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The eco-friendly commodity supply chain strategy and competitive advantage on Indonesia plastic industry

Setiyo Purwanto[a*], Didin Hikmah Perkasa[b], Nur Endah Retno Wuryandari[a] and Ryani Dhyan Parashakti[a]

[a]*Fakultas Bisnis dan Ilmu Sosial, Universitas Dian Nusantara, Jakarta, Indonesia*
[b]*Fakultas Ekonomi dan Bisnis, Universitas Paramadina, Jakarta, Indonesia*

A B S T R A C T

The research aims to examine the role of supply chain strategy on eco-friendly commodity products and competitive advantage to improve financial performance of plastic recycling industries, export commitments and circular economic regulations as an intervening variable to see whether it will be better. This research involved a saturated sample of 176 employees in plastic recycle industries. Quantitative analysis was carried out through a survey approach using questionnaires and the Smart-PLS model structural analysis method. The interesting finding of this study is the eco-friendly commodity supply chain strategic and competitive advantage of plastic recycling products has a positive effect to improve financial performance. The circular economy regulation has a positive support also in this effect as well without any export commitment to the Indonesia plastic recycling industry. The importance of optimizing local resources in the eco-friendly commodities as recycling products to become a competitive advantage will be potentially in the export market.

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1. Introduction

Research on the use of plastic product waste has been carried out previously to provide an understanding that plastic product waste has a negative impact on the environment (Gunaalan et al., 2020), including air and land pollution (Zhang et al., 2020), even river water and sea, as a result several air habitats were found that feed on plastic waste (Blettler & Mitchell, 2021), so that if all of this is allowed to continue, it will affect climate change (M. Shen et al., 2020). Plastic waste will result in plastic waste compounds not being properly decomposed by the environment and causing a burden of environmental pollution. The price of plastic products is relatively cheap, easy to produce for various needs, making plastic product producers grow everywhere. This results in the use and volume of plastic waste becoming a major threat to the ecosystem. Based on data from the Indonesia Solid Waste Association in 2023, plastic waste is in second place with annual production of 5.4 million tons or 14 percent and this volume has surpassed paper waste which is now in third place with 3.6 million tons per year or contributing 9 percent of the total waste. This is increasingly becoming a concern for researchers regarding the magnitude of the problem of plastic waste management in Indonesia.

The current situation of plastic waste in Indonesia, the magnitude of the problem that needs immediate action, highlights the environmental challenges posed in Indonesia. This problem requires a waste management system to reduce the burden of environmental pollution, as well as encourage recycling practices in the form of other derivative products to fill local and export markets. This effort needs to receive attention from the government in the form of business tax incentives and ease of

* Corresponding author
E-mail address setiyo.purwanto@undira.ac.id (S. Purwanto)

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licensing so as to encourage the community to jointly implement effective strategies in overcoming plastic pollution and protecting the environment for future generations (Fossi et al., 2020).

On the global market, total plastic production is growing at an annual rate of 6.1% (Khaw-ngern et al., 2021). The largest medical equipment manufacturers in the world, such as America, contribute around 40% of plastic waste, followed by Europe and Japan (Duque, 2020). The high demand in the plastic health equipment sector has contributed to the spread of the burden of environmental pollution increasingly to developing countries in the Asia-Pacific region (Rajbhandari et al., 2023). Failure to manage medical waste from plastic produces plastic fragments on the coastline (Chugh, 2024). According to the Ministry of Environment and Forestry (KLHK), the results of monitoring medium-sized and large-sized waste, it is estimated that the total national marine waste is around 1.2 million tons and the estimated total national plastic waste is around 490 thousand tons.

The circular economy concept is believed by researchers to be one solution to overcome the problem of plastic use and plastic waste management by involving plastic product users to maximize the reuse of plastic products and implementing processing strategies to become pelletizing as raw material for derivative plastic products that still have economic value. high, so this will reduce dependence on pure plastic (Rizan et al., 2020). This is very different from the concept of traditional linear economic models, which do not show a sustainable utilization process. The transformation of the concept from a linear economy consisting of a take-make-dispose process to a circular economy that changes waste into a recycling process is a model for strategic change to overcome the problem of plastic waste in Indonesia (Kurniawan et al., 2022; Kevin van Langen et al., 2021; Panuvatvanich & Limphitakphong, 2023).

The process of transforming a linear into a circular economy requires a set up concept from process design, handling plastic recycling products into manufacturing, (Cruz Sanchez et al., 2020) designing efficient collection, sorting and recycling systems. This approach not only addresses the environmental challenges posed by plastic waste but also presents economic opportunities by reducing the environmental burden, creating new jobs in plastic recycling and plastic pellet manufacturing activities, encouraging innovation in the design of other sustainable derivative products. When companies adopt the circular economy concept, they strive to achieve operations to minimize waste production and resource consumption (Cruz Sanchez et al., 2020). Thus, companies can reduce production costs, increase operational efficiency, and increase their overall competitiveness in the market (Fahlevi et al., 2023).

Circular economy regulation (CER) in its implementation can develop new business models centered on increasing the efficiency of product recycling (Urbinati et al., 2017). The plastic recycling industry has the opportunity to enter the remanufacturing sector, which is the creation of a new way to generate income by taking advantage of opportunities in increasing market demand for sustainable products and materials. Consumer society currently has a preference for products from manufacturers that are environmentally responsible (Ahmad et al., 2023). Caring for the environment that is demonstrated in real terms by implementing the circular economy concept will improve the public image (Kevin & Langen et al., 2021), strengthen relations with the world community (Shirinbakhsh & Harvey, 2021), and ensure compliance with developing environmental regulations, thereby maintaining long-term market relevance in mitigating reputation risks (Goovaerts & Verbeek, 2018). But the transition to a circular economy also poses certain challenges for companies, especially the need for investment in technology, infrastructure and workforce retraining. For this reason, strategic planning, targeted investment and the application of a long-term perspective are needed that recognize the potential advantages and benefits of implementing a circular economy model (Urbinati et al., 2017).

An important consideration regarding the implementation of a circular economy in the context of financial performance (FP), (Nieto, 2024; Lahcen et al., 2021), which is strengthened through eco-friendly of supply chain strategies for commodity products, (Amicarelli et al., 2021; Syberg et al., 2021) with competitive advantages (CA) and export commitment (EC), (Johansen et al., 2022). Adopting a circular economy model is in line with corporate finance principles in the decision-making process. This principle allows companies to see long-term benefits in ongoing efforts to effectively reduce environmental risks by prioritizing environmentally responsible procurement, production and distribution processes. In this way, companies can reduce their carbon footprint, while creating a competitive advantage in a market that increasingly values eco green products. Management's export commitment also plays an important role in shaping the company's financial performance in reducing domestic plastic waste. Incentives from the government which are strengthened in regulations will increase the enthusiasm of players in the plastic recycling industry for export purposes and further improve their performance. Companies that proactively implement circular economics in their operations will gain strategic advantages in accessing and utilizing recycled materials and components in their plastic derivative products.

2. Literature Review

2.1 The Eco-Friendly Commodity Supply Chain Strategic

Despite extensive research on coordination to foster primary growth, there is a growing trend towards a more strategic approach to managing business operations. Many believe that strategic activities across organizational boundaries represent a

new frontier for competitive advantage. In this context, (Hussain, 2020) highlighted the significant impact of strategic supply chain management on financial performance. The eco-friendly commodities supply chain strategy (ECSCS) encompasses a wide range of issues and involves various decision-making activities that affect a company's long-term growth and processes (Siagian et al., 2021). These include determining the number, location, and capacity of warehouses and manufacturing plants, managing material flow through different logistics networks, inventory management policies, supply contracts, distribution strategies, procurement strategies, supply chain integration, outsourcing, product design, and information technology (Lahane et al., 2020). Commodity strategic supply chain management helps resolve various issues and enhances overall performance. According to (Kazancoglu, 2018), strategic supply chain management has a notable relationship with industry performance, providing various strategies in decision making, products, and services that increase performance through innovation in supply chain procedures. Strategies in supply chain management enhance valuable services and the entire distribution process, which positively impacts performance by satisfying customers (Li, 2021). Studies such as those by Bressanelli (2019) and Kazancoglu (2018) support the argument that strategic supply chain strategy has a significant relationship with financial performance.

2.2 Financial Performance

Financial performance, encompassing profitability, efficiency, and market share, is significantly influenced by eco-friendly supply chains, competitive advantage, and export commitment. Theories such as the Resource-Based View (RBV) and Porter's competitive advantage framework emphasize that unique resources, capabilities, and strategic positioning drive better financial outcomes (Harney & Alkhalaf, 2021). Incorporating sustainability through the circular economy regulation, which focuses on reducing waste and reusing materials, can enhance a company’s reputation, lower costs, and attract environmentally conscious customers, thereby improving financial performance (Phan et al., 2019).

Empirical studies support the positive impact of these factors on financial performance (Grover & Dresner, 2022; Troise et al., 2022). For instance, companies that adopt green supply chain practices often report improved financial outcomes due to cost savings and enhanced market reputation (Yu, 2019). Firms in the recycling industry, such as those dealing with plastic recycling in Indonesia, can gain competitive advantages through innovation and efficiency, leading to better financial results (Agyabeng-Mensah, 2020). Additionally, a strong commitment to exporting can open up larger markets and diversify revenue streams, further boosting financial performance. Thus, strategically integrating eco-friendly practices, leveraging competitive strengths, and committing to exports are crucial for enhancing financial firm performance in today’s global market (Jiakui, 2023).

2.3 Competitive Advantage

Competitive advantage is a cornerstone concept in strategic management and business success (Farida & Nuryakin, 2021). It refers to the attributes that allow a company to outperform its rivals. Michael Porter, a pioneer in competitive strategy, delineates three primary sources of competitive advantage: cost leadership, differentiation, and focus (Purwanto, 2019). Cost leadership involves becoming the lowest-cost producer in the industry, allowing the firm to offer lower prices than competitors (Chen et al., 2020). Differentiation, on the other hand, entails offering unique products or services that are valued by customers, leading to brand loyalty and the ability to charge premium prices. These strategies, individually or in combination, help firms create and sustain a competitive edge in the marketplace, enhancing their profitability and market share (Zameer, 2020). In the context of a circular economy, competitive advantage can be achieved through sustainable practices that not only reduce environmental impact but also enhance operational efficiency and customer value (Susiati et al., 2023). Companies that integrate eco-friendly processes, such as recycling and the use of sustainable materials, can differentiate themselves in the market. They attract environmentally conscious consumers and comply with increasing regulatory demands for sustainability (Wang, 2019). Additionally, these practices can lead to cost savings through more efficient resource use and waste reduction (Susiati et al., 2023). In the case of the plastic recycling industry in Indonesia, leveraging these sustainable practices can create a strong competitive advantage. Firms can position themselves as leaders in environmental stewardship, thereby enhancing their brand reputation and opening new markets, especially in regions with stringent environmental standards (Tu, 2021). This strategic approach not only contributes to a healthier planet but also drives long-term financial performance and resilience (Sellitto, 2020).

2.4 Export Commitment

Export commitment is a critical factor for firms looking to expand their operations into international markets. It involves a strategic dedication to consistently allocate resources, such as capital, management attention, and labor, toward developing and maintaining export activities (Haddoud, 2021). According to the (Uwizeyemungu, 2022), firms gradually increase their commitment to foreign markets through a series of incremental steps, starting from sporadic exporting to establishing subsidiaries abroad. This process is driven by experiential knowledge and the growing recognition of opportunities in foreign markets. A high level of export commitment can lead to improved performance by allowing firms to better understand and adapt to foreign market conditions, build robust distribution networks, and establish long-term relationships with international customers (Ahamed, 2022).

In the context of the plastic recycling industry in Indonesia, export commitment is crucial for penetrating and succeeding in competitive global markets. Firms with strong export commitment are more likely to invest in quality improvements, certifications, and innovations that meet international standards, thereby enhancing their competitive edge (Mahmoud, 2020). Additionally, committed exporters often engage in extensive market research and participate in international trade shows to better understand market dynamics and customer preferences (Vidigal, 2022). This strategic focus on exports not only diversified revenue streams but also mitigates risks associated with dependence on the domestic market. By demonstrating a robust commitment to export activities, Indonesian plastic recycling firms can achieve greater market penetration, increased sales, and improved financial performance, ultimately contributing to the country's economic growth and sustainability objectives (Gomar-Alba, 2022) .

2.5 Circular Economy Regulation Moderating Eco-friendly Commodity Supply Chain Strategic

The plastic recycling industry has gained significant attention as a pivotal component of the circular economy regulation, aimed at reducing environmental impact and promoting sustainable resource use (Johansen et al., 2022). Recycling plastic not only mitigates pollution and conserves natural resources but also provides economic benefits by creating new business opportunities and jobs (Almeshal, 2020). Technological advancements have enhanced the efficiency and quality of recycled plastic products, enabling their use in a wide range of applications from packaging to automotive parts (Basha, 2020). In Indonesia, the plastic recycling sector is emerging as a critical industry, driven by increasing environmental awareness, regulatory pressures, and the global demand for sustainable products, (Gopi, 2020). Studies indicate that eco-friendly commodity recycled plastic products into supply chain strategic one choice strategy to lower production costs and reduce the carbon footprint, thereby offering competitive prices in domestic and international markets potentially, (Meneses et al., 2022). Furthermore, Indonesian companies that excel in plastic recycling can leverage export opportunities, meeting the growing international demand for eco-friendly materials and contributing to global sustainability goals.

3. Research Hypothesis

The research problem formulation is expressed in the form of a question sentence which the truth should still be tested empirically, namely:

3.1 The correlation between the competitive advantage and financial performance

Previous research has consistently highlighted the critical role of competitive advantage (CA) in enhancing financial performance (FP). For instance, a study by Almumani and Almazari (2021) found that firms with strong differentiation strategies significantly outperformed their peers in terms of profitability and market share. Similarly, Zameer (2020) demonstrated that cost leadership strategies led to increased operational efficiencies and higher profit margins. Furthermore, an analysis by Grover and Dresner (2022) indicated that firms focusing on sustainable practices and innovation gained a substantial competitive edge, resulting in improved financial outcomes. These findings underscore the importance of competitive advantage as a driver of financial success, supporting the proposed hypothesis that firms in the plastic recycling industry can strengthen their financial performance through strategic competitive positioning (Mikalef, 2020).

H_1: *There is a relationship between competitive advantage and financial performance.*

3.2 The Relationship between eco-friendly commodity supply chain strategic and financial performance

Studies have shown that firms adopting eco-friendly of commodities supply chain strategic (ECSC), such as efficient resource utilization, waste minimization, and sustainable sourcing, experience significant improvements in their financial performance (Liu, 2018). For example, a study by Liu (2018) indicated that companies integrating circular economy practices into their supply chains reported higher profitability and market share. Similarly, research by Giudice (2020) demonstrated that strategic supply chain initiatives led to cost reductions and enhanced competitive advantage, thereby boosting financial outcomes. These findings underscore the importance of aligning supply chain strategies with sustainability goals to drive financial success.

H_2: *There is a relationship between eco-friendly commodity supply chain strategic and financial performance.*

3.3 The Relationship between the competitive advantage and export commitment

According to study by Couraud (2022) revealed that companies with differentiated eco-friendly products showed higher levels of export commitment (EC), resulting in greater market penetration and sales growth. Additionally, research by (Singh, 2021) found that cost leadership in sustainable practices allowed firms to allocate more resources towards exporting, thus enhancing their international presence and financial performance. These findings highlight the critical interplay between developing a competitive edge and maintaining a strong commitment to export activities in achieving global market success.

H3: *There is a relationship between competitive advantage and export commitment.*

3.4 The Relationship between eco-friendly commodity supply chain strategic and export commitment

Studies have shown that companies employing eco-friendly of commodities supply chain strategic characterized by efficient resource utilization, sustainable sourcing, and waste minimization tend to exhibit higher levels of export commitment, (Siagian et al., 2021). For example, a study by (Lahcen et al., 2021) found that firms with well-optimized supply chains were better positioned to meet international standards and consumer expectations, thereby increasing their export activities. Similarly, research by (Farida & Nuryakin, 2021) demonstrated that companies with sustainable and strategically managed supply chains were more likely to invest in and commit to exporting, as these practices not only reduced costs but also enhanced their competitive advantage in global markets (Muhammad Yusuf et al., 2022). These findings underscore the critical role of strategic supply chain management in fostering strong export commitment and achieving success in international markets.

H4: *There is a relationship between eco-friendly commodity supply chain strategy and export commitment.*

3.5 Circular economy regulation moderates the relationship between eco-friendly commodity supply chain strategic and financial performance

Incorporating circular economy regulations into business practices is hypothesized to moderate the relationship between competitive advantage and export commitment. Specifically, companies that adopt circular economy principles may leverage these regulations to enhance their eco-friendly commodities supply chain strategy, thereby increasing their commitment to exporting activities (Susiati et al., 2023). Previous research by (Lahcen et al., 2021) suggests that circular economy practices can lead to improved resource efficiency and innovation, which are critical for gaining a competitive edge. However, how these regulations influence the export commitment of firms with varying degrees of competitive advantage remains under-explored (Giudice, 2020). This study aims to fill this gap by examining whether the adoption of circular economy regulations amplifies the positive effects of competitive advantage on export commitment. The implementation of circular economy regulations moderates the relationship between eco-friendly commodities supply chain strategic and financial performance in a significant manner (Blomsma, 2019). Specifically, the adoption of circular economy practices can enhance the efficiency and sustainability of supply chains for strategic commodities, which in turn strengthens the commitment of firms to exporting activities. Previous research by (Hussain, 2020) highlighted the potential benefits of circular economy practices in improving supply chain resilience and reducing environmental impact. Updated studies, such as those by (Bag, 2022), further elaborate on how circular economy regulations can provide a framework for more sustainable and economically viable supply chains, thereby potentially increasing the propensity of companies to improve financial performance.

H5: *Circular economy regulation moderates the relationship between eco-friendly commodity supply chain strategic and financial performance.*

3.6 The relationship between export commitment and financial performance

Studies indicate that companies actively engaged in exporting activities tend to experience higher revenue growth, profitability, and market valuation compared to their non-exporting counterparts (Khan, 2021b). For example, research by Kravchenko (2019) demonstrated that companies with strong export commitment achieved higher sales volumes and improved profitability, attributed to the access to larger markets and diversified revenue streams. Additionally, findings from a study by (Sdiri, 2023) showed that export-oriented companies exhibited greater resilience to economic fluctuations and were more capable of capitalizing on global market opportunities, leading to enhanced financial outcomes. These studies underscore the strategic importance of export commitment in driving financial performance, highlighting its role in expanding market reach, reducing dependence on domestic markets, and fostering sustainable growth in an increasingly globalized economy (Ahamed, 2022).

H6: *There is a relationship between export commitment and financial performance.*

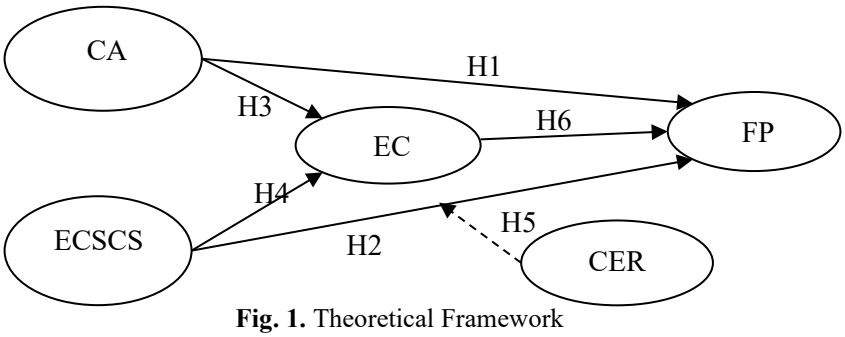

Fig. 1. Theoretical Framework

4. Methodology

4.1 Research Design and Approach

This study utilizes a quantitative research design, specifically Partial Least Squares Structural Equation Modeling (PLS-SEM) (Kaya, 2020), to examine the influence of competitive advantage, strategic commodities supply chain, financial firm performance, circular economy regulations and export commitment. The selection of PLS-SEM is intentional, as it is an effective method for analyzing complex models and is well suited for exploratory studies in emerging research areas (Khan, 2021). By selecting plastic recycling companies in Indonesia as the focal point of investigation, this study gains strength, as this sector faces unique environmental, regulatory, and supply chain complexities and opportunities (Hahladakis et al., 2020). Considering the pivotal role of plastic recycling manufacturers in advancing social welfare and environmental responsibility, it is essential to comprehensively grasp the facets of each variable in this framework to effectively promote sustainable practices within this industry (L. Shen & Worrell, 2024).

4.2 Data Collection and samples

The current study's sample consisted of firms involved in plastic recycling in Indonesia, encompassing all such companies in the country. Managerial employees from these firms served as respondents for this survey, which was conducted online in July 2024. Each participant received a survey link along with a letter introducing the researcher and outlining the research objectives, with assurances of confidentiality for their responses. To encourage participation, three reminders were sent at different intervals. Email addresses were sourced from the head offices of the Indonesian plastic recycling companies. A total of 300 questionnaires were distributed, resulting in 176 valid responses. According to (Sekaran, 2017), this response rate is deemed adequate for email surveys. Consequently, the analysis focused on these 176 responses to achieve the study objectives. Furthermore, following the guideline by (Sekaran, 2017), a response rate of 176 is considered sufficient for data analysis. After data collection, response bias was assessed, revealing no significant differences between early and late responses, thereby allowing the study to proceed with further analysis.

5. Results and Discussion

5.1 Result

5.1.1 Instrument Test

Construct Validity and Reliability Test

The validity and reliability analysis consists of each construct, which serve as measures of the central tendency and dispersion of respondents' answers, respectively (Midha & Tomar, 2024). The information presented in Tables 1 presents the findings of our extensive statistical analysis of the data collected from the survey. Confirmation and validation of the construct measures under investigation are contingent upon this analysis (Nieto, 2024). We strictly adhered to reliability and validity standards in our analysis. Each item's suitability for its relevant concept was evaluated using factor loadings of 0.7 or higher (Lahcen et al., 2021). Furthermore, we evaluated the internal consistency of the constructs using Cronbach's alpha and composite reliability, where a benchmark of 0.7 denotes sufficient reliability (Reeder, 2016). To ensure that each construct captures more variation across items than would be caused by measurement error (Purwanto, 2019). Our designs have an internal consistency and a strong factorial structure, as shown by the data in Table 1.

Table 1
Validity and Reliability Test

Variables	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
CA	0.880	0.881	0.912	0.675
CER	0.924	0.928	0.937	0.599
EC	0.718	0.718	0.825	0.542
ECSCS	0.829	0.842	0.876	0.546
FP	0.880	0.890	0.906	0.551
Moderating Effect CER	1.000	1.000	1.000	1.000

Source: Data processing from Smart PLS 3.29

The survey items were well-crafted and accurately resonated from the respondents' viewpoints, as indicated by the strong factor loadings seen across the board. The constructs are consistently measured by our items, as seen by the high Cronbach's alpha and composite reliability values that surpass our 0.7 standard for the majority of the constructs (Panuvatvanich & Limphitakphong, 2023). Based on the results of the construct reliability and validity test from the analysis of X1 = CA, X2 = ECSCS, Z= EC, M= CER and Y = FP, it shows Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE) on each variable looks valid and reliable, because it has met the prerequisite test of research data as follows:

a) Convergent Validity: indicators are considered valid if the Cronbach's Alpha coefficient value is> 0.70, and the research indicator test results show > 0.70.

b) Discriminant Validity: indicators are considered valid if the Average Variance Extracted (AVE) on each variable is > 0.50.
c) Composite Reliability: indicators are considered reliable if the Composite Reliability on each variable is > 0.70.

Multicollinearity Test

Table 2
Multicollinearity Test

Inner VIF Values	VIF	Description
CA → EC	3.222	No multicollinearity
CA → FP	3.579	No multicollinearity
EC → FP	3.192	No multicollinearity
ECSCS → EC	3.222	No multicollinearity
CER → FP Moderating Effect	4.332	No multicollinearity

Source: Data processing with SmartPLS 3.3

Based on Table 2 above, the results of the collinearity statistics (VIF) test where the VIF test requirements < 5, it can be seen that the CA and ECSCS independent variables on the mediation and dependent variable have met the test requirements so that it can be explained that there are no symptoms of multicollinearity. The test results of the variable value of CA on EC amounted to 3.222 then the variable of CA on FP amounted to 3.579 and the value of EC on FP amounted to 3.192. Meanwhile, the variable value of ECSCS on EC amounted to 3.222 then the moderating effect of CER variable on FP amounted to 4.332 and the moderating effect of CER on ECSCS to FP amounted to 1.365. The coefficient determination test results can be seen in Table 3 below:

Table 3
Coefficient Determination Test

	R Square	R Square Adjusted
EC	0.602	0.597
FP	0.964	0.963

Source: Data processing from Smart PLS 3.29

Furthermore, the coefficient of determination (R-square adjusted) is used to assess how much the dependent variable is influenced by the moderation and independent variables together. The R^2 adjusted value of EC obtained is 0.597, meaning that the effect of the moderation variables together is 59.7%. Then the R^2 adjusted value of FP obtained is 0.963, meaning that the effect of the moderation variables together is 96.3% while 3.7% of the dependent variable is still influenced by other variables.

Structural Model

The PLS Algorithm technique depicted in Fig. 1 is highly effective in the context of PLS-SEM because of its ability to operate without assuming data normality (Lahcen et al., 2021), making it a reliable approach in situations with limited sample sizes or when the normal distribution of the data cannot be assumed.

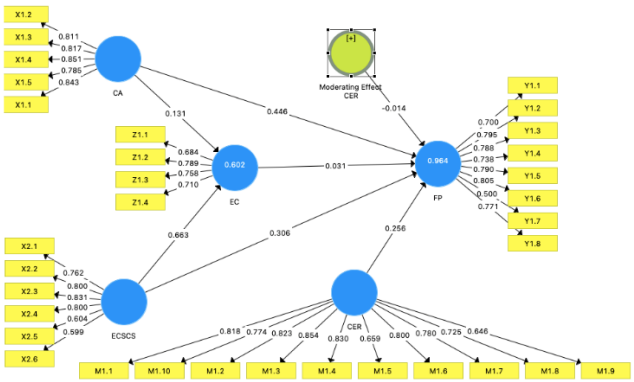

Fig. 1. Structure Model

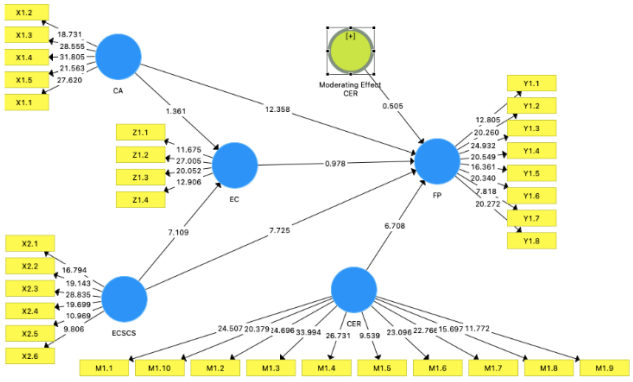

Fig. 2. Hypothesis Test

Source: Data processing from Smart PLS 3.29

Hypothesis Test

Fig. 2. bootstrapping highlights major relationships, such as CA (Construct A) → FP (Construct E) with a t-value of 12.404, demonstrating that CA has a strong and statistically significant influence on FP.

This study includes path coefficients and accompanying t-values (in parenthesis) to determine the statistical significance of the correlations. Asterisks indicate significance levels. The path coefficients in the original sample indicate the strength and direction of each association, while the t-values provide statistical support for these conclusions. Other routes, including CA → EC had no significance but CA → FP had indicating significant influences. The Moderating Effect of CER to FP has a lesser t-value of 0.505, indicating that it may not be statistically significant. T-values demonstrate the relevance of both measurement and structural models, which aids in validating the model's stated hypotheses.

Table 4
Hypothesis Test

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics O/STDEV)	P Values
CA → EC	0.131	0.126	0.096	1.361	0.174
CA → FP	0.446	0.445	0.036	12.358	0.000
CER → FP	0.256	0.244	0.038	6.708	0.000
EC → FP	0.031	0.041	0.032	0.978	0.328
ECSCS → EC	0.663	0.668	0.093	7.109	0.000
ECSCS → FP	0.306	0.307	0.040	7.725	0.000
Moderating Effect CER → FP	-0.014	-0.031	0.028	0.505	0.614

Source: Data processing from Smart PLS 3.29

Based on the hypothesis analysis above, it can be explained that the partial statistical t value of 12.358 and p value 0.000 > 0.05 means that the CA relationship does positively affect significance to FP, so H1 is accepted. Meanwhile, the hypothesis analysis with a partial statistical t value of 7.725 and a p value of 0.000 > 0.05 means that the ECSCS relationship does positively affect significant to FP, so H2 is accepted. However, the hypothesis analysis with a partial statistical t value of 1.361 and a p value of 0.174 > 0.05 means that the CA Effect relationship positively affects not significant to EC, so H3 is rejected. Furthermore, the hypothesis analysis with a partial statistical t value of 7.109 and a p value of 0.000 > 0.05 means that the ECSCS relationship does positively affect significant to EC, so H4 is accepted. Then, the hypothesis analysis with a partial statistical t value of 0.505 and a p value of 0.614 > 0.05 means that the CER moderating effect relationship positively affects not significant ECSCS to FP, so H5 is rejected. The last analysis hypothesis with a partial statistical t value of 0.978 and a p value of 0.378 > 0.05 means that the EC mediating affect relationship positively affects not significant to FP, so H6 is rejected.

Table 5
Indirect effect

	Original Sample (O)	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values**
CA → EC → FP	0.004	0.005	0.006	0.689	**0.491**
ECSCS → EC → FP	0.021	0.028	0.022	0.935	**0.350**

Source: Data processing from Smart PLS 3.29

Besides that, on the indirect affect analysis above, it can be explained that the statistical t value of 0.689 and p value 0.491 > 0.05 means that the EC variable that doesn't significant mediating relationship between CA to FP. Meanwhile, the indirect affect analysis with a statistical t value is 0.935 and a p value of 0.350 > 0.05 means that the EC does not have any significant mediating relationship between ECSCS to FP.

6. Discussion

The growing problem of plastic waste in Indonesia presents a major environmental issue with extensive implications, as demonstrated by (Lahcen et al., 2021; Cahayani et al., 2023) and (Purwanto & Perkasa, 2023). The dangers of this widespread waste include pollution of essential water and soil resources, threats to wildlife, and worsening climate change, as discussed by (Syberg et al., 2021; Khalid, 2024; Bhullar & Prabhakar, 2024; Capetillo et al., 2022). Reports from (IEA, 2022) highlight the need for urgent and strategic actions.

In the results of the analysis of hypothesis one above, where it was found that there was influence between competitive advantage and financial performance. This will also increase demand for healthcare, especially in developing countries, is expected to drive further growth in the medical plastics sector, which already faces significant environmental issues and thus will represent an opportunity for economical of scale (Pizzi, 2021); (Hu, 2021); (Jouzdani, 2021); (Saha & Mathew, 2022).

Adopting a circular economy, as suggested by (Pascale, 2021), the eco-friendly commodities supply chain strategic affect to financial performance that found improve to approach involves reducing plastic use, prolonging material life cycles, and improving resource efficiency through the reuse and recycling of products. This transformative strategy aligns with environmental accounting principles and is essential for addressing the plastic waste management challenges in Indonesia (Subekti, 2023; Cahayani et al., 2023; Fatimah, 2020). However, the competitive advantage does not need to be mediated by export commitment because this is related to trade agreement, but different with eco-friendly commodities supply chain strategic has a significant direct effect to do export commitment and improve financial performance. The export commitment as a mediating variable has no effect on financial performance, it was proven that export commitment has no significant relationship positively affects to financial performance. The circular economy regulation as a moderation effect, it cannot

strengthen eco-friendly commodities supply chain strategic to financial performance, because regulation is only rule given and there are no effect incentive for plastic recycling business sector.

7. Conclusion

This study focuses on the implementation of the eco-friendly commodities supply chain strategic and competitive advantage which respectively increase financial performance. It reveals that the eco-friendly commodities has a significant effect on the export commitment of plastic recycling products because it includes a system of supply chain strategy but it has nothing to do with competitive advantage. The regulation of the circular economy has a positive effect on financial performance. This regulation regulates how plastic recycling can be used so that it can add economic value to the companies and create the jobs to support the daily economy of community living. So, the finding of this study is that the eco-friendly commodity supply chain strategic and competitive advantage of plastic recycling products has a positive effect to improve financial performance. The circular economy regulation has a positive support also in this effect as well without any export commitment to the Indonesia plastic recycling industry.

8. Limitation and implication

This research suggests to the business practitioners and other stakeholders as well as further researchers who can be explained it that these findings as scientific insights and be references in decision making on business and public policy. Furthermore, for future researchers, this research still has the potential to develop with other variables that through from meta data analysis as implementation regulation of circular economy will be more meaningful for who is doing on recycle industries in Indonesia. The research limitations are realized from the size of the area, the lack of research samples and the accuracy of the selection variables. Hopefully, in future research can lead to better results.

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