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THE IMPACT OF GREEN INTELLECTUAL CAPITAL ON SUSTAINED COMPETITIVE ADVANTAGE AND BUSINESS PERFORMANCE OF MSMES IN SOUTH KALIMANTAN

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Abstract

This study aims to analyze the influence of green human capital, green structural capital, and green relational capital on MSME business performance, both directly and indirectly through sustained competitive advantage as a mediating variable. The study employs a quantitative approach using a survey method involving 400 MSME actors in South Kalimantan Province, selected through simple random sampling. Data were collected through questionnaires and analysed using Structural Equation Modeling (SEM) based on Partial Least Squares (PLS). The results show that green human capital, green structural capital, and green relational capital have a positive and significant effect on sustained competitive advantage and MSME business performance. Furthermore, sustained competitive advantage has a strong effect on business performance and serves as a mediating variable in the relationship between the three dimensions of green intellectual capital and business performance. These findings indicate that the effective management of environmentally oriented resources, particularly human capital, plays a crucial role in enhancing competitiveness and improving MSME performance. This study suggests that sustainability-based strategies can be an effective approach for MSMEs to remain competitive in increasingly dynamic and environmentally demanding business environments.

Keywords: *Green Intellectual Capital, Sustained Competitive Advantage, MSMEs Performance*

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1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) play a strategic role in the Indonesian economy, serving as drivers of economic growth, providers of employment, and instruments for equitable development (Inrawan et al., 2021).

The economic significance of MSMEs in Indonesia is reflected in their substantial contribution to national GDP and their dominant role in employment generation, with nearly 97% of the workforce engaged in this sector (Kementrian Koordinator Bidang Perekonomian Republik Indonesia, 2023). Currently, Indonesia has around 64 million MSMEs, with a significant number distributed across regions, including South Kalimantan Province, which has 364,628 MSMEs spread across 13 districts and cities. This number is expected to continue increasing over time.

However, the growth in the number of MSMEs is not always accompanied by an improvement in competitiveness. Rapid changes in the business environment, intense market competition, and increasing consumer awareness of sustainability issues require MSMEs to develop not only temporary but also sustained competitive advantage to maintain long-term business performance. One of the key strategies to achieve this is through innovation, particularly innovation that emphasizes environmental sustainability. This is essential considering that MSME activities may generate negative environmental impacts, such as the use of non-environmentally friendly raw materials, dependence on fossil energy, excessive use of single-use plastics, and inadequate waste management practices.

In this context, the ability of MSMEs to achieve sustained competitive advantage depends on how effectively they manage and utilize their resources. This argument is consistent with the Resource-Based View (RBV), which emphasizes that organizations can achieve competitive advantage through unique strategic resources that are difficult for competitors to replicate or replace. (Barney, 1991). Intellectual capital is one approach used to measure intangible assets and is believed to provide added value to firms (Novianty & Fajriannor, 2023). With the growing emphasis on sustainability, the concept of intellectual capital has evolved to incorporate environmental dimensions, known as green intellectual capital (GIC).

Green intellectual capital refers to intangible assets related to environmental knowledge, employee capabilities, organizational systems, and relationships that support sustainable innovation and environmentally friendly business practices (Solihin et al., 2023). GIC consists of three main components: green human capital, green structural capital, and green relational capital (Chen, 2008). Green human capital reflects employees' environmental knowledge, skills, and awareness that foster sustainable innovation. Green structural capital represents organizational systems, policies, routines, and organizational culture that

support the implementation of environmentally sustainable practices (Chang & Chen, 2012; Yusoff et al., 2019). Meanwhile, green relational capital relates to an organization's ability to build sustainability-oriented relationships with stakeholders, including customers and suppliers (Chang & Chen, 2012). The synergy among these components enhances the organization's capacity to create sustainable value and strengthen its competitive position.

As environmental awareness increases, the implementation of GIC becomes increasingly relevant for MSMEs in promoting sustainable product development and environmentally friendly production processes. Several empirical studies have reported a positive relationship between GIC and business performance (Astuti et al., 2022; Chaudhry et al., 2016; Dwianika & Gunawan, 2020; Hariyati et al., 2022; Idrus & Hilalia, 2023; Khanlarov et al., 2020). However, findings remain inconsistent, as some studies suggest that GIC may not significantly affect financial performance and may even be perceived as a burden due to additional costs (Sidik et al., 2019; Sukirman & Dianawati, 2023).

From an RBV perspective, the impact of GIC on business performance is not always direct but often occurs through the development of sustained competitive advantage. GIC contributes to value creation by enhancing efficiency, differentiation, and sustainability-oriented innovation, which are difficult for competitors to imitate. Therefore, sustained competitive advantage acts as a strategic mechanism linking GIC to business performance. Sustained competitive advantage refers to a condition in which a company possesses advantages that can be maintained over a relatively long period compared to its competitors. Sustained competitive advantage enables firms to maintain or improve business performance while creating added value for stakeholders.

Previous studies have shown that GIC positively influences sustained competitive advantage (Ahmar & Astuti, 2023; Anik et al., 2014; Astuti. Pratiwi Dwi & Datrini, 2021; Bombiak, 2023; Cahyono & Hakim, 2020; Chaudhry et al., 2016; Chen, 2008; Solihin et al., 2023), although some findings indicate that certain components of GIC may not have a significant effect (Firmansyah, 2017; Lastanti & Augustine, 2022). Furthermore, sustained competitive advantage has been proven to improve business performance (Firdaus & Sakinah, 2023; Kiyabo & Isaga, 2020; Nguyen et al., 2021; Ratnawati et al., 2022).

Despite the increasing attention to green intellectual capital, previous studies have predominantly focused on large firms and direct relationships with

organizational performance, while limited research has examined MSMEs, particularly within regional contexts and through the mediating role of sustained competitive advantage. Moreover, inconsistent findings in prior studies indicate the need for further investigation. Therefore, this study examines the influence of green human capital, green structural capital, and green relational capital on MSME performance through sustained competitive advantage among MSMEs in South Kalimantan. This study contributes to the Resource-Based View (RBV) literature by highlighting the role of sustainability-oriented intangible resources in creating long-term competitive advantage and improving business performance, while also providing practical insights for MSME development and sustainability strategies.

Hypothesis Development

The Effect of Green Human Capital on Sustained Competitive Advantage

Green human capital represents employees' environmental knowledge, capabilities, skills, and awareness that support sustainable business practices and environmentally responsible activities. According to the Resource-Based View (RBV), human resources possessing unique environmental competencies can serve as strategic assets that are valuable, rare, inimitable, and difficult to substitute, thereby contributing to the creation of sustained competitive advantage. Prior empirical studies have also demonstrated that green human capital plays a significant role in strengthening firms' competitive positions.

H1: Green Human Capital positively affects Sustained Competitive Advantage.

The Effect of Green Structural Capital on Sustained Competitive Advantage

Green structural capital refers to organizational systems, procedures, routines, policies, and organizational culture that facilitate environmental sustainability and green innovation practices. Well-established organizational structures can enhance operational effectiveness and support the implementation of environmentally oriented strategies, which may contribute to long-term competitive advantage.

H2: Green Structural Capital positively affects Sustained Competitive Advantage.

The Effect of Green Relational Capital on Sustained Competitive Advantage

Green relational capital emphasizes the quality of environmentally oriented relationships between firms and external stakeholders, including customers, suppliers, business partners, and communities. Strong stakeholder relationships based on environmental commitment may improve organizational reputation, collaboration, and customer trust, thereby enhancing sustained competitive advantage.

H3: Green Relational Capital positively affects Sustained Competitive Advantage.

The Effect of Sustained Competitive Advantage on MSME Performance

Sustained competitive advantage enables firms to maintain superior market positions through unique resources and capabilities that are difficult for competitors to imitate. Firms that successfully develop sustained competitive advantage are more likely to achieve improved business performance and long-term sustainability.

H4: Sustained Competitive Advantage positively affects MSME Performance.

The Effect of Green Human Capital on MSME Performance

Employees with strong environmental competencies are capable of improving innovation, operational efficiency, and environmentally responsible business practices. These capabilities may contribute directly to enhancing MSME performance.

H5: Green Human Capital positively affects MSME Performance.

The Effect of Green Structural Capital on MSME Performance

Organizational systems, procedures, and cultures that support sustainability practices may improve operational efficiency and organizational effectiveness, which ultimately contribute to better MSME performance.

H6: Green Structural Capital positively affects MSME Performance.

The Effect of Green Relational Capital on MSME Performance

Strong relationships with environmentally conscious stakeholders may increase customer loyalty, market opportunities, and business sustainability.

Consequently, green relational capital may positively contribute to MSME performance.

H7: Green Relational Capital positively affects MSME Performance.

2. Research Method

This research applies a quantitative design to examine the relationships between green human capital, green structural capital, green relational capital, sustained competitive advantage, and MSME performance. Data were obtained from MSME actors in South Kalimantan Province through questionnaire-based surveys. In this study, sustained competitive advantage was positioned as a mediating variable in explaining the indirect effects of green intellectual capital dimensions on business performance.

The population of this study consists of 364,628 MSMEs in South Kalimantan. The sample size was determined using the Slovin formula with a 5% margin of error, resulting in 400 respondents. The sampling technique used was simple random sampling with proportional distribution across each district/city.

This study employed green human capital, green structural capital, and green relational capital as the independent variables representing the dimensions of green intellectual capital. The constructs were measured using 5, 9, and 5 indicators, respectively, adapted from (Chen, 2008). Sustained competitive advantage functioned as the mediating variable and was measured using 10 indicators developed from prior studies (Arsawan et al., 2022; Nguyen et al., 2021; Salisu & Julienti, 2019) . Meanwhile, MSME business performance was treated as the dependent variable and measured through 4 financial and non-financial performance indicators (Lontchi et al., 2023; Nguyen et al., 2021; Wongsansukcharoen & Thaweepaiboonwong, 2023). All measurement items were evaluated using a five-point Likert scale ranging from strongly disagree to strongly agree.

Data were analyzed using Structural Equation Modeling (SEM) based on Partial Least Squares (PLS). This method was chosen because it can accommodate complex models involving latent variables and does not require strict assumptions of normal data distribution. The analysis was conducted through the evaluation of the outer model to assess construct validity and reliability, and the inner model to examine the relationships among variables and test the

hypotheses. Hypothesis testing was based on t-statistics and p-values at a 5% significance level.

SEM-PLS was employed in this study because the proposed model involves multiple latent variables and mediating relationships with a predictive research orientation. In addition, the constructs were measured using perception-based Likert scales, making PLS-SEM appropriate due to its flexibility in handling non-normal data distributions and complex structural models.

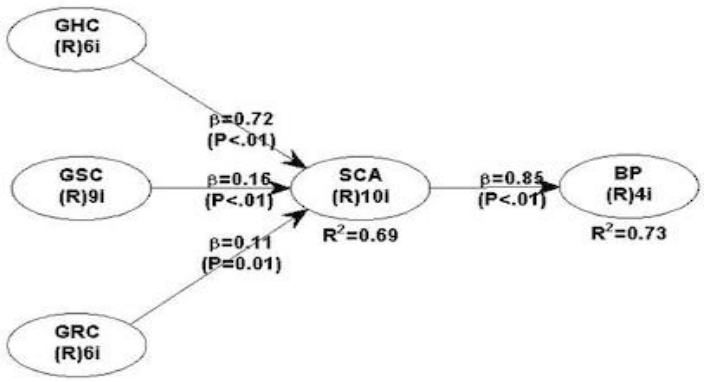
3. Result and Discussion

Characteristics Respondents

This study involved 400 MSME respondents in South Kalimantan Province with diverse characteristics. Based on gender, the majority of respondents were female (56.3%), while male respondents accounted for 43.8%. In terms of age, most respondents were in the range of 45–54 years (52.3%), indicating that the majority of business actors have relatively mature experience.

Regarding education level, most respondents had completed high school (43.3%) and held a bachelor's degree (39.8%). Based on business experience, the majority of respondents had been operating their businesses for 4–6 years (33.0%) and 7–10 years (29.5%). The business sectors were dominated by food and beverage (37.0%), followed by trade/retail (18.0%) and food service businesses (16.0%).

Figure 1. Research Model



Source: processed data, 2026

The distribution of respondents across regions was relatively even, with the largest proportions coming from Banjar Regency (18.5%) and Hulu Sungai Selatan (16.3%). In terms of income, most MSMEs earned between IDR 5,000,000 and IDR 10,000,000 per month (38.5%), and the majority employed between 1 and 5 workers (92.8%).

Analysis Statistics Descriptive

Descriptive statistical analysis shows that all variables have relatively high average values, which indicates that respondents gave a positive assessment of the implementation of environmentally based practices and business performance.

Table 1. Statistical Results Descriptive

Variable	N	Min	Max	Mean	Standard Deviation
Green Human Capital	400	2	5	3,756	0.694
Green Structural Capital	400	2	5	3,578	0.592
Green Relational Capital	400	2	5	3,447	0.656
Sustained Competitive Advantage	400	2	5	3,892	0.621
MSME Performance	400	2	5	3,831	0.689

Source: processed data (2024)

Based on Table 1, the total number of respondents (N) was 400. The *green human capital* variable had a minimum value of 2 and a maximum value of 5, with a mean of 3.756 and a standard deviation of 0.694. The *green structural capital* variable also ranged from 2 to 5, with a mean of 3.578 and a standard deviation of 0.592. Similarly, *green relational capital* had a minimum value of 2 and a maximum value of 5, with a mean of 3.447 and a standard deviation of 0.656.

Furthermore, the *sustained competitive advantage* variable showed a minimum value of 2 and a maximum value of 5, with a mean of 3.892 and a standard deviation of 0.621. The MSME business performance variable also ranged from 2 to 5, with a mean of 3.831 and a standard deviation of 0.689.

Overall, the mean values of all variables are higher than their respective standard deviations, indicating that the data are relatively well distributed and that the mean values adequately represent the variability of the data.

Evaluation (Model Fit and Outer Model)

The model fit test results indicate that the research model meets the required criteria, with APC = 0.462 ($p < 0.001$), ARS = 0.708 ($p < 0.001$), and AVIF

= 1.983 (< 5), indicating that the model is fit. Furthermore, the results of the outer model evaluation show that all indicators have loading factor values above 0.70, indicating that the indicators are valid in measuring their respective latent constructs.

Table 2. ***Convergent Validity***

Indicator	*Green Human Capital*	*Green Structural Capital*	*Green Relational Capital*	*Sustained Competitive Advantage*	MSME Performance
X1.1	0.928				
X1.2	0.781				
X1.3	0.717				
X1.4	0.928				
X1.5	0.927				
X1.6	0.904				
X2.1		0.825			
X2.2		0.766			
X2.3		0.753			
X2.4		0.733			
X2.5		0.764			
X2.6		0.720			
X2.7		0.777			
X2.8		0.806			
X2.9		0.847			
X3.1			0.855		
X3.2			0.867		
X3.3			0.874		
X3.4			0.873		
X3.5			0.832		
X3.6			0.832		
Z1.1				0.829	
Z1.2				0.733	
Z1.3				0.832	
Z1.4				0.871	
Z1.5				0.901	
Z1.6				0.766	
Z1.7				0.899	
Z1.8				0.874	
Z1.9				0.891	
Z1.10				0.820	
Y1.1					0.722
Y1.2					0.954
Y1.3					0.944
Y1.4					0.928

Source: processed data (2024)

Inner Model Analysis Results

The results indicate that the R-square value for sustained competitive advantage is 0.689, meaning that 68.9% of its variance is explained by green human capital, green structural capital, and green relational capital. Meanwhile, the R-square value for MSME business performance is 0.728, indicating that the model has strong explanatory power. Furthermore, the Q-square values of 0.591 for sustained competitive advantage and 0.726 for MSME business performance suggest that the model has good predictive relevance.

Hypothesis Test Results

Table 5. *Path Coefficients* and *P-Value*

Variables	*P- Value*	*Path Coefficients*	Information
GHC →SCA	< 0.001	0.725	Hypothesis accepted
GSC →SCA	< 0.001	0.155	Hypothesis accepted
GRC →SCA	0.011	0.133	Hypothesis accepted
SCA →MSME Performance	< 0.001	0.853	Hypothesis accepted
GHC →MSME Performance	< 0.001	0.618	Hypothesis accepted
GSC →MSME Performance	< 0.001	0.132	Hypothesis accepted
GRC →MSME Performance	0.003	0.097	Hypothesis accepted

Source: processed data (2024)

The results indicate that all hypotheses are supported. *Green human capital* has the most dominant influence on sustained competitive advantage (β = 0.725), followed by *green structural capital* and *green relational capital*. In addition, sustained competitive advantage has a very strong effect on MSME performance (β = 0.853).

The findings show that green human capital has a positive and significant effect on sustained competitive advantage. This indicates that employees' environmental knowledge, skills, and awareness play a crucial role in creating advantages that are difficult for competitors to imitate. From a Resource-Based View (RBV) perspective, human resources with environmental competencies represent valuable and unique strategic assets that can drive long-term competitive advantage. This result is consistent with (Chen, 2008), who emphasized the importance of green intellectual capital in enhancing competitiveness, particularly through human capital. Similarly, Solihin et al., (2023)found that environmentally oriented capabilities contribute significantly to improving competitive advantage. In the context of MSMEs, this finding

suggests that limitations in resources can be offset by enhancing the quality of human resources that are adaptive to sustainability issues.

Furthermore, green structural capital is found to have a positive effect on sustained competitive advantage, although its contribution is relatively lower than that of green human capital. This suggests that organizational systems, procedures, and cultures that support environmentally friendly practices still play an important role in strengthening competitive position. This finding is in line with Chang & Chen, (2012), who argued that organizational structures supporting environmental knowledge management can enhance competitive advantage. However, in MSMEs, the contribution of green structural capital tends to be limited due to constraints in formal systems and technological development. This indicates that although structural support is important, its implementation in MSMEs remains suboptimal.

In addition, green relational capital also shows a positive effect on sustained competitive advantage, although it has the smallest contribution among the three dimensions. This implies that relationships with stakeholders, such as customers and suppliers, still play a role in supporting environmentally based competitive advantage. This finding is consistent with (Huang & Kung, 2011), who highlighted the importance of environmentally oriented external relationships in enhancing firm value and competitiveness. However, the relatively low contribution suggests that MSMEs have not fully leveraged external relationships as a strategic resource for sustainability.

Moreover, sustained competitive advantage is found to have a strong positive effect on MSME performance. This indicates that the ability of MSMEs to maintain a superior position in the market is a key determinant of business performance. This finding supports previous studies by (Kiyabo & Isaga, 2020) and Nguyen et al., (2021) which demonstrate that competitive advantage significantly improves firm performance. Within the RBV framework, competitive advantage acts as a mechanism that transforms resources into superior performance. Therefore, MSMEs that are able to develop innovation and sustainability-based advantages tend to achieve better performance outcomes.

The results also reveal that green human capital has a direct and significant effect on MSME performance. This indicates that environmentally aware and competent employees not only contribute to competitive advantage but also directly enhance business performance. This finding is consistent with

Yusoff et al., (2019), who found that environmentally oriented knowledge practices improve organizational performance and sustainability. In MSMEs, where human resources are central to operations, strengthening environmental competencies can significantly impact performance.

On the other hand, green structural capital and green relational capital also have significant effects on MSME performance, although their contributions are relatively smaller. This suggests that organizational systems and external relationships still provide added value but are not yet dominant factors in performance improvement. This finding is consistent with (Bombiak, 2023), who noted that environmental practices can enhance performance, although their impact depends on the level of implementation and organizational readiness. Therefore, strengthening structural and relational aspects remains a potential area for development in MSMEs.

Overall, the results demonstrate that sustained competitive advantage plays a crucial mediating role in linking green intellectual capital to MSME business performance. This finding reinforces the RBV perspective that resources do not directly improve performance but do so through the creation of sustained competitive advantage. Therefore, the integrated management of green human capital, green structural capital, and green relational capital is essential for enhancing competitiveness and long-term performance of MSMEs.

4. Conclusion

The study emphasizes that environmentally oriented intangible resources are important drivers of MSME competitiveness and performance. In particular, green human capital emerged as the strongest factor, indicating that employee competence and environmental awareness are essential for business sustainability. The findings also reveal that sustained competitive advantage serves as an important pathway through which green intellectual capital improves MSME performance. Therefore, MSMEs need to manage environmental knowledge, organizational systems, and stakeholder relationships in a more integrated manner to remain competitive in an increasingly sustainability-oriented business environment.

Despite providing important findings, this study is subject to several limitations. The analysis relies primarily on respondents' perceptions, which

may introduce subjective bias in measuring the variables. In addition, the research was conducted only among MSMEs in South Kalimantan, so the results may not fully represent MSMEs in other regions with different business and environmental characteristics. Future studies are encouraged to involve broader geographical coverage and examine additional factors, such as green innovation, that may further explain the relationship between green intellectual capital and business performance. From a practical perspective, MSMEs are encouraged to prioritize the development of human resource capabilities oriented toward environmentally friendly practices and to gradually implement simple systems that support sustainability, in order to enhance competitiveness and business performance.

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