



## The Influence of Green Intellectual Capital on Sustainable SMEs

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### Abstract

Environmental degradation is a global issue that invites attention from various groups, including small and medium enterprises (SMEs). To preserve the environment and build a sustainable business, it is necessary to optimize environmentally friendly resources. Green intellectual capital, which includes green human capital, green structural capital, and green relational capital, can be practiced by SMEs in maintaining sustainable business. The research aims to empirically prove the influence of green intellectual capital on sustainable SMEs. The research adopted a quantitative method with a self-administered survey. The research sample consisted of 157 respondents who were SMEs in Madiun of Indonesia. Furthermore, the data were analyzed using Smart-PLS 3.0 to prove the hypothesis. The results show that green human capital and green relational capital do not have a significant influence on sustainable SMEs. Meanwhile, green structural capital has a significant influence on sustainable SMEs. This implies that SMEs must pay attention to the internal organizational management system in practicing environmentally businesses.

### Abstrak

Kerusakan lingkungan menjadi masalah global yang perlu mendapat perhatian dari berbagai kalangan, termasuk pelaku usaha kecil dan menengah (UKM). Dalam upaya menjaga kelestarian lingkungan sekaligus untuk membangun usaha yang berkelanjutan perlu mengoptimalkan sumber daya yang ramah lingkungan. Green intellectual capital yang meliputi green human capital, green structural capital dan green relational capital dapat dipraktikkan oleh UKM dalam mempertahankan usaha berkelanjutan. Tujuan penelitian yaitu membuktikan secara empiris pengaruh green intellectual capital terhadap UKM berkelanjutan. Penelitian menggunakan metode kuantitatif jenis survei. Sampel penelitian berjumlah 157 responden yang merupakan UKM di Kota Madiun. Kemudian data dianalisis dengan menggunakan bantuan Smart-PLS 3.0 untuk pembuktian hipotesis. Hasil penelitian menunjukkan bahwa green human capital dan green relational capital tidak berpengaruh terhadap UKM berkelanjutan. Sedangkan green structural capital berpengaruh signifikan terhadap UKM berkelanjutan. Implikasi dari penelitian ini perlu memperhatikan sistem manajemen organisasi internal dalam mempraktikkan usaha ramah lingkungan.

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## INTRODUCTION

The dynamic growth of business has led to environmental issues, including environmental pollution and business waste. Environmental pollution does not only result from waste from large companies but also from small and medium enterprises (SMEs). In Indonesia, the SMEs sector is experiencing rapid development, one of which is in the Madiun in East Java of Indonesia. The data portal from web page Madiun government recorded the number of SMEs in Madiun in 2022 was 23,672, and the majority will be in the trade, hotel, and restaurant sectors at 62 percent and services at 16% (Dinas Tenaga Kerja, 2023). The rapid development of SMEs is an important concern for the government as it contributes greatly to regional economic development. Some studies noted that SMEs also contribute to large amounts of business waste, which has a negative impact on the environment (Ratnawati et al., 2018; Styaningrum et al., 2020). Waste from SMEs includes production waste, chemical raw materials, and waste from the use of materials that are difficult to decompose or renew. Therefore, SMEs need to start implementing environmentally friendly business activities to support business sustainability.

A sustainable business describes an organization that can create, deliver, and capture value in an economic, social, and environmental context in a sustainable way (Nosratabadi et al., 2019). The current concept of sustainable business models needs to meet economic, social, and environmental goals together. In addition, the concept of sustainable business connects three important elements, namely economic prosperity, environmental quality, and social justice—well known as the triple bottom line (Elkington, 1998). The triple bottom line is a program, policy, or activity designed to create or maintain jobs and wealth by contributing to environmental, social, and economic well-being over time (Hammer & Pivo, 2017). SMEs can contribute to the welfare of society and the environment today without sacrificing the welfare of society and the environment in the future when SMEs can run businesses that are environmentally and socially responsible as well as economically (Salimzadeh et al., 2013). Some studies remarked that corporate social responsibility activities through creating innovation can help increase the survival rate and competitive advantage of SMEs both on a local and global scale (Ratnawati et al., 2018; Rochayatun et al., 2023; Styaningrum et al., 2020).

The dynamic capabilities of SMEs in coping rapidly environment changes will drive social, environmental, and economic performance (Eikelenboom & de Jong, 2019). The results of the analysis regarding sustainable businesses show the need to pay attention to environmental, social, and economic aspects in the resulting performance (Dos Santos et al., 2013; Govindan et al., 2013, 2016; Matinaro et al., 2019). The triple bottom line concept can be applied by SMEs to run businesses that involve environmental practices by protecting natural resources, utilizing natural resources efficiently, and minimizing the generation of waste, which has a negative impact on community welfare and environmental sustainability. By using the triple bottom line concept, which involves three performance measures, namely economic, environmental, and social, and optimizing the role of intangible green intellectual capital assets in running a business, SMEs will be able to maintain the sustainability of environmentally friendly businesses (Styaningrum et al., 2023).

Green intellectual capital is a company's intangible assets that can be used to create innovation, increase competitiveness, and realize environmentally-friendly business sustainability (Styaningrum et al., 2023). The role of green intellectual capital was found to be significant, which will help companies achieve sustainable performance by paying attention to environmental and social performance in addition to paying attention to economic performance. Green intellectual capital is a critical dimension in environmental issues. This is not limited only to environmental issues but is also related to social performance. Therefore, green intellectual capital tends to have a positive relationship with economic, environmental, and social performance in companies (Yusliza et al., 2020). Later, green intellectual capital can be a solution to overcome environmental problems and achieve business sustainability (Jermsittiparsert, 2021; Yusoff et al., 2019).

Chen (2008) is first scholar to classify green intellectual capital into green human capital, green structural capital, and green relational capital. From the three elements of green intellectual capital, empirical test results show that green human capital, green structural capital, and green

relational capital have a significant positive effect on sustainable SME performance (Inayat et al., 2022; Rahayu et al., 2023; Ullah et al., 2021; Yusliza et al., 2020). However, many previous studies also state that not all elements of green intellectual capital have an effect on sustainable SMEs (Josephine et al., 2020; Syahidun & Nawangsari, 2022a). The first element of green intellectual capital is green human capital, which is employee effort, creativity, attitudes, experience, and competence towards environmental sustainability or green innovation (Ullah et al., 2021). Therefore, employees who are capable enough to ensure environmental sustainability in SMEs operations are likely to encourage business sustainability.

Some scholars revealed that green human capital significantly influences performance and sustainable business (Al Issa et al., 2023; Josephine et al., 2020; Syahidun & Nawangsari, 2022b; Tjahjadi et al., 2023). Improved employee skills and experience will increase employee productivity and contribute to sustainable efforts that balance the achievement of economic, environmental, and social goals. The implementation of environmentally friendly logistics practices in SMEs supported by green human capital can produce stronger environmentally friendly competitiveness, as well as better social and economic performance (Agyabeng-Mensah & Tang, 2021). In this era of highly competitive business competition and the issue of environmental damage arising from business activities, it is an important concern for business actors. The success of a business is no longer achieved simply by having a healthy financial status or creating innovative products, but rather success is achieved through implementing environmentally friendly human resource management (Shoaib et al., 2021; Yong et al., 2019). Green human capital capabilities can be generated through effective environmentally friendly training and development approaches, and can be obtained through effective environmentally friendly recruitment and selection procedures (Ahmed et al., 2021).

The second element of green intellectual capital is green structural capital which refers to trademarks, copyrights, patents, corporate image, organizational culture, management philosophy, corporate commitment, environmental protection, and green innovation competencies (Ullah et al., 2021). Green structural capital has a positive impact on competitive advantage and sustainable business success (Jermsittiparsert, 2021; Nawangsari et al., 2022; Omar et al., 2019; Solihin et al., 2023; Wang et al., 2023; Yusoff et al., 2019). Green structural capital can be developed to increase the capacity of organizations that aim to preserve the environment, including environmentally friendly facilities, certification that supports environmental commitment, organizational structures that support the flow of environmentally friendly knowledge, organizational culture built on the pillars of sustainability, and continuous investment in research and development (Marco-Lajara, Zaragoza-Sáez, & Martínez-Falcó, 2022). Sustainable structural capital that is proactive towards environmental management means that the company continues to introduce innovation and improvements in its environmental technology portfolio, which consists of preventive practices, the establishment of an environmental department, the appointment of management representatives, and the existence of an environmental manager (López-Gamero et al., 2011).

The third element of green intellectual capital is green relational capital, which is a company's interactive relationships with customers, suppliers, network members, and partners regarding corporate environmental management and green innovation, which enables wealth creation and gaining competitive advantage (Chen, 2008). Green relational capital has a significant effect on sustainable SMEs (Fitri et al., 2022; Jermsittiparsert, 2021; Nawangsari et al., 2022; Omar et al., 2019; Syahidun & Nawangsari, 2022a; Yusoff et al., 2019). Green relational capital predicts environmentally friendly performance (Al Issa et al., 2023). Proactive sustainable relational capital towards environmental management reveals that the company's relationship with the environment is very relevant, namely in the primary and secondary sectors they tend to involve suppliers in the environmental management process, while in the service sector, customers are the agents most directly involved (López-Gamero et al., 2011). Building good relationships with consumers, suppliers and other work partners (stakeholders) is an important thing for SMEs to do. This can be the main source of strength for SMEs to win competition in the business world without ignoring the welfare of the environment in which the company operates.

## METHOD

### Research Design, Population, and Sample

The research was conducted using a quantitative survey method approach with a self-administered survey. The population in this study was 530 SMEs who are members of communities or associations in Madiun, East Java of Indonesia. While the samples were 157 SMEs, which determined using a purposive sampling technique. The criteria participants in this survey are respondents being SMEs that had developed their business for at least six years and were engaged in the service and culinary sectors. These criteria are used to suit the research objectives, namely sustainable business. SMEs that are at least six years can see their business development and their business practices in preserving the environment. The determination of SMEs in the service and culinary sectors due to the majority of SMEs in Madiun operating in this sector.

### Measurement

Measuring green human capital with indicators of knowledge, skills, competencies, and experience of human resources regarding environmental protection was adapted from Yusliza et al. (2020) and Ullah et al. (2021), with a total of seven statement items valid. Green structural capital with indicators of organizational processes, organizational systems, organizational culture, and ownership of environmental permits was adapted from Ullah et al. (2021) and Yusliza et al. (2020) with a total of 6 valid statement items. Green relational capital with indicators of relationships with customers, suppliers, communities, and partners adapted from Malik et al. (2020) and Yusliza et al., (2020), with a total of seven valid statement items. Sustainable SMEs are measured by three aspects, namely economic, environmental, and social, which adapted from Wu (2017); Zailani et al. (2012) with a total of 14 valid statement items. The scale used in the questionnaire instrument is a Likert scale of 1 "Strongly Disagree" to 5 "Strongly Agree".

### Data Analysis

This study used partial least square structural equation modeling (PLS-SEM) that was processed with the help of the SmartPLS 3.0 application. This study followed two stages of SEM, which includes outer model and inner model assessment. Outer model to test validity and reliability. Validity testing by looking at the outer loadings of the indicators and the average variance extracted (AVE). The outer loading of all indicators must be statistically significant, must be 0.708 or higher and the AVE value must be 0.50 or higher (Hair Jr et al., 2017). Testing reliability by looking at Cronbach's alpha and composite reliability values must be 0.7 or more (Hair Jr et al., 2017). Next, assess the inner model to assess the relationship between constructs by testing  $R^2$  (explained variance) and  $Q^2$  (predictive relevance).  $R^2$  values of 0.75, 0.50, or 0.25 for endogenous constructs can be described as substantial, moderate, and weak (Hair Jr et al., 2017). As a relative measure of predictive relevance,  $Q^2$  values of 0.02, 0.15, and 0.35, respectively, indicate that an exogenous construct has a small, medium, or large predictive relevance for a certain endogenous construct (Hair Jr et al., 2017). Hypothesis testing through Bootstrapping steps by looking at the t-value and p-value. The minimum t-value is 1.96 (in the case of a significance level of 5%) and the p-value must be smaller than 0.05 to render the relationship under consideration significant (Hair Jr et al., 2017).

## RESULTS AND DISCUSSION

The population in this study was 530 SMEs who are members of communities or associations in Madiun, East Java of Indonesia, with a sample of 157 using purposive techniques. Respondent data was successfully collected from 157 SMEs using the research criteria with characteristic findings as shown in Table 1.

Table 1. Respondent Characteristics

Category	Characteristics	Frequency (N=157)	Percentage (%)
Gender	Woman	94	60
	Man	63	40
Type of business	Service	38	24
	Culinary	119	76
Business Age	> 15 years	39	25
	11 - 15 years old	18	11
	6 - 10 years	100	64
Education	elementary school	19	12
	Junior High School	12	8
	Senior High School	85	54
	Diploma	10	6
	Bachelor	29	19
	Postgraduate	2	1
Number of employees	1 - 4 people	106	68
	5 - 19 people	47	30
	20 - 99 people	4	2

Source: Authors (2023)

### Outer Model Assessment

Outer model assessment to assess the validity and reliability of the model by looking at the values of outer loadings, Average Variance Extracted (AVE), Cronbach's alpha, and composite reliability. Criteria used for the outer model by the theory of Hair Jr et al. (2017). The results of the outer model assessment are illustrated in Table 2.

Table 2. Outer Model

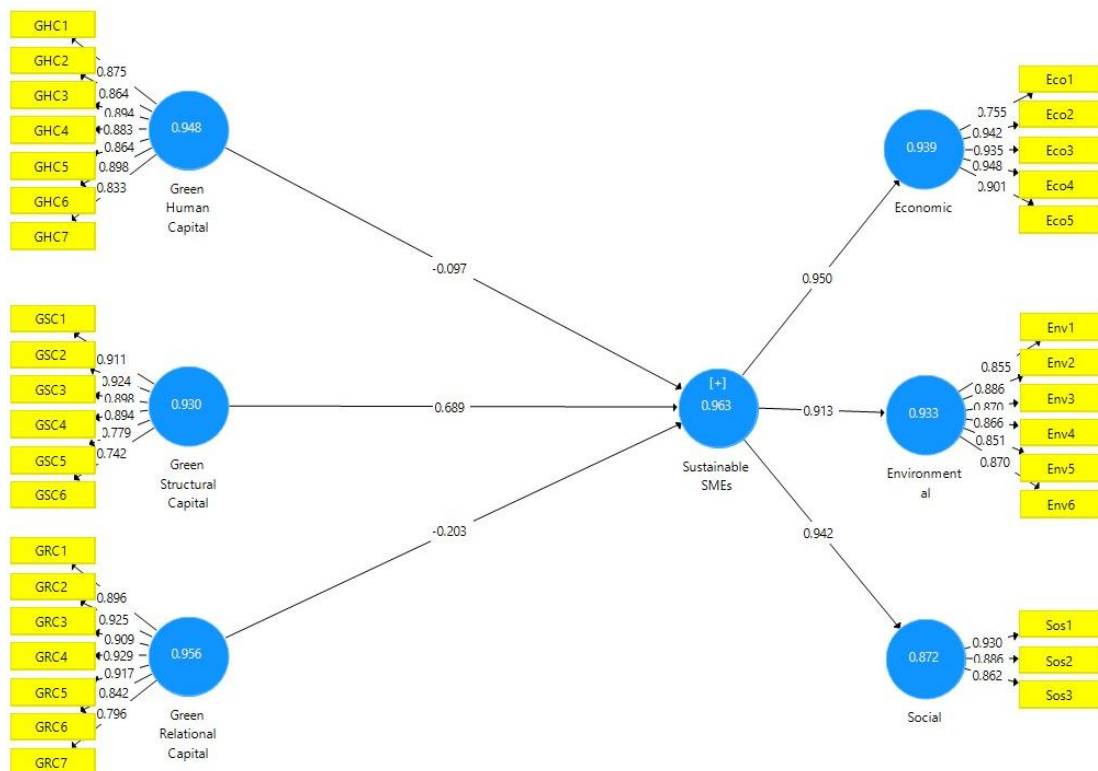
First Order	Second Order	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE
Green Human Capital		GHC1	0.875	0.948	0.957	0.763
		GHC2	0.864			
		GHC3	0.894			
		GHC4	0.883			
		GHC5	0.864			
		GHC6	0.898			
		GHC7	0.833			
Green Structural Capital		GSC1	0.911	0.930	0.945	0.741
		GSC2	0.924			
		GSC3	0.898			
		GSC4	0.894			
		GSC5	0.779			
		GSC6	0.742			
Green Relational Capital		GRC1	0.896	0.956	0.963	0.790
		GRC2	0.925			
		GRC3	0.909			
		GRC4	0.929			
		GRC5	0.917			
		GRC6	0.842			
		GRC7	0.796			



Economics	Eco1	0.755	0.939	0.954	0.808
	Eco2	0.942			
	Eco3	0.935			
	Eco4	0.948			
	Eco5	0.901			
Environmental	Env1	0.855	0.933	0.947	0.750
	Env2	0.886			
	Env3	0.870			
	Env4	0.866			
	Env5	0.851			
	Env6	0.870			
Social	Sos1	0.930	0.872	0.922	0.798
	Sos2	0.886			
	Sos3	0.862			
Sustainable SMEs	Economics	0.950	0.963	0.967	0.678
	Environmental	0.913			
	Social	0.942			

Source: Authors (2023)

Table 2 shows the outer model assessment to specify the relationship between constructs and their indicators. Validity assessment by looking at the outer loading of all construct indicators shows a value greater than 0.708, and the AVE value for each construct also shows a value higher than 0.50. This means that it meets the construct validity criteria. Next, assess reliability by looking at Cronbach's alpha and composite reliability, which shows greater than 0.7, which means it meets the construct reliability criteria. The research design showing the output from the outer model assessment results is shown in Figure 1.



Source: Authors (2023)

Figure 1. Research Design Output Results

## Inner Model Assessment

The inner model assessment aims to assess how big the relationship between constructs is. The results of the inner model assessment by looking at the values of  $R^2$  (explained variance) and  $Q^2$  (predictive relevance). Criteria used for the inner model according to the suggestion of Hair Jr et al. (2017). The results of the outer model assessment are presented in Table 3 and Table 4, respectively.

Table 3.  $R^2$  Results

	$R^2$	$R^2$ Adjusted
Sustainable SMEs	0.225	0.210

Source: Authors (2023)

The results of the  $R^2$  estimation, as presented in Table 3, indicate a value of 0.225 or 22.5 percent. This means that the relationship between exogenous constructs and endogenous constructs, namely between green human capital, green structural capital, and green relational capital, towards sustainable SMEs has a weak relationship or is 22.5 percent.

Table 4.  $Q^2$  Results

	SSO	SSE	$Q^2$ (=1-SSE/SSO)
Sustainable SMEs	2198.000	1956.042	0.110

Source: Authors (2023)

The results of the  $Q^2$  test, as presented in Table 4, show a sustainable SMEs value of 0.110. This means that the constructs of green human capital, green structural capital, and green relational capital have moderate predictive relevance to the construct of sustainable SMEs. Inner model assessment was also carried out through confidence interval testing with the help of SPSS Statistics version 23.0 with a confidence level of 95 percent. The results of the confidence interval test are presented in Table 5.

Table 5. Confidence Interval Results

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Green Human Capital	68.527	156	0.000	28.25478	27.4403	29.0692
Green Structural Capital	72.971	156	0.000	24.46497	23.8027	25.1272
Green Relational Capital	71.941	156	0.000	28.73248	27.9436	29.5214
Sustainable SMEs	67.056	156	0.000	55.59873	53.9609	57.2365

Source: Authors (2023)

The results of the confidence interval test as presented in Table 5 show that with a confidence level of 95 percent, the average green human capital value is between 27.4403 and 29.0692; the average value of green structural capital is between 23.8027 and 25.1272; The average value of green relational capital is between 27.9436 and 29.5214. Meanwhile, the average sustainable value for SMEs is between 53.9609 and 57.2365.

## Hypothesis Testing

Proving the hypothesis by looking at the results of testing through the bootstrapping resamples method. Criteria used to assess the results of hypothesis testing by the theory of Hair Jr et al. (2017). By looking at the t and p-values of each hypothesis, it can be stated that green

structural capital has a significant effect on sustainable SMEs, while green human capital and green relational capital do not have a significant effect on sustainable SMEs. The results of hypothesis testing are indicated in Table 6.

Table 6. Hypothesis Results

Hypothesis	Original Sample	Sample Mean	Standard Deviation	<i>t-values</i>	<i>p-values</i>	Conclusion
GHC → Sustainable SMEs	-0.097	-0.054	0.238	0.408	0.684	Rejected
GSC → Sustainable SMEs	0.689	0.639	0.230	2.999	0.003	Accepted
GRC → Sustainable SMEs	-0.203	-0.197	0.261	0.778	0.437	Rejected

Source: Authors (2023)

The findings indicate that the first hypothesis is rejected, which shows that green human capital does not have a significant effect on sustainable SMEs. In this study, green human capital operates in the service and culinary sectors, has not been able to have an impact on economic, social, and environmental performance. Owners and employees who work in SMEs do not have sufficient knowledge about how to practice environmentally friendly business activities. The focus of SMEs is still on economic performance, namely by producing products that consumers are interested in and marketing on social media which will have an impact on increasing sales and income.

In facing environmental change trends, business organizations are required to create new strategies that are no longer optional but necessary and important for business sustainability while still paying attention to economic, environmental, and social performance. However, for SMEs to integrate sustainability into business practices poses many challenges, due to limited resources (Jämsä et al., 2011). Limited human resources mean that SMEs are unable to implement business sustainability practices optimally. Strategies for optimizing sustainable business practices by increasing green human capital capabilities can be through effective environmentally friendly training and development and can be obtained through effective environmentally friendly recruitment and selection procedures (Ahmed et al., 2021).

The SMEs in Madiun can strive for good green human capital to be able to encourage economic, social, and even environmental performance. From the perspective of sustainable human capital that is proactive in environmental management, it shows the extent to which the company is committed to the environment, organizes environmental training, provides environmental information and awareness, and attends seminars and workshops to gain new knowledge related to the environment (López-Gamero et al., 2011). The research results are supported by Jermsittiparsert (2021); Nawangsari et al. (2022); Omar et al. (2019); and Yusoff et al. (2019), which stated that green human capital has no significant effect on sustainable SMEs. In addition, a preliminary study from Asiaei et al. (2022) also noted that green human capital has no direct effect on environmental performance.

The research results show that the second hypothesis is accepted. Green structural capital has a significant effect on sustainable SMEs. Green structural capital, which is defined as organizational processes, organizational systems, organizational culture, and ownership of environmental permits applied to SMEs in Madiun, especially those operating in the service and culinary sectors, has a positive impact on economic, social, and environmental performance. SMEs operating in the service and culinary sectors that have practiced environmental care in the business systems they run have proven to be supportive in realizing sustainable businesses. Service and culinary SMEs in Madiun have managed eco-friendly businesses because they believe that this practice can improve a good business image to customers, increase competitiveness, and help businesses remain sustainable. SME players are committed to continuing to strive to manage their business in a way that leads to environmentally friendly practices. For example, in managing business waste, SMEs, especially culinary businesses, have separated organic and inorganic waste to make further waste management easier. Environmentally friendly waste management can be successful by sorting waste according to its type and nature (Manik et al., 2021).

The regional government also emphasizes that SMEs care about the management of waste and business waste to maintain the balanced development of Madiun. In addition, the government



has provided technical guidance to SMEs to provide direction in managing waste and business waste. This activity was held because SMEs support the development of the city by caring about the sustainability of the surrounding environment. The research results are supported by Jermittiparsert (2021); Nawangsari et al. (2022); Omar et al. (2019); Solihin et al. (2023); Ullah et al. (2021); and Yusoff et al. (2019) which documented that green structural capital has a significant effect on sustainable SMEs.

The last finding showed that green relational capital does not have a significant effect on sustainable SMEs, rejecting the last hypothesis. Green relational capital, which is defined as the relationship between SMEs and customers, suppliers, communities, and partners regarding environmental protection management, does not have an impact on the economic, social, and even environmental performance of SMEs in Madiun. SMEs believe that there is no need to maintain good relationships with customers because, with good products that suit customer needs, SMEs can still maintain their business. Customer awareness about environmentally friendly products is also still minimal, so they do not care about products or SME businesses that are environmentally friendly or damage the environment. SMEs do not consider customers as assets so they pay less attention to relationships with customers. Relationships with suppliers are also not considered because the majority of SMEs use raw materials from local resources to find suppliers.

Relations with the community have also not received attention from SMEs because they think that the business, they run does not have a significant impact on the surrounding community. However, relations with partners, especially fellow SMEs, are still being paid attention to because several SMEs collaborate with other SMEs regarding product marketing. Overall, SMEs do not consider it important to establish relationships with customers, suppliers, communities, and partners, because, for SMEs, these activities will increase costs and have little positive impact on the economic and environmental performance of SMEs. The research results are supported by research by Asiaei et al. (2022) stated that green relational capital has no direct effect on environmental performance. Indeed, Al Issa et al. (2023) also remarked that green relational capital has no direct effect on economic performance.

## CONCLUSIONS AND SUGGESTION

The conclusion from the research results shows that the first and third hypotheses are rejected, but the second hypothesis is accepted. In detail, green human capital and green relational capital do not have a significant influence on sustainable SMEs, while green structural capital has a significant influence on sustainable SMEs. In improving or maintaining sustainable SMEs' performance based on economic, social, and environmental aspects, it is necessary to support environmentally friendly practices in the management system run by SMEs. The organizational structure run by SMEs by implementing environmentally friendly practices starting from the production process, an environmentally friendly culture, and the owner's willingness to obtain permits regarding the management of production waste will be able to have a positive impact on economic, social and environmental performance so that business sustainability can be created. Advice that can be given to SMEs operating in the service and culinary sector, especially in Madiun, in improving or maintaining their business is by first improving the internal organizational management system so that it can influence the human resources involved in the organization and support the business requires good relationships. with external parties in practicing environmentally friendly businesses.

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