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Effect of Eco-Innovation, GSCM, and CE Capability on Performance of MSMEs

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Abstract: *This study aims to determine and analyze the effect of eco-innovation on green supply chain management, circular economy capability, and firm performance of MSMEs. This is a survey study with a questionnaire as a data collection tool. The population in this study is the MSMEs in the processed salak culinary industry in Sleman Regency. The data used in this study are primary data from 50 respondents using purposive sampling. Hypothesis testing uses Partial Least Squares (PLS) with SmartPLS 4. The results of this study indicate that 1) eco-innovation has a positive and significant effect on firm performance, 2) eco-innovation has a positive and significant effect on green supply chain management, 3) eco-innovation has a positive and significant effect on circular economy capability, 4) green supply chain management has no significant effect on firm performance, 5) circular economy capability has a positive and significant effect on firm performance.*

Keywords: *Circular economy capability; Eco-innovation; Firm performance; Green supply chain management*

1. Introduction

In this era of globalization, there are many environmental issues, such as environmental pollution by industrial waste and ecosystem damage that can damage biodiversity, to the emergence of health problems due to environmental pollution caused by industrial waste, so that there is a need to increase awareness of environmental issues with the concept of sustainability in various industrial sectors. Indonesia is committed to achieving a maximum of Net Zero Emissions by 2060. Net Zero Emission (NZE) is a condition where the carbon emissions do not exceed the Earth's absorption capacity. It is necessary to transition from the current energy system to a clean one, creating a balance between human and natural activities. The primary focus is the carbon footprint produced by human activities over a specific period, where reducing the carbon footprint is key to avoiding adverse impacts such as drought, lack of clean water sources, extreme weather, changes in the food chain, and other natural damage. As an effort to implement NZE, the Indonesian government has implemented five main principles to reduce the carbon footprint, namely: (1) increasing the use of new renewable energy (EBT), (2) reducing fossil energy, (3) using electric vehicles in the transportation sector, (4) increasing the use of electricity in households and industry, and (5) utilizing Carbon Capture and Storage (CCS). Indonesia also declared an emission reduction target listed in the Nationally Determined Contribution (NDC) document, where Indonesia raised the emission reduction target to 31.89% in 2030 with an international support target of 43.20%. As an effort by the government to achieve this target, the government has prepared several schemes, including minimizing organic materials and

changing the mindset of the community to be clean, green, and sustainable (Limanseto, 2021).

MSMEs produce greenhouse gas emissions that are responsible for the climate crisis. The estimated energy emissions from MSMEs reached 216 MtCO2 in 2023, equivalent to half of the national industrial sector emissions in 2022. MSMEs must be significant in achieving Net Zero Emission (NZE) 2060. A study at the IESR (Institute for Essential Services Reform) found that 95 percent of MSME emissions come from burning fossil fuels, so the government has begun to identify opportunities and challenges for reducing greenhouse gas emissions (Hasjanah & Simanjuntak, 2024). As contributors to emissions, MSMEs should contribute to reducing these emissions. MSMEs that implement NZE will not only support the sustainability agenda but can also attract new environmentally conscious markets, increase operational efficiency, and reduce long-term costs such as the use of fossil fuels. To that end, they can implement eco-innovation, green supply chain management, and circular economy capability. Indonesia is also the second-largest producer of plastic waste after China. Some of the basic things related to waste management include the low capacity of local governments in managing waste, the indifference of the Indonesian people to the environment, the increasing trend of waste, low industrial responsibility, regulatory problems, and the last one is related to waste imports. With this phenomenon, the Indonesian government needs to evaluate waste management policies in Indonesia (Maskun et al., 2022).

One of the MSME sectors in Sleman Regency that has excellent potential to continue to grow is the salak processed culinary industry. Salak is one of the leading commodities from Sleman Regency, with a total salak production in 2023 of 435,730 quintals. Meanwhile, in other districts such as Kulon Progo Regency, only 32,540 quintals, Bantul Regency, 101 quintals, Gunung Kidul Regency, 42 quintals, and Yogyakarta City do not produce salak. With a production figure of 435,730 quintals, salak is the fruit with the second highest production after bananas, with a total production of 550,438 quintals (BPS Provinsi DIY, 2024). Salak production showed significant results, with the plantation area decreasing from the initial 2163.43 Ha in 2019, but in 2023, it will only be 1240.5 Ha. However, with a decrease in the area of 5 plantations by 42%, the decrease in production was only 5.13%. So that this is a success in increasing the productivity of Sleman salak with salak profits in 2019 of 235.60 quintals per hectare, while in 2023 it will be 390.08 quintals per hectare, or an increase of 65.56%. The production also got the opportunity to export to Cambodia, carried out by PT Serena Sejahtera with the help of the Ministry of Trade in 2021. This export is worth USD 15 thousand with a total of 60 tons of salak and involves around 1200 farmers (Pemerintah Kabupaten Sleman, 2023).

Eco-innovation can reduce the impact of environmental degradation by using innovative ways to minimize the environmental impact caused by the production process. MSMEs that can adopt the environmentally friendly innovations can increase the value of their products to consumers who are increasingly concerned about environmental issues, and the products from MSMEs can highlight their uniqueness with environmentally friendly labels that will be an added value for consumers. Green supply chain management (GSCM)

is expected to minimize or eliminate the use of hazardous chemicals, energy emissions, and waste in the supply chain. GSCM is one of the company's strategies to achieve profits and market share goals by reducing the company's environmental impact (Puryono & Kurniawan, 2017). The concept of GSCM was developed based on an environmental perspective, namely minimizing waste and environmental impacts caused by a company's or an industry's supply chain activities (Hassan et al., 2016).

Circular Economy (CE) is an effort to minimize the use of limited resources, which is focused on the design of innovative materials, products, and (Ripanti & Tjahjono, 2019). CE aims to seek the replacement of limited resources with renewable energy, 7 eliminate the use of toxic chemicals, and reduce waste through good design of materials and products. CE is a system designed to create new products without losing the value of old products by managing the latest waste using existing (Novitasari & Agustia, 2023). The Ministry of Industry also explained that the CE has five main principles called the 5R: reduce, reuse, recycle, recovery, and repair. With these five principles, it can reduce the use of limited raw materials, optimize the use of reusable materials, and is expected to be more effective and efficient.

Eco-innovation is closely related to GSCM. This is based on previous research conducted by Bag et al. (2022) The study results show that eco-innovation and GSCM have a positive influence; in addition, eco-innovation and circular economy have a positive influence. Another study from Le et al. (2024) Also found is a significant influence of GSCM on company performance, and a significant influence of eco-innovation on company performance. In research by Karmaker et al. (2023) It was found that the circular economy has a significant influence on company performance. This research gap shows that in research by Novitasari & Agustia (2023) Related to the analysis of competitive advantages, which are mediating variables in green innovation and firm performance, it was found that green innovation had no significant impact on firm performance.

2. Literature review & hypothesis development

2.1 Dynamic Capability Theory

Firm performance depends on the company's resources and dynamic ability to respond to rapid and dynamic environmental changes. DCT emphasizes that companies that can identify opportunities, capture the value of those opportunities, measure how much effort must be made, and reconfigure their resources can improve their performance more competitively. GSCM helps companies adapt and respond to changes in the dynamic business environment by emphasizing that companies must play a role in identifying opportunities, measuring how much effort must be made, and reconfigure to align with environmentally friendly practices. DCT can help GSCM to improve organizational performance because DCT allows companies to manage resources efficiently, adapt to changing environments, and take advantage of sustainability-oriented market opportunities (Song & Choi, 2018). Also, companies implementing the CE can identify opportunities in the CE through monitoring environmental trends and regulations, utilizing resources to develop products and processes that support CE principles, and companies transforming

their structures, organizations, cultures, and operational systems to align with CE principles. Moreover, with DCT, companies can detect trends and market needs related to environmentally friendly products, help companies develop and market products that meet sustainability criteria, and adjust operational processes to support eco-innovation implementation.

2.2 Firm Performance

Firm performance describes the firm's influence over a specific period, and GSCM directly influences firm performance and encourages the development of environmental management, which refers to performance improvement. Firm performance is the achievement of environmental innovation practices in the firm's operational activities, which include coordination and collaboration with suppliers and (Nugroho et al., 2024). Firm performance refers to the environmental and financial performance of a business and multidimensional performance indicators that consider financial and non-financial variables that include indicators of revenue growth, profit, competition, return on equity, and increased environmental awareness that enable companies to make the best decisions regarding their performance (Le et al., 2024). The measurement of firm performance is important as an assessment of an effective management system. According to Bag et al. (2022) Firm performance can be measured in terms of financial, market, economic, and environmental performance (Budiarto et al., 2018).

2.3 Green Supply Chain Management

Green Supply Chain Management (GSCM) is a company that uses a comprehensive approach by considering environmental impacts, including planning, managing manufacturing processes to reduce greenhouse gas emissions and waste, and implementing recycling and waste management practices. The implementation of GSCM in this company can help improve the company's ability to implement sustainability and business performance because GSCM is considered to be able to save costs through waste management and environmental conservation (Rasheed et al., 2024). GSCM practices are not only about the company's commitment to the environment, but also the encouragement of development and innovation values that companies can adopt to implement GSCM better (Deshpande & Nithya Priya, 2023). Based on research by Çankaya & Sezen (2019) and Dzikriansyah et al. (2023) GSCM indicators include green purchasing, internal environmental management, packaging, and distribution. This concept covers the production phase from initial design, production, distribution, to consumer product use.

2.4 Circular Economy Capability

Quoting from Ripanti & Tjahjono (2019), Turner et al. (1994) divide the circular economy into four functions: convenience value, economic resource base, waste flow absorption, and life support systems, where Hu et al. (2011) Also stated that the basic philosophy in the circular economy approach is to enhance the emergence of industry from an economic system that relies on cooperation between factors and the flow of material and energy management, by using waste materials and energy as resources, minimizing raw materials and energy inputs to the system. Based on research conducted by Zeng et al. (2017), Circular

economy indicators include reduce, reuse, and recycle. Reduce, reuse, and recycle (3R) is a concept that everyone begins to understand and apply in their daily lives as an effort for sustainable living.

2.5 Eco-Innovation

Eco-innovation can reduce environmental risks like carbon dioxide emissions and climate change. Eco-innovation generates new ideas and promotes creativity in products, services, processes, and procedures. These procedures can help reduce the dangers of environmental damage by reducing the consumption of natural resources, following recycling policies, reusing waste or residual materials, using non-toxic materials that are harmful to the environment, and producing environmentally friendly products through design and innovation (Khan et al., 2022). Eco-innovation can also be interpreted as an effort to reduce environmental risks, pollution, and negative impacts from the use of resources, including production, services, organizational structures, and new business methods for companies throughout their life cycle (Horbach et al., 2012). Based on research by Prieto-Sandoval et al. (2018) Environmentally friendly innovation has four indicators: environmentally friendly organizational structure innovation, environmentally friendly process innovation, environmentally friendly product innovation, and environmentally friendly marketing innovation.

2.6 Hypothesis

Eco-innovation is one of the company's strategies to reduce or eliminate the effects of environmental damage due to the impact of the production process. Eco-innovation reduces resource consumption, waste dumps, and pollution in the processes, products, and management methods companies use by reducing resource consumption, waste dumps, and pollution. By implementing eco-innovations, companies can achieve cost savings through energy consumption, waste reduction, and resource improvement. Eco-innovation also helps achieve sustainable growth in an environmentally conscious market regarding finance, market, economy, and environment. Eco-innovation has a positive influence on firm performance, supported by research from Le et al. (2024), Alshuaibi et al. (2024), and Dharmayanti et al., (2023).

H_1: Eco-innovation has a positive influence on firm performance

Harmful emissions and toxic packaging materials create pollution, so GSCM is a practical approach to reduce these and other environmental hazards. Eco-innovation combines environmental aspects and supply chain activities into an environmentally friendly innovation based on sustainability. Eco-innovation also drives changes in GSCM practices to adopt an eco-friendly approach in the design, procurement, production, and distribution processes, by incorporating sustainable practices into the supply chain, such as green purchasing, green packaging, green distribution, and internal environmental management to improve the overall sustainability of the company's operations. Eco-innovation has a positive influence on green supply chain management, supported by research by Bag et al. (2022) and Dharmayanti et al. (2023).

H_2: Eco-innovation has a positive influence on green supply chain management

The circular economy highlights the importance of environmental issues around the world with the idea of an eco-friendly economy, so that eco-innovation and the circular economy have a positive relationship, as they have similar issues, such as green and sustainable innovation and corporate response to the environment. The circular economy can also increase sustainable development by increasing economic growth. By implementing green innovation practices with a circular economy, companies can reduce pollution emissions and reduce dependence on traditional resources by minimizing environmental hazards with more efficient energy and fewer materials by implementing the development of green innovations. Eco-innovation practices have a positive influence on circular economy capability, as supported by research by Bag et al. (2022) and Li et al. (2023).

H_3: Eco-innovation has a positive influence on circular economy capability

GSCM demonstrates supply chain management oriented towards sustainability and closely relates to the firm's performance. The sustainability aspect of performance guarantees GSCM practices that allow companies to minimize the use of non-renewable resources and establish more environmentally friendly measures to carry out manufacturing processes. GSCM is the primary strategy to maximize the company's profitability and market share. GSCM also meets stakeholder expectations for better products by advancing its eco-friendly practices and maintaining customer loyalty by motivating them to purchase its products to increase revenue share, revenue, and profitability. Companies can minimize waste by adopting the 3R mechanism and implementing eco-friendly practices. Green supply chain management has a positive influence on firm performance, supported by research by Bag et al. (2022), Le et al. (2024), and Le (2023).

H_4: Green supply chain management has a positive influence on firm performance

CE allows companies to reduce non-renewable resources and use more environmentally friendly materials, which can help companies minimize waste and practice proper resource utilization. CE is aligned with the firm's performance in handling the regeneration system without harming the environment. The principles of CE bring benefits to the organization, including the reduction of harmful emissions from toxic gases and waste generation, the improvement of brand reputation, the increase of market share, and the competitive benefits. By adopting CE, companies can potentially improve sustainable firm performance significantly. This can lower resource use, energy consumption, greenhouse gas emissions, and improve overall environmental sustainability. The circular economy has a positive influence on firm performance, supported by research by Bag et al. (2022), Karmaker et al. (2023), and Tetteh et al. (2024).

H_5: Circular economy capability has a positive influence on firm performance

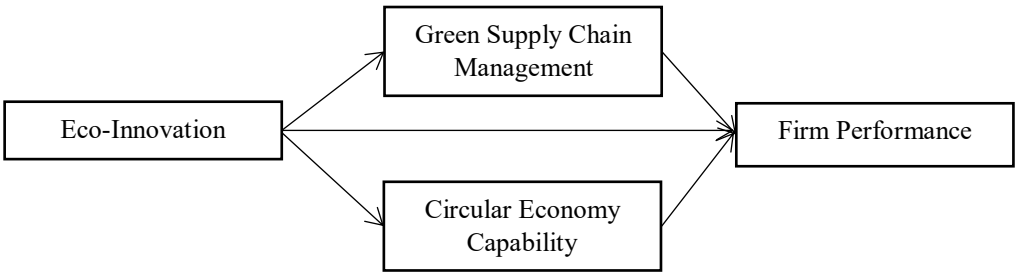

Figure 1. Research Model

3. Method

Primary data was collected via a survey to examine the research hypothesis. A Likert scale measures the level of agreement with the statement (5 being strongly agree and one being strongly disagree). We have 50 completed questionnaires, which were developed into two parts, consisting of questions related to name, age, position, name of business, product, how long the business has been in operation, and market reach. The second part of the questionnaire contains items to measure the latent constructs.

Table 1. Research Instrument

Variables	Instrument
Eco-Innovation (Prieto-Sandoval et al., 2018)	1. Our MSMEs have programs to encourage employee involvement in environmental conservation 2. Our MSMEs develop Standard Operating Procedures (SOP) in the production process according to environmentally friendly standards 3. Our MSMEs choose raw materials that are environmentally friendly and biodegradable naturally 4. Our MSMEs use innovative communication channels such as social media, online shopping sites, or other digital applications to carry out marketing strategies that emphasize the value of sustainability and environmental friendliness
Firm Performance (Bag et al., 2022)	1. Our MSMEs have increased sales growth through eco-friendly products 2. Our MSMEs introduce new eco-friendly products to the market 3. Our MSMEs reduce energy consumption costs by choosing the nearest supplier 4. Our MSMEs reduce the use of raw materials that generate much waste and reduce energy consumption
Green Supply Chain Management (Bag et al., 2022; Dzikriansyah et al., 2023)	1. Our MSMEs choose suppliers that are close to production to minimize environmental pollution 2. Our MSMEs manage internal waste, which ensures that the rest of the production materials do not pollute the environment 3. Our MSMEs use packaging that is environmentally friendly and can be recycled or reused 4. Our MSMEs prioritize energy efficiency and carbon footprint reduction in the distribution process
Circular Economy Capability (Zeng et al., 2017)	1. Our MSMEs reduce the use of raw materials that are not environmentally friendly in the production process 2. Our MSMEs reuse raw materials or components that can still be reused 3. Our MSMEs implement a waste recycling system generated from the production process

We calculate the statistical power and minimum sample requirements in SmartPLS (version 4.1) software using the Partial Least Squares (PLS) method. We used a purposive sampling technique to select MSMEs; the criteria are 1) MSMEs that produce processed

food from salak fruit, and process salak waste such as salak seeds, salak bark, and salak tree waste. MSMEs that implement this have relevance to the concept of environmentally friendly innovation, GSCM, and circular economy because MSMEs not only use salak fruit as the primary raw material but also manage the waste produced to reduce negative impacts on the environment and increase the added value of the remaining production, 2) MSMEs that have been operating for at least 2 years. This selection is based on MSMEs that have been running during that period and generally already have more experience managing their businesses to achieve significant performance, including facing various operational challenges and market competition. MSMEs that have been running during this period also make it possible to have experience in implementing environmentally friendly innovations, green supply chain practices, and the application of circular economy in their businesses. We used the Structural Equation Model (SEM) to measure the outer model, such as validity test using convergent validity and discriminant validity, and reliability test using Cronbach's alpha and composite reliability. We measure the inner model using the value of R-Square, Predictive Relevance (Q^2), and Goodness of Fit (GoF).

4. Results and Discussion

Based on the analysis of 50 respondents, the descriptive analysis results regarding the respondents' characteristics based on gender, age, education, firm age, and market reach. Figure 2 shows that, based on the processed data, the results of the outer model were obtained in the convergent validity test, which showed that all indicators had a loading factor of ≥ 0.60. The discriminant validity shows that all cross-loadings show a higher indicator value of each construct than the indicator on other constructs, with a value of > 0.70, so the result is valid. Based on Table 3, the lowest Cronbach's alpha value is found in the green supply chain management variable of 0.752. Meanwhile, the lowest composite reliability value is in the green supply chain management variable, 0.841. The reliability test results can be said to be reliable because the value of all constructs is above the minimum test requirement, which is > 0.60.

The results of the PLS-Algorithm test show that green supply chain management and circular economy are influenced by eco-innovation. The results of R-Square on green supply chain management practices of 0.197 or 19.7% and on circular economy capability of 0.287 or 28.7% show that the percentage of green supply chain management and circular economy capability as dependent variables can be explained through the eco-innovation variable. Other test results showed an R-Square firm performance value of 0.838, which showed that the percentage of firm performance could be explained through three variables, eco-innovation, green supply chain management, and circular economy capability, of 83.8%.

The Q2 value represents how well the observation value is generated by the model and the estimation of its parameters. A value of Q2 > 0 indicates that the model lacks predictive relevance, while a value of Q2 < 0 indicates that the model lacks predictive relevance. A value of 0.02 indicates a weak effect, a value of 0.15 indicates a moderate effect, and a value of 0.35 indicates a strong effect. The Q2 calculation is strong because it is > 0.35. Goodness of Fit (GoF) is a single measure to validate the combined performance of the outer and inner

models. The criteria in the GoF assessment are 0.1, a small GoF, 0.25, a medium GoF, and 0.36, a large GoF. The Goodness of Fit (GoF) value in this study is 0.544, which means that the value is included in the large GoF and shows that the exogenous variable is appropriate as an explanatory variable that can predict endogenous variables. The results are 0.907, showing the model has an excellent predictive relevance value

Table 2. Respondent Characteristic

Profile of Respondents	Respondents	Percentage (%)
Gender		
1. Male	4	8
2. Female	46	92
Age (Years Old)		
1. ≤ 30	0	
2. 31 – 50	25	50
3. ≥ 51	25	50
Education		
1. SD – SMA	32	64
2. D3 – S2	18	36
Firm Age		
1. 2 – 5 years	14	28
2. 5 – 10 years	30	60
3. ≥ 10 years	6	12
Market Reach		
1. Local	34	68
2. Regional	5	10
3. National	11	22
4. International	0	0

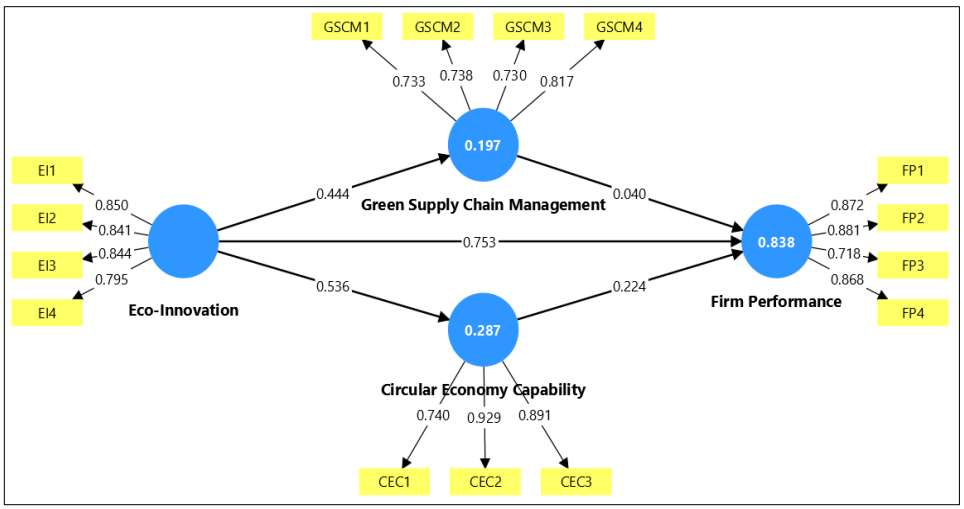

Figure 2. PLS-Algorithm Model

Table 3. Reliability Test

Variable	Cronbach's Alpha	Rho_A	Composite Reliability	AVE	Result
Eco-Innovation (EI)	0.852	0.852	0.900	0.694	Reliable
Firm Performance (FP)	0.855	0.863	0.903	0.701	Reliable
Green Supply Chain Management (GSCM)	0.752	0.757	0.841	0.570	Reliable
Circular Economy Capability (CEC)	0.820	0.876	0.892	0.735	Reliable

Table 4. Inner Model Test

Testing	Test Result	Criteria
Determination Coefficient (R-Square)		
Firm Performance (R_1^2)	0.838	Strong
Green Supply Chain Management (R_2^2)	0.197	Weak
Circular Economy Capability (R_3^2)	0.287	Weak
Predictive Relevance (Q-Square)		
$Q^2 = 1 - ((1-R_1^2)(1-R_2^2)(1-R_3^2))$ $= 1 - ((1-0.838)(1-0.197)(1-0.287))$ $= 1 - 0.0927$ $= 0.9072$		Strong means that the observed value has been well reconstructed because it has strong predictive relevance
Goodness of Fit (GoF)		
$GoF = \sqrt{\overline{AVE} \; x \; \bar{R}^2}$ $= \sqrt{0.675 \; x \; 0.440}$ $= 0.5449$	54.5%	Large

Table 5. Hypothesis Test

Hypothesis	Original Sample	Sample Mean	STDEV	T-Statistic	P-values
EI => FP	0.753	0.761	0.067	11.199	0.000**
EI => GSCM	0.444	0.465	0.111	4.008	0.000**
EI => CEC	0.536	0.547	0.100	5.368	0.000**
GSCM => FP	0.040	0.034	0.069	0.571	0.568
CEC => FP	0.224	0.217	0.092	2.440	0.015*

** Sig < 1 %, * Sig sig < 5%

Based on the hypothesis test on Table 5, it can be described as the t-statistic result was 11.199 > 2.014 and the p-value was 0.000 < 0.05, so H1 was accepted. So, eco-innovation has a positive and significant effect on firm performance. MSMEs in the processed salak culinary industry in Sleman Regency innovate in their organizational structure to achieve environmentally friendly efforts by involving owners or employees in environmentally friendly training. Usually, this training is held by the Community Forum (FORKOM) in Sleman Regency by inviting resource persons who are experts in their fields. This training also seeks to provide new knowledge about environmentally friendly processes and products that MSMEs can use to develop their businesses and explore new online and offline markets. Therefore, MSMEs that implement eco-innovation well will find it easier to gain new knowledge in conducting business innovations so that they can improve the performance of MSMEs (Le et al., 2024; Alshuaibi et al., 2024; Dharmayanti et al., 2023).

The t-statistic result was 4.008 > 2.014, and the p-value was 0.000 < 0.05, so H2 was accepted. So, eco-innovation positively and significantly affects green supply chain management. MSMEs in the processed salak culinary industry in Sleman Regency implement environmentally friendly innovations that play an important role in creating a more environmentally friendly and efficient supply chain. Environmentally friendly innovations carried out by MSMEs directly impact supply chain decisions, including raw material selection, production, packaging, distribution, and end-of-life management of products, to increase the effectiveness of environmentally friendly supply chains as well (Bag et al., 2022; Dharmayanti et al., 2023).

The t-statistic result was 5.368 > 2.014, and the p-value was 0.000 < 0.05, so H3 was accepted. So, eco-innovation has a positive and significant effect on circular economy capability. MSMEs in the salak processed culinary industry in Sleman Regency carry out environmentally friendly innovations by considering the company's ability to carry out 3R (reduce, reuse, recycle) by involving reducing pollution emissions, reducing dependence on natural resources, and minimizing hazardous materials, so that environmentally friendly innovations can help increase economic growth. This research is in line with the results of (Bag et al., 2022; Li et al., 2023).

The t-statistic result was 0.571 < 2.014, and the p-value was 0.568 > 0.05, so H4 was rejected. So, green supply chain management has no significant effect on firm performance. In implementing green supply chain management, companies require much motivation to improve reputation, efficiency, effectiveness, differentiation, and revenue growth (Novitasari & Agustia, 2021). Many companies have not implemented green supply chain management because of the low level of environmental awareness regarding product design, sourcing and material selection, manufacturing processes, distribution of product to consumers, and end-of-life management (Audhitiawaty & Murwaningsari 2024; Novitasari & Agustia 2021).

The t-statistic result was 2.440 > 2.014, and the p-value was 0.015, so H5 was accepted. So, circular economy capability positively and significantly affects firm performance. Thus, circular economy capability positively and significantly affects firm performance. The circular economy plays an important role in improving the company's performance, especially in MSMEs in the salak culinary industry in Sleman Regency. This application can strengthen the environmentally friendly image, improving the company's performance by attracting consumers who care about sustainability. Circular economy practices also help support the efficiency of the company's operating costs, which can improve the company's financial performance and open up opportunities for diversification of environmentally friendly products from processing salak seed and salak shell waste, thereby expanding market share and strengthening market performance (Bag et al., 2022; Karmaker et al., 2023; Tetteh et al., 2024).

5. Limitations & suggestions for the future

The results of this study show that green supply chain management does not influence firm performance. These results indicate that implementing GSCM practices, which include green purchasing, internal environmental management, green distribution, and green packaging, has not substantially improved financial performance, market performance, economic performance, and environmental performance in MSMEs. GSCM does not affect the company's performance, which can also be caused by the scale of MSMEs, which tend to be smaller and have limited resources in finance, technology, and optimal GSCM practices. This limitation is an obstacle to implementing GSCM effectively, so the impact on the company's performance is less than optimal. The awareness of MSME actors towards investing in environmentally friendly practices is also still low, reducing the opportunity for GSCM to make a real contribution to improving company performance. This study has

limitations that only focus on MSMEs in the processed salak culinary industry in Sleman Regency, which is likely that the application of variables in this study does not apply to other industries because in MSMEs, there are often limitations in resources, organizational structures, and dynamic changes, so further research can try to apply the variables in this study in other industrial fields in a broader scale (Del Brío & Junquera, 2003).

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