Performance Management (IJPPM)

We are thankful to the anonymous reviewers, and the editors ***International Journal of Productivity and Performance Management***, for their encouraging remarks and constructive and insightful comments. The insightful comments led us to think deeper, and we believe we have now come up with an improved version of the paper. As follows, we provide a response to the individual comments of the editor and two reviewers in the following Table. The changes made in the manuscript while responding to reviewers' comments are highlighted in yellow. We have also made some additional changes to align the existing text with the revised one, made a few necessary textual changes, and incorporated suggested edits after copy editing. All such changes in the manuscript are highlighted in yellow and red.

We hope this improvement can meet the expectations of reviewers. Thank you

No	Comments and Question from Reviewer 1	Revision
1	Good paper. It could be considered for publication, upon Editor's agreement, if the suggestion made above is accepted by the authors.	We thank reviewer(s) that our manuscript meets the IJPPM qualifications
2	Originality: Does the paper contain new and significant information adequate to justify publication?: Yes. The study aimed to examine the relationship between green economic incentives and environmental commitment as drivers of the circular economy practices in Small and Medium Enterprises. This covers a gap identified in the extant literature by the authors, which makes the paper interesting for publication.	We are very grateful for the appreciation of the reviewers regarding our paper on circular economy practices in SMEs
3	Relationship to Literature: Does the paper demonstrate an adequate understanding of the relevant literature in the field and cite an appropriate range of literature sources? Is any significant work ignored?: Yes. The paper adequately covers the recent literature on the subject, considering a wide array of other studies that support its content.	We are grateful for the reviewer's comments.
4	Methodology: Is the paper's argument built on an appropriate base of theory, concepts, or other ideas? Has the research or equivalent intellectual work on which the paper is based been well designed? Are the methods employed appropriate?: Yes. The method employed (Smart PLS) is adequate for	We are grateful for the reviewer's comments.

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	the hypotheses testing. Research design was described in detail, allowing full understanding of what was done.	
5	Results: Are results presented clearly and analysed appropriately? Do the conclusions adequately tie together the other elements of the paper?: Yes. Results enabled to fulfill the identified gaps, adding relevant knowledge to the existing literature.	We are grateful for the reviewer's comments.
6	Implications for research, practice and/or society: Does the paper identify clearly any implications for research, practice and/or society? Does the paper bridge the gap between theory and practice? How can the research be used in practice (economic and commercial impact), in teaching, to influence public policy, in research (contributing to the body of knowledge)? What is the impact upon society (influencing public attitudes, affecting quality of life)? Are these implications consistent with the findings and conclusions of the paper?: The authors detailed how the paper can contribute to the literature and managerial practice. Limitations and suggestions for future research are also presented. The only suggestion this reviewer would like to make is to create a "Discussion" section. In fact, the discussion is currently part of the conclusions but separating them as a new item would benefit the paper structure.	We are very grateful for the constructive comments from the reviewers. For the discussion section, we have made significant additions to the paper by adding Discussion and Theoretical Contribution (Page 8, paragraph 1-6), which is then followed by the Managerial Contribution, and Conclusions, Limitations, and Further Study sections (Page 10, paragraph 1-4) (please see in yellow highlight).
7.	Quality of Communication: Does the paper clearly express its case, measured against the technical language of the field and the expected knowledge of the journal's readership? Has attention been paid to the clarity of expression and readability, such as sentence structure, jargon use, acronyms, etc.: Ye. The paper is well written and developed.	We are grateful for the reviewer's comments.

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No	Comments and Question from Reviewer 2	Revision
1	Recommendation: Major Revision Comments: All comments were made above. The paper is interesting but it needs improvements.	We are very grateful for the constructive comments from the reviewers. The author (s) has made improvements in accordance with the reviewer comments. We hope that the revisions made meet the expectations, suggestions and quality so that they deserve to be published in IJPPM
2	Originality: Does the paper contain new and significant information adequate to justify publication?: the paper is original.	We are grateful for the reviewer's comments.
3	Relationship to Literature: Does the paper demonstrate an adequate understanding of the relevant literature in the field and cite an appropriate range of literature sources? Is any significant work ignored?: The paper misses the method used to raise the literature review. Authors should perform a systematic literature review, where they could clearly state how the references were raised. Besides, concerning the hypothesis, some of them lack relationship to theory.....authors use Natural resource-based theory but it not clear the relationship between this lens and all the hypothesis....	In the literature review, we used the research of Suryantini et al. (2021) regarding the circular economy in SMEs which needs to involve the role of the government, SMEs and other stakeholders. This study uses a systematic literature review (SLR) to reveal the research agenda that we are trying to uncover in our study. So, for this reason, the literature has been built based on a systematic literature review (SLR) so that a clear state of how the references were raised. Furthermore, on the advice of a very valuable reviewer, we have linked the natural resource based view (NRBV) to all hypotheses in this study (can be seen in the yellow section).
4	Methodology: Is the paper's argument built on an appropriate base of theory, concepts, or other ideas? Has the research or equivalent intellectual work on which the paper is based been well designed? Are the methods employed appropriate?: research methods appears to be OK.	We are grateful for the reviewer's comments.
5	Results: Are results presented clearly and analysed appropriately? Do the conclusions adequately tie together the other elements of the paper?: Results are clear, but the paper misses a section with the discussion of the results.	We are grateful for the reviewer's comments. The author (s) has created a discussion section

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6	Implications for research, practice and/or society: Does the paper identify clearly any implications for research, practice and/or society? Does the paper bridge the gap between theory and practice? How can the research be used in practice (economic and commercial impact), in teaching, to influence public policy, in research (contributing to the body of knowledge)? What is the impact upon society (influencing public attitudes, affecting quality of life)? Are these implications consistent with the findings and conclusions of the paper?: Discussion is poor in the paper. i suggest authors create a new section: discussion right after the results.	We are very grateful for the constructive comments from the reviewers. For the discussion section, we have made significant additions to the paper by adding Discussion and Theoretical Contribution (Page 8, paragraph 1-6), which is then followed by the Managerial Contribution, and Conclusions, Limitations, and Further Study sections (Page 10, paragraph 1-4) (please see in yellow highlight).
7.	Quality of Communication: Does the paper clearly express its case, measured against the technical language of the field and the expected knowledge of the journal's readership? Has attention been paid to the clarity of expression and readability, such as sentence structure, jargon use, acronyms, etc.: English language needs polishing.	Our paper has been sent to native for polishing. All changes have been communicated to the word in red. In addition, we also attach our proofread paper that includes track changes. Overall, the quality of communication has been improved.

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