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Research Article

Impact Of Circular Economy Practices on Sustainable Performance in Vietnam

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ARTICLE INFO	ABSTRACT

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Purpose - This study attempts to examine the impact of circular economy practices (CEP) on sustainable performance (SP) in enterprises Vietnam, simultaneously assessing the moderating role of enterprises size.

Methodology - The study uses quantitative research methods, which is based on a sample survey of 608 enterprises nationwide. The data is then processed in PLS 4.1 software using the PLS-SEM model to evaluate influence of circular economy practices on sustainable performance.

Findings - The study finds that circular economy practices have a positive impact on sustainable performance. The results also demonstrate the moderating role of enterprise size in evaluating how circular economy practices affect sustainable performance.

Originality - The study provides empirical evidence from plastic firms in the context of emerging countries and Vietnam as the case study.

Keywords: Circular economy practices, sustainable performance

1. INTRODUCTION

The circular economy has gained popularity recently as a key component of sustainable development (Genovese et al., 2017; Gunasekaran et al., 2017). Additionally, the circular economy is built in alignment with regulations, policies from the government and attempts from all agents of government to create a strong green business system (Zeng et al., 2017). Businesses must adhere to environmental protection regulations, actively reduce disposals and pollutant, reallocate beneficial resources (green materials, clean energy, natural resources, efficient information and infrastructure), and use a variety of clean production techniques in a circular economy (Bai et al., 2020a; Jabbour et al., 2019). Additionally, businesses will achieve greater economic profits and social efficiency as well as improved environmental quality when they raise awareness and launch campaigns with a stronger goal towards sustainable development (Yu et al., 2015). Being aware of the positive effects of the circular economy on businesses, many previous researchers have studied business activities in the procedure of circular economy practices (CEP) with the aim towards sustainable performance (SP). In Vietnam, the production and consumption of plastic, especially single-use plastic, is on the rise, which could lead to a global plastic pollution crisis - white pollution. According to the General Statistics Office of Vietnam (2024), the plastic industry has nearly 4,000 operating enterprises, which operate mainly in the plastic packaging sector and are concentrated in the Southern region. Moreover, Vietnamese plastic enterprises are completely dependent on imported production lines and machinery, as the plastics export market has continued to grow slightly in the past two years. Driven by the concerning circumstances, Vietnamese companies have mostly used CEP to advance the sustainable plastics development.

However, earlier research on CEP and its influence on sustainable performance has primarily been undertaken in industrialised nations. Thus, within the context of Vietnam - a developing country, research on the circular economy requires a more comprehensive approach, especially since there has been no study in Vietnam that has analysed in detail the direct and indirect influence of CEP on SP, but on the feasibility of the circular economy for the plastics sector. Furthermore, most studies have not addressed the moderating effect of some relevant variables, including enterprise size, in assessing the impact of CEP on SP.

The objective of this research is comprehensively evaluating the influence of circular economy practices on sustainable performance. We utilize the three pillars of sustainable development: economy, society and environment and involve a moderating variable of enterprise size. Through the results achieved, the study proposes solutions to improve CEP and increase SP in Vietnamese plastics enterprises. The results are also the premise for future studies on this topic.

The remaining part is as follows: Section 2 presents the relevant literature, the data and research methodology are outlined in Section 3, Section 4 shows the empirical results, and Section 5 involves conclusion.

2. LITERATURE REVIEW

2.1. Circular economy practices (CEP)

Circular economy (CE) is a concept that focuses on the continuous use of resources for other production processes, creating a closed loop in the industrial ecosystem, and reducing waste while following sustainable development practices. Unlike the traditional linear economic model, which relies on fast and cheap production, CE emphasizes reducing, reusing, and recycling materials, minimizing waste, and using biodegradable products, presenting an effective solution for global sustainability.

Firms are increasingly attempting to reach the CE targets surrounding the '3R' principles of CE by reducing waste discharge, reusing raw materials, and promoting closed loop systems (Bai et al., 2020b). Since CEP has been shown to enhance business performance, more organizations are considering their adoption (Edwin Cheng et al., 2022a). Industries such as textiles, electronics, and plastics represent key sectors where the execution of CE strategies has successfully led to waste reduction, resource optimization, and sustainability, effectively aligning business performance with environmental objectives. CE practices are grounded in the transformation, utilization of resources, as well as the continuous circulation and reclamation of products (Bag et al., 2022). The adoption of CEP is deemed an effective strategy to mitigate the negative impacts of manufacturing, external shocks, and globalization (Khan et al., 2021).

Prior research has defined CEP through typical internally focused activities, including environmental management within the organization, eco-design, and the recovery of investments (Edwin Cheng et al., 2022a; Subarmanim and Chin, 2022). Rehman Khan et al. (2022) also generalized CEP by assessing three key constructs: recycling and remanufacturing, green manufacturing, and green design. In line with the innovation era, recent studies have also explored the characteristics of CEP, particularly focusing on eco-innovations (Hysa et al., 2020; Vence et al., 2019).

The concept of CEP varies depending on different perspectives and contexts; however, the path to broad implementation of these practices, particularly in the plastic sector, remains ambiguous (Payne and Kwofie, 2024). Therefore, in this research, we examine CEP through three main dimensions adapted from Edwin Cheng et al. (2022): environmental management, eco-design, and investment recovery.

2.2. Sustainable performance

The concept of sustainability is more complicated than commonly assumed. This is clearly evident that there are more than 200 different answers to what sustainable development is. Introduced by the United Nations in 1987, "Sustainable Development" was regarded as one of key principles for economic, environmental, and social development, with the view of “meeting the needs of the present without compromising the ability of future generations to meet their own needs" and ensuring "a fair distribution of environmental costs and the benefits of economic development between and within countries." Sustainability requires protecting the environment, conserving natural resources, along with providing social and economic well-being for both current and future generations (United Nations, 1987). Vogt & Weber (2019) also argued that sustainability is a major normative principle for contemporary society, including the long-term ethical relationship between current and future generations.

Sustainability is an integrated concept which indicates that environmental, social, and economic dimensions are fundamental pillars. These pillars are known as the core of sustainability, showing that responsible development must take natural, human, and ecological capital, or, more simply, the environment, people, and profit into consideration (Hariram et al., 2023; Schoolman et al., 2012), and to ensure sustainable living, it is imperative to pay attention to our planet, its resources, and its people (Sulston et al., 2013). Therefore, it ensures that we can pass on a viable planet to future generations, enabling them to thrive in true sustainability.

Thus, achieving sustainability requires a balance among three aspects (Ghisellini et al., 2016), which can be defined as:

- ***Environmental Sustainability:*** Humans are living in diverse and abundant natural resources. Utilizing natural resources, such as materials, energy fuels, land, and water in a responsible and efficient way is essential to achieve environmental sustainability. Moreover, considering both resource scarcity and harmful impacts on the environment caused by exploiting them is also of great necessity. Implementing policies and strategies can lead to positive environmental outcomes, particularly in terms of environmental protection and climate stability (Qamruzzaman and Karim, 2024).

- ***Economic Sustainability:*** Economic sustainability requires that companies or countries utilize their resources efficiently and responsibly to ensure the long-term operation and consistent profit generation. Without a sustainable profit model, businesses will not be able to maintain their activities. Without resources being used responsibly and efficiently, the ability of an enterprise to sustain its operations in the long run will be in danger.

- ***Social Sustainability:*** Social sustainability refers to the continuous achievement of social well-being within a society. Developing social sustainability can ensure the maximization of social welfare of a nation, an organization, or a community will remain in the long term, moving towards sustainable development.

The concept of sustainable performance (SP) within organizations has been extensively researched and empirically proved in recent years. Firms increasingly adopt sustainable technologies and optimize their operations in a sustainable manner to meet customer demands and market expectations (Doghan and Razak, 2024; Li et al., 2020; Wang et al., 2025). In this respect, business leaders have emphasized the use of various methods, techniques, and tools to study, analyze, and design business procedures, including the improvement of certain factors such as cost, quality, time, flexibility, and sustainability. Grounded in the theory of the “Three Pillars of Sustainability”, businesses must concentrate concurrently on all dimensions to attain long-term sustainable performance.

While the concept of performance has long been considered critical in management science and has been defined by numerous scholars since the 1950s, there remains no scientific consensus about the definition of business performance (Taouab and Issor, 2019). According to Bulut & Can (2013), business performance is “the degree of fulfillment of managerial goals in business practices and realized outputs of these goals by the end of a certain period”.

As businesses have an indispensable role to play in boosting the global economy, the concept of performance has expanded from being narrowly defined in financial terms by (Friedman, 2007) to being supported by broader, more global frameworks in multiple dimensions. Elkington (1998) further conceptualized business performance through the "3P" framework (Triple Bottom Line), which includes Profit, Planet, and People, which represents economic efficiency, environmental quality, and social considerations respectively. According to this theory of Elkington, businesses must achieve performance across all three domains to attain sustainable business performance (Politis and Grigoroudis, 2022).

Although there is still no widespread consensus, numerous studies have demonstrated a positive correlation between social, environmental, and financial outcomes within organizations (Sroufe and Gopalakrishna-Remani, 2019; Xie et al., 2019). In line with this model, and based on the “Three Pillars of Sustainable Development” theory, businesses must optimize performance across economic, environmental, and social objectives to achieve simultaneous, sustainable performance. Hence, in this research, sustainable performance is investigated through three above factors developed by (Mousa and Othman, 2020).

2.3. Impact of circular economy practices on sustainable performance

Direct impact of circular economy practices on sustainable performance

By embedding sustainability principles into core business practices, the circular economy is gaining popularity across various industries, hopefully resulting in noticeable improvement of sustainable performance.

It is evident that Circular economy approaches are essential for manufacturing companies due to their significance in resource and energy utilization during the use phase, byproduct generation, as well as their influence on employment and GDP (Lieder and Rashid, 2016). The circular economy aims to minimize resource consumption across different activities, potentially lowering production costs for businesses while improving resource efficiency, economic returns, andthe environmental sustainability (Kwarteng et al., 2021) .

Studies have consistently demonstrated that sustainable practices of a business and CEP of the business are positively correlated. More specifically, Magnano et al. (2024) demonstrated that the adoption of CEP not only enhances economic results but also advances social and environmental goals, thereby generating long-term sustainable value for companies. Yet, in the first place, implementing circular modes of production would appear counterproductive in terms of economic efficiency, especially in the short-run, given the nature of investment that companies have to showcase. However, these initiatives provide sustained financial advantages by lowering energy expenses and improving recycling efficiency (Liu et al., 2023).

Environmentally, through the process of adopting and implementing CEP such as recycling, companies reduce the adverse externalities of waste materials (Aryee and Kanda, 2024). From a societal standpoint, the circular economy (CE) has the ability to create job opportunities, directly addressing regional unemployment disparities and occupational mismatches (Padilla-Rivera et al., 2020). Additionally, Ali et al. (2024) also assert that implementing CE can improve public health and healthcare services by introducing several strategies that enhance affordability and operational efficiency. After examining the effects of the CEP across all three dimensions of SP, we propose the hypothesis:

Hypothesis 1: Circular economy practices have a positive impact on sustainable performance.

Moderating role of size

As firms scale up, the advantages of scale are increasingly optimized, providing favorable conditions for enhancing sustainable performance. In the plastics industry, the application of a circular economy in large-scale enterprises can yield significant benefits, particularly in improving environmental performance through the capability to invest in advanced technologies, optimize production processes, and utilize resources more efficiently. Conversely, smaller enterprises may face numerous challenges when implementing cleaner production measures due to limitations in financial resources, human capital, and technology. This can lead to situations where the benefits gained do not sufficiently offset the initial investment costs.

From a sustainability perspective, firm size also moderates the relationship between ESG and innovation, as noted by Feng et al. (2025). The study indicates that larger firms possess greater resources to implement comprehensive ESG strategies, thereby enhancing ESG performance and fostering innovation by reducing financial barriers and encouraging internal creativity (Mardini, 2022). Additionally, environmental investments contribute to cost optimization, freeing up financial resources for innovation activities. With strong brand influence, large firms attract greater public and market attention, creating a spillover effect that encourages industry-wide emphasis on ESG and innovation (Saygili et al., 2022).

Furthermore, the moderating effect of firm size also positively influences corporate sustainability performance when combined with frugal innovation, as highlighted by Cuevas-Vargas et al. (2022). According to the study, the association between sustainability performance and frugal innovation is moderated by firm size. Larger firms tend to allocate much more budget to R&D, generate more innovations, and focus on durable, low-cost products that meet consumers' basic needs while minimizing environmental impact. Additionally, large firms have stronger ties to sustainability and corporate social responsibility due to greater regulatory and media pressures compared to smaller enterprises.

Therefore, the impact of CEP on SP may be moderated by enterprise size. Specifically, the relationship between CEP and SP intensifies with business size since larger organizations have the resources needed to successfully execute sustainable strategies.

Hypothesis 2: Firm size moderates the impact of circular economy practices on sustainable performance: The larger the firm, the stronger the relationship between circular economy practices and sustainable performance.

3. RESEARCH METHODOLOGY

3.1. Context

Vietnam's plastics industry is experiencing rapid growth, with production levels anticipated to reach 11.65 million tons by 2024 and forecasted to expand further to 16.36 million tons by 2029. This upward trend reflects a compound annual growth rate (CAGR) of 8.44%, highlighting the sector's increasing scale and development potential (General Statistics Office of Vietnam, 2024). The total revenue of the industry is forecasted at USD 31.1 billion in 2024, reflecting a 23.9% year-on-year increase, driven by rising domestic consumption and export market growth (Ministry of Industry and Trade, 2024).

Despite its positive growth trajectory, the industry faces structural challenges, particularly its high dependence on imported raw materials, which accounts for approximately 70% of total demand. This reliance not only elevates production costs but also affects the sector's competitiveness in global markets (Vietnam Plastics Association, 2024). Vietnam's plastic exports continue to demonstrate strong growth, with export turnover projected to reach USD 6.57 billion in 2024, a 26.79% increase compared to 2023. The country's key export destinations include the EU, China, Japan, South Korea, and the US (General Department of Customs, 2024). However, the industry must adapt to increasingly stringent environmental regulations, especially in major export markets such as the EU and the U.S., which have imposed restrictions on single-use plastics and introduced mandatory recycled content requirements (Ministry of Natural Resources and Environment, 2024).

Overall, the Vietnamese plastics industry is on a strong growth trajectory, with increasing production, revenue, and export volumes. However, to ensure long-term sustainability, the industry must continue efforts to reduce dependency on imported raw materials, enhance production technologies, and accelerate the implementation of circular economy solutions.

3.2. Sample

The study distributed 778 survey questionnaires to plastic enterprises, primarily through online channels. For businesses in Northern Vietnam, direct sampling was conducted. By the end of the official data collection period, 704 responses were received, yielding a relatively high response rate of 90.49 %, indicating strong participation from enterprises. However, after eliminating invalid responses, only 608 valid questionnaires remained for analysis. The descriptive statistics below assess the distribution of surveyed enterprises based on size (number of employees), operational region, and main products.

Table 1. Descriptive statistics of the study sample

Enterprise size (number of employees)	Quantity	%
<50	95	16
[50;100)	138	23
[100;200)	197	32
[200;500)	118	19
>=500	60	10
Operational region	**Quantity**	**%**
Northern	212	35
Central	68	11
Southern	328	54

Main products	Quantity	%
Packaging	238	39
Construction	157	26
Civil	126	21
Engineering	87	14

Source: Authors'own estimation

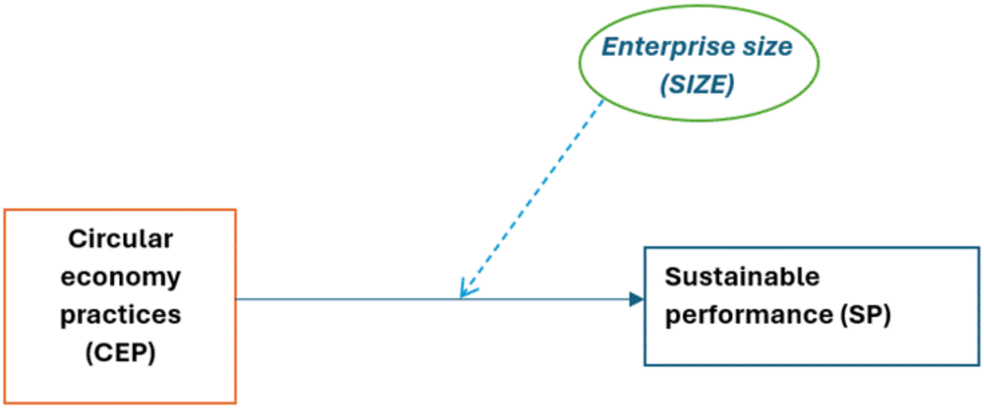

Figure 1. Research model

Source: Authors'own estimation

In which:

Independent variable: Circular Economy Practices (CEP) consists of three components: Management Systems, Eco-design, and Investment Recovery Practices.

Dependent variable: Sustainable Performance (SP) comprises three aspects: Economic, Social, and Environmental.

Moderating variable: Enterprise Size (SIZE).

This study utilizes Smart PLS 4.1 software to conduct data analysis within the PLS-SEM framework. The application of PLS-SEM adheres to a two-step methodology, encompassing the validation of the measurement model and the examination of the structural model. As noted by Hair et al. (2019a), this study applies a second-order construct, making PLS-SEM a fitting choice for assessing both reliability and relationships among variables.

3.3. Measurements

Survey data were assessed utilizing a Five-point Likert scale, with "strongly disagree" at the lowest point and "strongly agree" at the highest. To measure the variables in the research framework, scales adapted from prior studies were employed.

Circular economy practices (CEP)

The scales used to measure CEP were inherited from the study of Edwin Cheng et al. (2022). Grounded in stakeholder theory, CEP is conceptualized as a second-order construct comprising three first-order factors: MS - Management Systems, ED - Eco-design, and IRP - Investment Recovery Practices. The CEP construct is measured using a 15-item scale, capturing various dimensions of circular economy implementation within firms.

Sustainable performance (SP)

Sustainable performance (SP) is conceptualized as the harmonization of environmental, social, and economic dimensions within core business activities to optimize value. Drawing on prior studies, questions related to social, environmental, and economic performance were utilized to assess sustainable performance (Mousa and Othman, 2020). Respondents were asked to evaluate 14 sustainable performance items, using a Five-point Likert scale.

Enterprise size (SIZE)

The enterprise size (SIZE) variable is determined based on the number of employees in each enterprise, as collected through the survey questionnaire. Specifically, enterprises are categorized into five distinct categories: fewer than 50 employees, 50 to under 100 employees, 100 to under 200 employees, 200 to 500 employees, and 500 or more employees. This classification follows a structured approach commonly used in studies analyzing enterprise size as a moderating factor in corporate sustainability and innovation research. Similar categorizations have been referenced in studies such as Cuevas-Vargas et al. (2022), have investigated the moderating effect of enterprise size on the relationship between frugal innovation and sustainability performance. Adopting this framework allows for a systematic evaluation of how enterprise size influences the relationship between Circular Economy Practices (CEP) and Sustainable Performance (SP) within the study.

4. RESULTS

4.1. Measurement model

According to the proposal by Henseler et al. (2009), items with an Outer loading < 0.7 will be removed. The Table 1's results indicate that the items with Outer loading values below 0.7 are: SOCP2 (0.253), MS3 (0.255), MS5 (0.208), ED5 (0.309), IRP2 (0.289). These items will not be included in the study to ensure convergent validity Hair et al. (2019a). After removing the above items, the Outer loading values were re-evaluated, and none of them violated the criteria set by Henseler et al. (2009). Therefore, convergent validity will be evaluated for the variables (first-order constructs) through the AVE (Average Variance Extracted) coefficient, as suggested by Hair et al. (2019a). The estimated AVE coefficients from the Smart PLS are shown in Table 1. All AVE values in this study exceed 0.5, with the minimum value being 0.614, ensuring convergent validity as proposed by Hair et al. (2019a).

Table 1: Outer loading

Factor	Sub-dimension	Item	Outer loading	Outer loading	Cronbach's Alpha	rho_A	AVE	Outer VIF
SP (Sustainable performance)	ECOP (Economic performance)	ECOP1	0.766	0.766	0.953	0.957	0.644	2.297
		ECOP2	0.879	0.879				6.605
		ECOP3	0.809	0.809				4.363
		ECOP4	0.905	0.906				7.780
	ENVP (Environmental performance)	ENVP1	0.772	0.774				3.887
		ENVP2	0.734	0.734				3.355
		ENVP3	0.772	0.772				3.735
		ENVP4	0.798	0.797				3.684
		ENVP5	0.752	0.751				3.117
		SOCP1	0.918	0.918				8.231

	SOCP (Social Environment)	SOCP2	0.253					1.084
		SOCP3	0.875	0.874				5.340
		SOCP4	0.703	0.702				1.854
		SOCP5	0.706	0.708				1.955
Circular economy practices	MS (Management systems)	MS1	0.799	0.803	0.937	0.939	0.614	2.648
		MS2	0.773	0.775				2.387
		MS3	0.255					1.333
		MS4	0.781	0.785				2.477
		MS5	0.208					1.339
		MS6	0.762	0.763				2.279
	ED (Eco-design)	ED1	0.756	0.762				2.219
		ED2	0.849	0.854				4.502
		ED3	0.857	0.861				4.974
		ED4	0.800	0.806				4.401
		ED5	0.309					1.156
	IRP (Investment Recovery Practices)	IRP1	0.731	0.733				2.760
		IRP2	0.289					1.128
		IRP3	0.752	0.756				3.165
		IRP4	0.704	0.705				3.022
SIZE			1.000	1.000				1.000
SIZE x CEP			1.000	1.000				1.000

Source: Authors' own estimation

Discriminant validity is evaluated using the Heterotrait-Monotrait ratio (HTMT) criterion, as suggested by Henseler et al. (2015). To confirm that the constructs remain distinct and do not exhibit excessive overlap, which may introduce estimation bias, HTMT values should be below 0.85. The calculated HTMT values are summarized in Table 1, all of which fall below the 0.85 threshold, with the highest recorded value being 0.525. These results confirm that the constructs meet the requirements for discriminant validity (Henseler et al., 2015).

Table 2. HTMT Coefficients

	CEP	SIZE	SP	SIZE x CEP
CEP				
SIZE	0.049			
SP	0.525	0.268		
SIZE x CEP	0.315	0.067	0.335	

Source: Authors' own estimation

4.2. Structural model

The R-squared coefficient reflects the extent to which the structural model explains the variation of the factors involved. The findings suggest that the structural model accounts for 54.4% of the variation in SP.

Table 3. Structural model estimation result

	Path coefficient	**P-value**	**Significance**	**Support**
H1: Circular economy practices -> Sustainable Performance	0.649	0.000	1%	Yes
H2: Circular economy practices x Size -> Sustainable Performance	0.464	0.000	1%	Yes

Source: Authors'own estimation

Multicollinearity

The findings at level 5 indicate that all VIF coefficients are below 3.3, which meets the criteria set by Kock, N. (2015).

Table 4: Inner VIF

	VIF
CEP -> SP	1.106
SIZE -> SP	1.008
SIZE x CEP -> SP	1.109

Source: Authors' own estimation

Model fit: The results indicate that the model has an SRMR coefficient of less than 0.08, demonstrating its adequacy.

f-square

The results indicate that CEP and SP, along with SIZE x CEP and SP, share a strong relationship, as evidenced by an f-square value greater than 0.15 (Hair et al., 2022). In contrast, SIZE and SP do not show any correlation within the model, as the f-square value is less than 0.02.

Table 5. f-square

	CEP	SIZE	SP	SIZE x CEP
CEP			0.838	
SIZE			0.090	
SP				
SIZE x CEP			0.515	

Source: Authors' own estimation

4.3. Discussion

When not accounting for the effects of moderating variables, the impact of CEP on SP is supported at a significance level of 1%, with a p-value of $0.000 < 0.01$. The results of this study are consistent with the findings of Magnano et al. (2024) by demonstrating that CEP has a positive impact on SP through various aspects. Similarly, Yin et al. (2023) noted that there is a statistically positive relationship between CEP and two components of economic performance that are the market share and sales.

Furthermore, the positive effect size indicates a favorable relationship. The effect size of 0.649 is relatively high, suggesting that CEP has a substantial impact on SP. In other words, improvements in CEP will significantly enhance the SP of plastic businesses.

To evaluate the empirical model, the study employs the Bootstrapping technique using Smart PLS, yielding the following results:

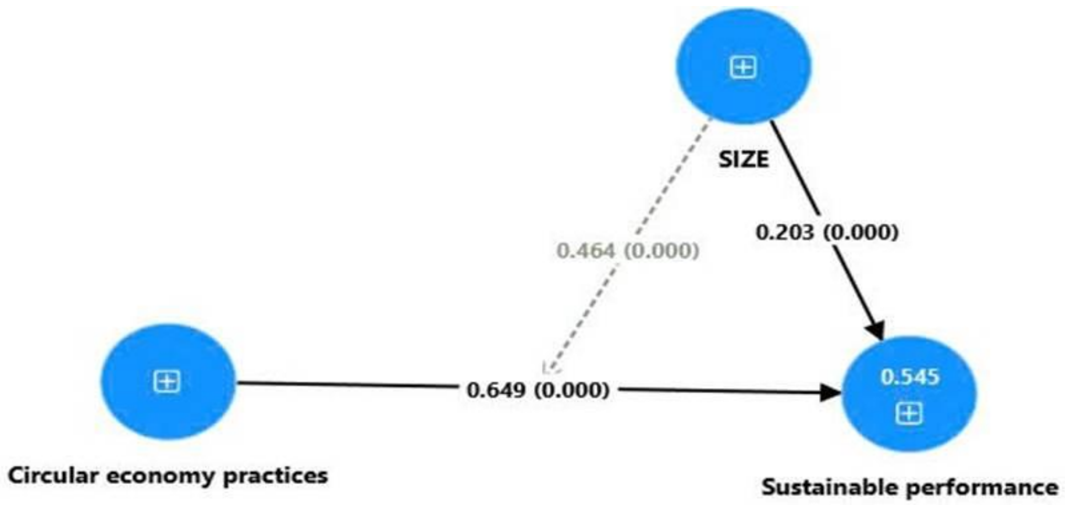

Figure 2. Results of Model Testing with Moderating Variable

Source: Authors' own estimation

The findings confirm that all effects in the model have a statistically significant level of 1% (p-values < 0.01), confirming support for H1 and H2. The results in Figure 1 ($\beta = 0.649$, $p < 0.001$) demonstrate that CEP has a positive and significant impact on SP.

To evaluate the moderating effect of enterprise size (SIZE**)** on the CEP-SP relationship, a two-stage approach was applied to assess the interaction. The results show that SIZE significantly moderates this relationship ($\beta = 0.464$, $p < 0.01$), suggesting that as firm size increases, the effect of CEP on SP strengthens. This implies that larger firms are better equipped to adopt circular economy practices, benefiting from greater financial capacity for R&D, innovation, and cost optimization. These findings align with Cuevas-Vargas et al. (2022), which emphasize that firm size is a critical determinant in strengthening the association between sustainability strategies and corporate performance.

More specifically, the study analyzes the moderating role of enterprise scale as follows:

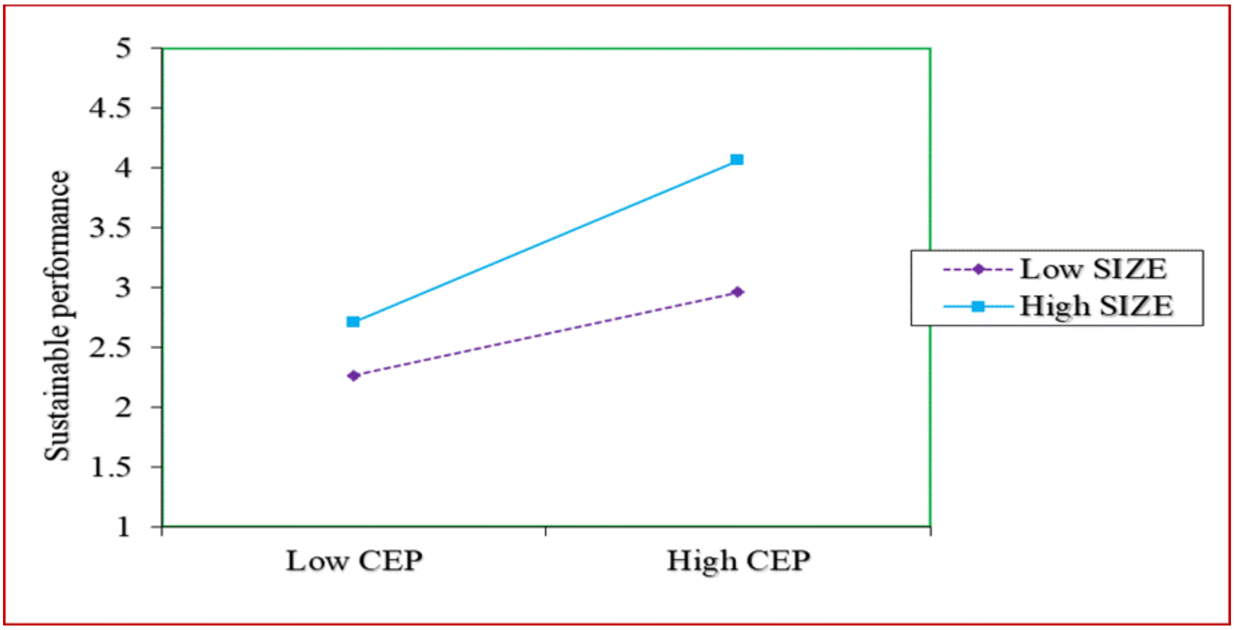

Figure 3. Moderating Role of Enterprise Scale

Source: Authors' own estimation

As illustrated in Figure 3, the High SIZE curve is positioned above the Low SIZE curve and exhibits a steeper slope, demonstrating that larger enterprises derive greater benefits from CEP implementation. This suggests that as enterprise size grows, the impact of CEP on SP becomes more substantial, reinforcing the idea that larger firms can better leverage sustainability strategies due to their enhanced resources and operational capacity.

Regardless of enterprise size, the adoption of CEP contributes to improved environmental performance. However, this effect is particularly significant for large enterprises, which benefit from well-defined processes, economies of scale, and higher production volumes. Larger firms can leverage circular economy initiatives more effectively due to their greater financial capacity, advanced technologies, and structured operational frameworks. These advantages enable them to optimize resource efficiency, reduce environmental impact, and enhance overall sustainability outcomes. Conversely, for smaller firms, the moderating effect is weaker, as reflected in the shallower slope of the Low SIZE curve. This implies that smaller enterprises may face challenges in implementing CEP due to resource constraints and limited scalability. Nonetheless, previous research suggests that small enterprises can still achieve sustainable performance by adopting flexible, cost-effective circular economy strategies and leveraging external support mechanisms (Cuevas-Vargas et al., 2022b).

These findings align with (Yin et al., 2023), who found that larger firms benefit from greater financial and technological resources, enabling more effective circular economy adoption and higher sustainability performance. In contrast, smaller enterprises face resource constraints, limiting CEP implementation. However, flexible, cost-effective strategies and external support can still help small firms enhance sustainability.

5. CONCLUSION AND POLICY IMPLICATIONS

In conclusion, circular economy practices (CEP) improve economic efficiency by reducing waste and conserving resources, with a clear positive link between CEP and sustainable business performance. The findings also highlight the moderating effect of enterprise scale, showing that larger enterprises experience a stronger relationship between CEP and sustainable performance. Regardless of size, enhancing CEP in plastic enterprises can drive higher sustainability. This is particularly significant for large-scale companies, where clear processes and substantial output allow circular economy practices to foster economies of scale while achieving both social and environmental goals.

To successfully implement a circular economy in Vietnam, the government must establish a clear legal framework that incentivizes businesses to adopt sustainable practices, drawing from successful models in countries like Germany, Japan, and China. A comprehensive long-term roadmap, with clear goals and financial mechanisms such as public-private partnerships (PPP) and green finance, should guide the country's transition. Policies must also address the shift in resource demand due to reduced fossil fuel use and increased renewable energy. Additionally, prioritizing scientific research and technological innovation will help optimize resources, reduce environmental impacts, and meet circular economy requirements.

For plastics enterprises, key actions include raising awareness about circular economy practices (CEP), as businesses must understand their responsibilities throughout the product life cycle. Investing in technological innovation is essential to enhance efficiency and promote the transformation to a circular economy. While initial investments may increase costs, adopting a long-term vision will ultimately lead to greater efficiency and competitive advantage once the circular economy system stabilizes.

The study identifies several limitations that may affect its findings. Firstly, the model focuses only on the plastics industry in Vietnam and only conducted in specific regions, which may inadequately capture the correlation between CEP and SP across the entire economy. Secondly, the subjective nature of the sustainable performance (SP) variable, which is based on responses to questions about environmental performance outcomes, could introduce measurement bias. Thirdly, a longitudinal approach would offer a more accurate understanding of the correlation over time by accounting for time delays and changes in practices. Fourthly, the study's consideration of time lags in the correlation between CEP and SP would improve measurement accuracy. We anticipate that our study will provide a strong basis for forthcoming works, providing valuable insights and a basis for further exploration of the link between circular economy practices and sustainable performance.

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