The Influence of Green Intellectual Capital on Sustainable Competitive Advantage with Green Innovation as a Mediator in Pematangsiantar City

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Abstract:

This study aims to see how much influence green intellectual capital contributes to increasing competitive advantage with green innovation as a mediator in Pematangsiantar City. This research method uses a mixed approach. Data collection using research instruments and statistical data analysis. The population is all MSMEs engaged in the food and beverage industry sector in Pematangsiantar City. The number of samples in this study was 300 samples. The measurement scale in this study is a Likert scale gradation from the lowest to the highest. Descriptive statistical analysis is used to determine the description of the characteristics of respondents and the answers of research respondents. Testing the estimation and hypothesis of the research model using the Partial Least Square Structural Equation Model (PLS-SEM) method. The results of the study show that Green human capital, structural capital, and Green relational capital have a significant effect on green innovation in MSMEs in Pematangsiantar City. Likewise, Green human capital, Green structural capital, and Green relational capital have a significant effect on sustainable competitive advantage in MSMEs in Pematangsiantar City. Furthermore, Green innovation has a significant effect on sustainable competitive advantage in MSMEs in Pematangsiantar City. Green innovation is able to mediate the influence between green human capital, green structural capital and green relational capital on sustainable competitive advantage in MSMEs in Pematangsiantar City.

1. Introduction

Micro, Small and Medium Enterprises (MSMEs) are the driving force of the economy in both developed and developing countries, including Indonesia [1]. Given the importance of the role of MSMEs for the economy, the performance of MSMEs needs to be improved sustainably because it will affect economic growth in a region. It is known that MSMEs in Pematangsiantar City still lack environmentally friendly social services in the community provided by MSME actors. In addition, there is a lack of commitment from business actors to comply with applicable environmental regulations. Therefore, sustainable competitive advantage plays an important role in helping companies achieve superior performance [2,3].

Companies need to have a competitive advantage, where businesses become successful because they have a competitive advantage over their competitors [4]. A company has a competitive advantage when it can do something that competitors cannot or has something that competitors want [5]. It is known that the phenomenon of competitive advantage problems in MSMEs in Pematangsiantar City is the strategy and goals of the organization that have not been communicated regularly. With the green innovation approach used in the manufacturing industry to promote organizational sustainability [6]. Companies that pioneer environmentally friendly innovation may be able to maintain a competitive advantage [7,8].

Nowadays, it is inevitable for organizations to adopt green practices in achieving sustainable performance, one of which is through the adoption of green innovation. To adopt green practices in achieving sustainable performance, one of which is through the adoption of green innovation [9,10]. It is known that the main problem in optimally adopting green innovation is that the majority of innovations only consider business profits without considering the impact on the environment. The next problem is the inadequacy of employees and technology owned by MSMEs in supporting the adoption of green innovation. This is due to the lack of support from the government in introducing what green innovation is and the lack of facilities provided by the government for MSMEs [11].

Green intellectual capital is one aspect that needs to be considered today so that the adoption of green innovation can run well to support the increase in competitive advantage [12,13]. Intellectual capital consists of all intangible assets, knowledge, and capabilities that a company can use to create value or competitive advantage so that it can achieve its goals very well [13,14]. It is known that green intellectual capital in MSMEs in the food and beverage industry sector is not optimal. This can be seen from the majority of employees who generally do not have higher education status and do not have special skills.

This study will focus on how and how much green intellectual capital contributes to increasing competitive advantage with green innovation as a mediator in Pematangsiantar City. This study also focuses on the management of environmentally friendly organizations, which are considered capable of making a positive contribution to increasing environmentally friendly innovation directly through the sincere commitment of company stakeholders to preserve the environment. Organizational concern is also needed by paying attention to marketing aspects that care about the environment and affect its reputation in the customer market to maintain its performance [15].

2. Literature Review

Competitive advantage refers to a company's ability to achieve greater performance than its competitors. In a highly dynamic environment, companies need experience-based adaptation to create competitive advantage [16]. Competitive advantage can be defined as the extraordinary ability of human resources in a company to utilize unique resources to meet customer needs and desires [17,18]. Competitive advantage is an advantage possessed by an organization or company, where the

advantage is used to compete with other companies to get something [19,20].

According to Hill et al., [21] a company is said to have a competitive advantage over its competitors if its profitability is greater than the average profitability and profit growth of other companies competing to get the same customers. The higher the profitability compared to its competitors, the greater the competitive advantage. A company has a sustained competitive advantage when its strategy allows it to maintain above-average profitability for several years.

The concept of sustainable competitive advantage began to be known when Porter and Advantage tried to define sustainable competitive advantage as a relevant strategy to achieve long-term market advantage. Barney tries to define sustainable competitive advantage as a long-term benefit resulting from the process of creating unique value that is different from potential competitors that cannot be easily imitated [22]. In addition, sustainable competitive advantage also refers to the creation of value achieved by companies through high innovation by encouraging market competition [23]. So it is concluded that sustainable competitive advantage is the ability of a company to utilize existing resources to create unique value that cannot be easily imitated in the long term to meet customer needs and desires in order to achieve greater performance than its competitors. Sustainable is traditionally defined as a condition in which a firm's competitive advantage is able to withstand erosion caused by competitor behavior. Proponents of the resource-based view of the firm introduce the idea of imitability, stating that 'a competitive advantage will only be sustainable if it continues to exist after attempts to duplicate it have ceased' [24].

Competitive advantage can be achieved through four elements, namely eliminating barriers to entry, supplier power, buyer power, and decision-making accuracy in the event of intense competition in the market [25]. Porter states that the components of competitive advantage come from a business's ability to maximize the efficiency of its production processes to develop goods and services with superior quality [26]. Several control variables that can affect a company's competitive advantage are the company's industry and company size [27]. Then, Ferreira and Coelho, (2020) suggest cost, quality, dependability and speed of delivery as some of a company's critical competitive priorities compared to competitors [4]. One important aspect that companies need to pay attention to to ensure their sustainability is green intellectual capital. Intellectual capital consists of all intangible assets, knowledge, and capabilities owned by the company

that can create value or competitive advantage so that it can achieve its goals well [13]. Intellectual capital can also be defined as a description of all intangible capital that allows an organization to create and maintain value, thus producing a competitive advantage. Meanwhile, green intellectual capital is an assimilation between intellectual capital and the concept of the environment [28].

Green intellectual capital is a new paradigm developed from intellectual capital. Green intellectual capital is an intangible asset in the form of information resources, innovation and knowledge that functions to increase competitive ability while still protecting the environment which can improve sustainable performance [12,29]. Furthermore, green intellectual capital is the total stock of all types of intangible assets, knowledge, capabilities, and relationships, etc. regarding environmental protection or green innovation both at the individual and organizational levels in a company [30]. Based on the descriptions of the experts above, it can be concluded that green intellectual capital can be defined as all intangible assets in the form of information resources, innovation and knowledge that function to create value or competitive advantage while still paying attention to environmental aspects in their application. Environmental management is increasingly important for companies in a dynamic global environment, and more and more companies are willing to put more effort into developing green innovation. Therefore, developing green innovation is a win-win solution to overcome the conflict between economic development and environmental protection [13]. According to Wang and Juo, green innovation is an innovative environmental management capability that can improve a company's ability to develop environmentally friendly products and process innovations [7]. In turn, this helps improve the company's environmentally friendly image and its environmentally friendly performance.

Green innovation is also seen as an important aspect of organizational capabilities that drive company performance. Green innovation also refers to the contribution of the business world to sustainable development, while increasing the company's competitive advantage [31]. Green innovation can act as a catalyst for creating new technologies and processes that enable companies to be environmentally friendly and also achieve economic sustainability [9]. Green innovation is one of the most significant environmental strategies, which involves the transformation of production procedures, consisting of reducing resource consumption, preventing pollution, and

implementing an environmental management system in the field of business operations in a company [32].

Based on the description presented above, it can be concluded that green innovation is one of the strategies that can be implemented by companies to develop new products or processes in company operations that allow companies to be environmentally friendly and also achieve economic sustainability. Good green innovation can also help companies to increase their competitive advantages.

Hypothesis

According to the research variables, research hypotheses can be formulated, including :

H1 = Green human capital has an effect on green innovation.

H2 = Green structural capital has an effect on green innovation.

H3 = Green relational capital has an effect on green innovation.

H4 = Green human capital has an effect on sustainable competitive advantage.

H5 = Green structural capital has an effect on sustainable competitive advantage.

H6 = Green relational capital has an effect on sustainable competitive advantage.

H7 = Green innovation has an effect on sustainable competitive advantage.

H8 = Green human capital has an effect on sustainable competitive advantage mediated by green innovation.

H9 = Green structural capital has an effect on sustainable competitive advantage mediated by green innovation.

H10 = Green relational capital has an effect on sustainable competitive advantage mediated by green innovation.

3. Research Method

This study uses a quantitative approach to research a specific population or sample. Data collection uses research instruments and data analysis is statistical. The population in this study is the total number of MSMEs engaged in the food and beverage industry sector in Pematangsiantar City. The number of samples in this study is 60 indicators from 5 variables used multiplied by 5, so that 300 samples are obtained. Furthermore, the data sources used in this study are Primary Data and Secondary Data. The data collection techniques used in this study are Documentation, Interviews, and Questionnaires. The measurement scale in this study is a Likert scale gradation from the lowest to the highest. Descriptive statistical analysis is used to determine the description of the characteristics of

respondents and the answers of research respondents. Testing estimates and hypotheses from the research model using the Partial Least Square Structural Equation Model (PLS-SEM) method.

4. Results and Discussions

The tabulation of respondents' answers is intended to obtain an overview or responses from respondents regarding green intellectual capital, green innovation, and sustainable competitive advantage, in the food and beverage industry sector UMKM in Pematangsiantar City. The determination of the criteria for the average value of the respondents' answers is entered into interval classes, where the determination of the interval uses the following formula :

$$\text{Class interval} = \frac{\text{Highest value} - \text{Lowest value}}{\text{Class interval}}$$

Where :

Highest score = 5, Lowest score = 1, Number of classes = 5

From the formula above, the class interval value is obtained = 0.8, so the category provisions apply with the following results :

Green Human Capital (GHC) is a concept that combines the principles of environmental sustainability with human resource management in an organization. In this modern era, attention to environmental issues is increasing, both among the community and companies. This has encouraged the emergence of a new approach to managing employees that focuses not only on productivity and efficiency, but also on efforts to minimize negative impacts on the environment. Green human capital also includes increasing environmental awareness among employees through training, skills development, and sustainability programs that involve all elements of the organization.

Through the implementation of green human capital, companies can create a work culture that not only supports sustainable business performance but also contributes to global efforts to address the challenges of climate change and environmental degradation. The following is a tabulation table of respondents' answers regarding green human capital.

Based on table 2 above, the tabulation of respondents' answers regarding green human capital in the indicator our employees participate in environmentally friendly production activities and contribute to environmental awareness activities is

3.68 with the answer criteria agree. The indicator our employees have adequate capabilities in terms of environmental awareness is 3.94 with the answer criteria agree. The indicator our employees produce high quality and environmentally friendly products is 3.98 with the answer criteria agree. The indicator our business has a team that works well together in achieving environmental awareness is 4.01 with the answer criteria agree. The indicator our leaders provide full support in environmental awareness activities in our business environment is 3.94 with the answer criteria agree.

The results of the tabulation of respondents' answers regarding green human capital obtained an overall average of 3.91 with the answer criteria agree. The highest value of 4.01 with the answer criteria agree is in the indicator our business has a team that works well together in achieving environmental awareness. The lowest value of 3.68 with the answer criteria agree is in the indicator our employees participate in environmentally friendly production activities and contribute to environmental awareness activities.

Green Structural Capital (GSC) is a sustainable concept that refers to an organization's intangible assets that enable the creation of environmental sustainability in its business operations. These structural assets include systems, processes, infrastructure, and corporate culture that support the implementation of environmentally friendly practices. Amidst increasing awareness of the need to protect the environment, the implementation of green structural capital is becoming increasingly relevant for companies that want to actively contribute to sustainability while increasing their competitiveness. This can include the use of environmentally friendly technologies, process optimization to reduce carbon footprints, and company compliance with certain environmental standards.

In addition, green structural capital also includes knowledge management and innovation that support the creation of more environmentally friendly products or services. Companies that implement green structural capital will be better able to adapt to increasingly stringent environmental regulations while increasing the company's positive reputation in the eyes of consumers and stakeholders. In addition to playing a role in creating long-term sustainability, green structural capital also provides added value to the company as a whole. The table 3 is a tabulation table of respondents' answers regarding green structural capital.

Based on table 3 above, the tabulation of respondents' answers regarding green structural capital in the indicator of our business has a good

environmental management system of 3.92 with the criteria of agreeing. The indicator of our business has a high ratio of employees in the field of environmental management to total employees of 4.01 with the criteria of agreeing. The indicator of our business has adequate investment in environmental protection facilities of 4.14 with the criteria of agreeing. The indicator of our business is always innovative in terms of environmental protection of 4.11 with the criteria of agreeing. The indicator of our environmentally oriented business operations generally runs smoothly of 4.03 with the criteria of agreeing.

The indicator of our business has a good environmental knowledge management system of 3.96 with the criteria of agreeing. The indicator of our business has an environmentally friendly operational monitoring team of 4.00 with the criteria of agreeing. The indicator of our business has detailed environmentally friendly business regulations of 4.00 with the criteria of agreeing. The indicator of our business has a reward system for employees who have carried out environmentally friendly business efforts of 4.01 with the criteria of agreeing. The results of the tabulation of respondents' answers regarding green structural capital obtained an overall average of 4.02 with the criteria for agreeing answers. The highest value of 4.14 with the criteria for agreeing answers was in the indicator that our business has adequate investment in environmental protection facilities. The lowest value of 3.92 with the criteria for agreeing answers was in the indicator that our business has a good environmental management system.

Green Relational Capital (GRC) refers to the relationships and networks that a company has with external stakeholders, such as customers, suppliers, business partners, communities, and governments, that support the creation of environmentally sustainable practices. This emphasizes the importance of building strong and long-term relationships with external parties, where attention to environmental issues is one of the main topics of business interactions. For example, companies can work with suppliers who implement environmentally friendly production practices or collaborate with customers to reduce the use of hazardous materials.

 In addition, green relational capital also includes the role of companies in educating and empowering communities and business partners regarding the importance of the concept of sustainability. By building a relational network based on the principles of sustainability, companies not only build a positive reputation but also contribute to positive change in the industry and society in general. Ultimately, green relational capital becomes a strategic asset that allows companies to grow sustainably, increase customer loyalty, and maintain harmonious relationships with all stakeholders. The table 4 is a tabulation table of respondents' answers regarding green relational capital.

Based on table 4 above, the tabulation of respondents' answers regarding green relational capital in the indicator of our business designing environmentally friendly products that suit customer tastes is 4.20 with the answer criteria agree. The indicator of customers being satisfied with the environmentally friendly products we produce is 4.27 with the answer criteria strongly agree. The indicator of our business establishing stable cooperative relationships with suppliers who care about environmental issues is 4.24 with the answer criteria strongly agree. The indicator of our business establishing stable cooperative relationships with customers who care about environmental issues is 4.25 with the answer criteria strongly agree. The indicator of our business establishing stable cooperative relationships with other strategic partners who care about environmental issues is 4.14 with the answer criteria agree.

The results of the tabulation of respondents' answers regarding green relational capital obtained an overall average of 4.22 with the answer criteria strongly agree. The highest value of 4.27 with the answer criteria strongly agree is in the indicator of customers being satisfied with the environmentally friendly products we produce. The lowest value of 4.14 with the answer criteria agree is in the indicator of our business establishing stable cooperative relationships with other strategic partners who care about environmental issues.

Green innovation is a concept that refers to the development and implementation of new products, services, or processes to improve their negative impact on the environment. The concept of sustainability encourages companies to innovate in various aspects of their business. Green innovation does not only mean compliance with applicable environmental regulations, but also the creation of new opportunities for companies to thrive in an increasingly environmentally conscious market. Overall, the implementation of green innovation provides benefits not only from an environmental perspective, but also from an economic and social perspective. This innovation helps companies stay relevant, increase competitiveness, and contribute to global efforts to address climate change and environmental damage. The table 5 is a tabulation table of respondents' answers regarding green innovation. Based on table 5 above, the tabulation

of respondents' answers regarding green innovation in the green product innovation dimension in the indicator of our business choosing non-polluting/toxic materials for existing and new products is 4.09 with the answer criteria agree. The indicator of our business choosing materials that consume less energy in the development of existing and new products is 4.13 with the answer criteria agree. The indicator of our business increasing the use of environmentally friendly packaging for existing and new products is 4.17 with the answer criteria agree. In the green process innovation dimension in the production process indicator, our business effectively reduces emissions of hazardous substances or waste by 4.19 with the answer criteria agree. The production process indicator of our business seeks to recycle waste that can be processed and reused is 4.12 with the answer criteria agree.

The results of the tabulation of respondents' answers regarding green innovation obtained an overall average of 4.14 with the answer criteria agree. The highest value of 4.19 with the answer criteria agree is in the green process innovation dimension in the production process indicator, our business effectively reduces emissions of hazardous substances or waste. The lowest value of 4.14 with the criteria of agreeing is in the green product innovation dimension in the indicator of our business choosing non-polluting/toxic materials for existing and new products.

Sustainable competitive advantage is a concept that refers to a company's ability to maintain a leading position in the market in the long term by using strategies that are difficult for competitors to imitate. This advantage is not only based on traditional factors, such as product quality or price, but also on elements that support sustainability, such as innovation, operational efficiency, and environmental responsibility. In today's dynamic business environment, companies must not only focus on cost efficiency and productivity improvements, but also on their ability to adapt to market changes and global sustainability trends.

In addition, sustainable competitive advantage also includes intelligent resource management, be it human resources, technology, or intellectual capital. By utilizing these resources optimally, companies can continue to innovate and provide added value to customers, while maintaining a good reputation in the eyes of the community and stakeholders. Ultimately, sustainable competitive advantage allows companies to remain relevant and successful amidst global challenges, such as regulatory changes, consumer preferences, or competitive pressures. Companies that are able to maintain this advantage will have a better chance of growing sustainably and becoming leaders in the industry they are in. The table 6 is a tabulation table of respondents' answers regarding sustainable competitive advantage. Based on table 6 above, the tabulation of respondents' answers regarding sustainable competitive advantage on the direction dimension in the indicator, our leaders have formulated a management philosophy in the business being run at 4.06 with the answer criteria agree. The management philosophy indicator is communicated by our leaders to all related parties at 4.14 with the answer criteria agree. In the consistence dimension, the strategy and business objectives indicator is communicated regularly to all related parties at 4.17 with the answer criteria agree. The strategy and business objectives indicator is translated into objectives at all levels of management and communicated properly at 4.03 with the answer criteria agree.

In the coherence dimension, the work process indicator for each person in our business is discussed routinely at 4.23 with the answer criteria strongly agree. The work process coherence indicator is discussed periodically in our business at 4.22 with the answer criteria strongly agree. Our employee performance indicator is measured and rewarded when they contribute to the goals achieved at 4.14 with the answer criteria agree. The indicator when improvements are realized in our business, the improvements are implemented step by step at 4.09 with the answer criteria agree. In the feedback dimension in the employee indicator we are told whether they are doing a good job or not when the meeting is 4.12 with the answer criteria agree.

Our leader indicator assesses the quality of employee performance objectively at 4.27 with the answer criteria strongly agree. Our employee indicator is informed about how their work relates to the work of other staff members when the meeting is 4.11 with the answer criteria agree. The results of the tabulation of respondents' answers regarding sustainable competitive advantage obtained an overall average of 4.14 with the answer criteria agree. The highest value of 4.27 with the answer criteria strongly agree is in the feedback dimension in the leader indicator we assess the quality of employee performance objectively. The lowest value of 4.03 with the answer criteria agree is in the consistence dimension in the strategy indicator and our business goals are translated into goals at all levels of management and communicated accordingly.

5. Data processing with Partial Least Square (PLS)

Data analysis in this study used Partial Least Square (PLS) where there are two stages of evaluation, namely evaluation of the measurement model (outer model) and evaluation of the structural model (inner model). Data processing was carried out using SmartPLS 4.0 software.

Evaluation of the measurement model is carried out to assess the validity and reliability of the model which is carried out using convergent validity, discriminant validity, and composite reliability as follows :

1.   Convergent Validity

Convergent validity is used to validate indicators against their variables as reviewed from the loading factor value. This value will be accepted if the loading factor value is above 0.7. However, loading factor values ranging from 0.4 to 0.7 will be completely removed if you want to increase the AVE value, which must be above 0.5. Table 7 shows the loading factor values owned by each indicator.

Based on table 7. above, it can be observed that there is 1 (one) indicator that has a loading factor below 0.7 which will be immediately deleted to increase the AVE owned by the research model. Indicators whose values are invalid or below 0.7 must be removed from the model, so for the GSC9 indicator, it must be removed or deleted. Furthermore, the PLS algorithm is repeated and the results can be seen in table 8 which shows that all indicators have a loading factor value of more than 0.7.

The final check of convergent validity is by looking at the AVE value. An indicator is considered to have good convergent validity if it has an AVE value of more than 0.5. The final AVE value can be seen in table 9.

Based on table 9 above, it can be observed that all variables have an Average Variance Extracted (AVE) value above 0.5. This result indicates that most of the variance is explained by the construct. Thus, convergent validity for the measurement scale items is achieved.

1.   Disriminant Validity

Discriminant validity examination is done by reviewing the indicator crossloading value. Discriminant validity is stated as good if the indicator correlates higher to its variable than other variables. The crossloading results can be seen in table 10.

From the crossloading in table 10, it can be seen that all indicators have a higher correlation with their variables than other variables, so it can be concluded that the discriminant validity is good.

2.   Construct Reliability

The construct reliability test is conducted by measuring two criteria, namely composite reliability and Cronbach alpha. The construct is declared reliable if the composite reliability and Cronbach's alpha values are above 0.7. The results of the composite reliability and Cronbach's alpha tests are in table 11.

From table 11, it can be seen that all variables have composite reliability and Cronbach's alpha above 0.7. This shows a satisfactory level of internal consistency and high reliability to assess each construct so that it can be concluded that all variables are said to be reliable.

3.   Model Fit Test (Model Fit)

SRMR (Standardized Root Mean Square Residual) is a tool to measure model fit. The requirement used is that the SRMR value below 0.08 indicates a model fit, while the SRMR value between 0.08 and 0.10 is still acceptable. The results of the Model Fit test can be reviewed in table 12.

From table 12 above, it can be seen that the SRMR or Standardized Root Mean Square Residual value is 0.049 < 0.08, so it can be concluded that the model fits the data.

After testing the measurement model (outer model), the next step is testing the structural model (inner model) as follows :

1.   Test of Determination Coefficient (R Square)

The coefficient of determination (R Square) is a way to assess how much the endogenous construct can be explained by the exogenous construct. The value of the coefficient of determination (R Square) is expected to be between 0 and 1. The results of the R Square test can be seen in table 13.

From table 13 above, it can be seen that the R Square value of green innovation is 0.236, which means that the joint influence of green human capital, green structural capital, and green relational capital on green innovation is 23.6%. Then, the R Square value of sustainable competitive advantage is 0.450, which means that the joint influence of green human capital, green structural capital, and green relational capital on green innovation on sustainable competitive advantage is 45%.

2.   Prediction Relevance Test (Q Square)

The Q Square value is used to see the relative influence of the structural model on the observation measurement for latent dependent variables (endogenous latent variables). The Q Square value > 0 shows evidence that the observed values have been well reconstructed so that the model has predictive relevance. While the Q Square value < 0 indicates no predictive relevance. The results of the Q Square test can be seen in table 14.

From table 14 above, it can be seen that the Q Square value of green innovation is 0.206 > 0, so it is concluded that green human capital, green structural capital, and green relational capital have

predictive relevance for green innovation. Then, the Q Square value of sustainable competitive advantage is 0.373 > 0, so it is concluded that green human capital, green structural capital, green relational capital, and green innovation have predictive relevance for sustainable competitive advantage.

After testing R Square and Q Square, the next step is hypothesis testing to determine whether the hypothesis can be accepted or rejected. This study will use a significant value (α) of 0.05 or 5%. The relationship between variables can be considered significant if the P value (P Values) is smaller than the significant value that has been set (P <0.05). The results of hypothesis testing can be seen in table 15. Table 15 shows that of the 28 hypotheses developed, there are 22 hypotheses that are supported with P values below 0.05 and there are 6 hypotheses that are not supported with P values above 0.05.

Table 1. *Interval Values and Respondent Answer Categories*

Interval Value	Category
1,00 – 1,80	Strongly Disagree
1,81 – 2,60	Disagree
2,61 – 3,40	Somewhat Agree
3,41 – 4,20	Agree
4,21 – 5,00	Strongly Agree

Source: data processing (2024)

Table 2. *Tabulation of Respondents' Answers Regarding Green Human Capital*

Question Code	SB	B	CB	TB	STB	Average
GHC1	62	101	116	20	1	3,68
GHC2	82	132	74	11	1	3,94
GHC3	90	126	75	7	2	3,98
GHC4	98	120	71	9	2	4,01
GHC5	99	97	91	13	0	3,94
Total Answers	431	576	427	60	6	3,91
Percentage	28,73%	38,40%	28,47%	4,00%	0,40%	100%

Source: data processing (2024)

Table 3. *Tabulation of Respondents' Answers Regarding Green Structural Capital*

Question Code	SB	B	CB	TB	STB	Average
GSC1	88	114	85	12	1	3,92
GSC2	105	104	82	8	1	4,01
GSC3	130	91	72	6	1	4,14
GSC4	123	95	74	7	1	4,11
GSC5	104	108	82	6	0	4,03
GSC6	87	125	80	5	3	3,96
GSC7	96	120	74	9	1	4,00
GSC8	105	100	85	10	0	4,00
GSC9	94	117	88	1	0	4,01
Total Answers	932	974	722	64	8	4,02
Percentage	34,52%	36,07%	26,74%	2,37%	0,30%	100%

Source: data processing (2024)

Table 4. *Tabulation of Respondents' Answers Regarding Green Relational Capital*

Question Code	SB	B	CB	TB	STB	Average
GRC1	120	119	61	0	0	4,20
GRC2	142	97	61	0	0	4,27
GRC3	151	70	78	1	0	4,24

GRC4	137	101	61	1	0	4,25
GRC5	132	86	75	7	0	4,14
Total Answers	**682**	**473**	**336**	**9**	**0**	**4,22**
Percentage	**45,47%**	**31,53%**	**22,40%**	**0,60%**	**0,00%**	**100%**

Source: data processing (2024)

Table 5. *Tabulation of Respondents' Answers Regarding Green Innovation*

Question Code	SB	B	CB	TB	STB	Average
GI1	123	98	61	18	0	4,09
GI2	133	91	60	14	2	4,13
GI3	134	97	54	15	0	4,17
GI4	149	76	60	14	1	4,19
GI5	140	72	71	17	0	4,12
Total Answers	**679**	**434**	**306**	**78**	**3**	**4,14**
Percentage	**45,27%**	**28,93%**	**20,40%**	**5,20%**	**0,20%**	**100%**

Source: data processing (2024)

Table 6. *Tabulation of Respondents' Answers Regarding Sustainable Competitive Advantage*

Question Code	SB	B	CB	TB	STB	Average
SCA1	123	98	54	25	0	4,06
SCA2	129	104	47	20	0	4,14
SCA3	132	98	60	9	1	4,17
SCA4	102	124	56	17	1	4,03
SCA5	143	96	49	12	0	4,23
SCA6	141	95	52	12	0	4,22
SCA7	126	99	68	6	1	4,14
SCA8	112	116	60	12	0	4,09
SCA9	115	120	51	13	1	4,12
SCA10	143	105	43	9	0	4,27
SCA11	121	101	67	11	0	4,11
Total Answers	**1387**	**1156**	**607**	**146**	**4**	**4,14**
Percentage	**42,03%**	**35,03%**	**18,39%**	**4,42%**	**0,12%**	**100%**

Source: Data processing (2024)

Table 7. *Initial Loading Factor*

	GHC	GSC	GRC	GI	GKS	SCA	SBP	GKS x GI
GHC1	0,765							
GHC2	0,704							
GHC3	0,752							
GHC4	0,820							
GHC5	0,777							
GSC1		0,741						
GSC2		0,748						
GSC3		0,703						
GSC4		0,786						
GSC5		0,733						
GSC6		0,767						
GSC7		0,736						
GSC8		0,747						
GSC9		0,619						

GRC1			0,710					
GRC2			0,723					
GRC3			0,719					
GRC4			0,706					
GRC5			0,715					
GI1				0,777				
GI2				0,789				
GI3				0,783				
GI4				0,794				
GI5				0,779				
GKS1					0,785			
GKS2					0,742			
GKS3					0,723			
GKS4					0,751			
GKS5					0,752			
GKS6					0,745			
GKS7					0,753			
GKS8					0,768			
GKS9					0,787			
GKS10					0,745			
SCA1						0,761		
SCA2						0,707		
SCA3						0,708		
SCA4						0,725		
SCA5						0,714		
SCA6						0,757		
SCA7						0,720		
SCA8						0,716		
SCA9						0,759		
SCA10						0,701		
SCA11						0,703		
ECP1							0,773	
ECP2							0,726	
ECP3							0,728	
ECP4							0,721	
ECP5							0,709	
SCP1							0,765	
SCP2							0,747	
SCP3							0,764	
SCP4							0,717	
SCP5							0,756	
EVP1							0,738	
EVP2							0,724	
EVP3							0,762	
EVP4							0,765	
EVP5							0,729	
GKS x GI								1,000

Table 8. Final Loading Factor

	GHC	**GSC**	**GRC**	**GI**	**GKS**	**SCA**	**SBP**	**GKS x GI**

4345

GHC1	0,765						
GHC2	0,704						
GHC3	0,752						
GHC4	0,820						
GHC5	0,777						
GSC1		0,746					
GSC2		0,751					
GSC3		0,709					
GSC4		0,796					
GSC5		0,736					
GSC6		0,760					
GSC7		0,747					
GSC8		0,752					
GRC1			0,710				
GRC2			0,723				
GRC3			0,719				
GRC4			0,706				
GRC5			0,715				
GI1				0,777			
GI2				0,790			
GI3				0,783			
GI4				0,794			
GI5				0,779			
GKS1					0,785		
GKS2					0,742		
GKS3					0,723		
GKS4					0,751		
GKS5					0,752		
GKS6					0,745		
GKS7					0,753		
GKS8					0,768		
GKS9					0,787		
GKS10					0,745		
SCA1						0,761	
SCA2						0,707	
SCA3						0,708	
SCA4						0,725	
SCA5						0,714	
SCA6						0,757	
SCA7						0,720	
SCA8						0,716	
SCA9						0,759	
SCA10						0,701	
SCA11						0,703	
ECP1							0,773
ECP2							0,726
ECP3							0,728
ECP4							0,721
ECP5							0,709
SCP1							0,765

							0,747	
SCP2							0,747	
SCP3							0,764	
SCP4							0,717	
SCP5							0,756	
EVP1							0,738	
EVP2							0,724	
EVP3							0,762	
EVP4							0,765	
EVP5							0,729	
GKS x GI							1,000	

Table 9. Average Variance Extracted (AVE) Value

	Average Variance Extracted (AVE)
Green Human Capital	0,585
Green Structural Capital	0,562
Green Relational Capital	0,511
Green Innovation	0,616
Sustainable Competitive Advantage	0,526

Table 10. Crossloading

	GHC	**GSC**	**GRC**	**GI**	**GKS**	**SCA**	**SBP**	**GKS x GI**
GHC1	**0,765**	0,338	0,280	0,238	0,311	0,351	0,292	0,007
GHC2	**0,704**	0,273	0,277	0,253	0,225	0,245	0,247	0,005
GHC3	**0,752**	0,285	0,286	0,261	0,237	0,295	0,252	-0,040
GHC4	**0,820**	0,325	0,261	0,278	0,282	0,429	0,338	-0,144
GHC5	**0,777**	0,404	0,337	0,295	0,271	0,424	0,318	-0,035
GSC1	0,399	**0,746**	0,411	0,318	0,338	0,378	0,364	-0,043
GSC2	0,313	**0,751**	0,420	0,309	0,302	0,325	0,316	-0,043
GSC3	0,248	**0,709**	0,370	0,270	0,311	0,241	0,268	-0,106
GSC4	0,299	**0,796**	0,474	0,360	0,391	0,389	0,405	-0,198
GSC5	0,273	**0,736**	0,328	0,303	0,318	0,321	0,355	-0,153
GSC6	0,373	**0,760**	0,362	0,294	0,343	0,334	0,366	-0,101
GSC7	0,322	**0,747**	0,368	0,212	0,316	0,352	0,361	-0,087
GSC8	0,337	**0,752**	0,387	0,289	0,330	0,361	0,302	-0,078
GRC1	0,317	0,430	**0,710**	0,306	0,423	0,453	0,367	-0,027
GRC2	0,302	0,338	**0,723**	0,313	0,295	0,408	0,347	-0,125
GRC3	0,286	0,414	**0,719**	0,256	0,317	0,409	0,305	-0,087
GRC4	0,241	0,327	**0,706**	0,313	0,304	0,285	0,372	-0,137
GRC5	0,180	0,348	**0,715**	0,267	0,266	0,316	0,318	-0,116
GI1	0,337	0,363	0,348	**0,777**	0,294	0,366	0,360	-0,168
GI2	0,245	0,306	0,353	**0,790**	0,327	0,400	0,385	-0,207
GI3	0,323	0,347	0,319	**0,783**	0,357	0,386	0,405	-0,153
GI4	0,241	0,279	0,348	**0,794**	0,350	0,350	0,413	-0,215
GI5	0,204	0,244	0,223	**0,779**	0,237	0,361	0,358	-0,139
GKS1	0,332	0,412	0,352	0,345	**0,785**	0,390	0,450	-0,094
GKS2	0,267	0,376	0,383	0,385	**0,742**	0,345	0,379	-0,105
GKS3	0,260	0,274	0,321	0,249	**0,723**	0,340	0,312	-0,104
GKS4	0,335	0,368	0,367	0,268	**0,751**	0,307	0,402	-0,072
GKS5	0,275	0,260	0,370	0,318	**0,752**	0,366	0,356	-0,125
GKS6	0,220	0,370	0,370	0,362	**0,745**	0,353	0,352	-0,109
GKS7	0,235	0,329	0,314	0,255	**0,753**	0,340	0,326	-0,043

GKS8	0,235	0,304	0,349	0,255	**0,768**	0,358	0,368	-0,109
GKS9	0,254	0,345	0,321	0,293	**0,787**	0,422	0,330	-0,081
GKS10	0,206	0,295	0,279	0,292	**0,745**	0,320	0,348	-0,137
SCA1	0,424	0,345	0,377	0,440	0,334	**0,761**	0,417	-0,123
SCA2	0,296	0,311	0,327	0,332	0,326	**0,707**	0,397	-0,175
SCA3	0,344	0,359	0,329	0,363	0,398	**0,708**	0,396	-0,194
SCA4	0,383	0,324	0,364	0,306	0,339	**0,725**	0,374	-0,141
SCA5	0,310	0,341	0,419	0,346	0,291	**0,714**	0,440	-0,162
SCA6	0,337	0,384	0,419	0,375	0,410	**0,757**	0,447	-0,148
SCA7	0,283	0,318	0,414	0,327	0,372	**0,720**	0,402	-0,152
SCA8	0,347	0,303	0,356	0,296	0,321	**0,716**	0,358	-0,113
SCA9	0,354	0,321	0,432	0,340	0,360	**0,759**	0,411	-0,208
SCA10	0,356	0,304	0,378	0,303	0,303	**0,701**	0,397	-0,171
SCA11	0,282	0,307	0,400	0,352	0,291	**0,703**	0,403	-0,115
ECP1	0,334	0,344	0,369	0,390	0,316	0,447	**0,773**	-0,071
ECP2	0,332	0,383	0,381	0,357	0,413	0,503	**0,726**	-0,131
ECP3	0,286	0,344	0,387	0,371	0,374	0,429	**0,728**	-0,172
ECP4	0,293	0,365	0,391	0,392	0,409	0,390	**0,721**	-0,241
ECP5	0,271	0,377	0,384	0,325	0,370	0,433	**0,709**	-0,088
SCP1	0,272	0,336	0,416	0,355	0,343	0,449	**0,765**	-0,092
SCP2	0,280	0,349	0,358	0,399	0,333	0,405	**0,747**	-0,170
SCP3	0,264	0,306	0,369	0,364	0,333	0,419	**0,764**	-0,135
SCP4	0,264	0,334	0,339	0,384	0,310	0,330	**0,717**	-0,086
SCP5	0,283	0,327	0,318	0,294	0,337	0,377	**0,756**	-0,156
EVP1	0,363	0,304	0,363	0,416	0,341	0,469	**0,738**	-0,085
EVP2	0,251	0,335	0,277	0,326	0,369	0,358	**0,724**	-0,135
EVP3	0,217	0,374	0,335	0,398	0,361	0,410	**0,762**	-0,173
EVP4	0,273	0,336	0,349	0,343	0,386	0,379	**0,765**	-0,179
EVP5	0,256	0,289	0,270	0,319	0,357	0,373	**0,729**	-0,161
GKS x GI	-0,060	-0,226	-0,129	-0,135	-0,137	-0,186	-0,213	**1,000**

Table 11. *Results of Composite Reliability and Cronbach's Alpha Tests*

	Composite Reliability	Cronbach's Alpha
Green Human Capital	0,875	0,823
Green Structural Capital	0,911	0,889
Green Relational Capital	0,839	0,761
Green Innovation	0,889	0,844
Sustainable Competitive Advantage	0,924	0,910

Table 12. *Model Fit Test*

	Saturated Model	*Estimated Model*
SRMR	0,049	0,051

Tabel 13. *R Square*

Variables	R Square	R Square Adjusted
Green Innovation	0,236	0,228
Sustainable Competitive Advantage	0,450	0,439

Table 14. *Q Square*

Variable	Q Square

Green Innovation	0,206
Sustainable Competitive Advantage	0,373

***Table 15.** Hypothesis Test Results*

	Original Sample (O)	*Standard Deviation (STDEV)*	*T Statistics (|O/STDEV|)*	*P Values*	*Result*
GHC -> GI	0,173	0,067	2,565	**0,010**	**Supported**
GSC -> GI	0,195	0,073	2,650	**0,008**	**Supported**
GRC -> GI	0,242	0,072	3,365	**0,001**	**Supported**
GHC -> SCA	0,215	0,051	4,240	**0,000**	**Supported**
GSC -> SCA	0,075	0,061	1,228	**0,220**	**Not Supported**
GRC -> SCA	0,248	0,060	4,146	**0,000**	**Supported**
GHC -> SBP	0,050	0,060	0,839	**0,401**	**Not Supported**
GSC -> SBP	0,114	0,057	2,009	**0,045**	**Supported**
GRC -> SBP	0,113	0,055	2,040	**0,041**	**Supported**
GI -> SCA	0,183	0,051	3,598	**0,000**	**Supported**
GI -> SBP	0,189	0,055	3,422	**0,001**	**Supported**
SCA -> SBP	0,247	0,060	4,144	**0,000**	**Supported**
GKS x GI -> SCA	-0,073	0,036	2,031	**0,042**	**Supported**
GKS x GI -> SBP	-0,027	0,030	0,919	**0,358**	**Not Supported**
GHC -> GI -> SCA	0,032	0,016	1,981	**0,048**	**Supported**
GSC -> GI -> SCA	0,036	0,016	2,258	**0,024**	**Supported**
GRC -> GI -> SCA	0,044	0,019	2,343	**0,019**	**Supported**
GHC -> GI -> SBP	0,033	0,015	2,249	**0,025**	**Supported**
GSC -> GI -> SBP	0,037	0,018	2,048	**0,041**	**Supported**
GRC -> GI -> SBP	0,046	0,020	2,238	**0,025**	**Supported**
GHC -> SCA -> SBP	0,053	0,018	2,921	**0,004**	**Supported**
GSC -> SCA -> SBP	0,019	0,016	1,129	**0,259**	**Not Supported**
GRC -> SCA -> SBP	0,061	0,021	2,895	**0,004**	**Supported**
GI -> SCA -> SBP	0,045	0,016	2,752	**0,006**	**Supported**
GHC -> GI -> SCA -> SBP	0,008	0,005	1,709	**0,087**	**Not Supported**
GSC -> GI -> SCA -> SBP	0,009	0,004	2,014	**0,044**	**Supported**
GRC -> GI -> SCA -> SBP	0,011	0,006	1,989	**0,047**	Supported
GKS x GI -> SCA -> SBP	-0,018	0,010	1,723	**0,085**	**Not Supported**

6. Discussions

If you Based on the results of the structural model evaluation in table 15, the influence of green human capital on green innovation (Green Human Capital $\square$ Green Innovation) produce a p-value $0,010 < \alpha = 5\%$. Thus, the H0 hypothesis is rejected, meaning that green human capital has a significant effect on green innovation in MSMEs in Pematangsiantar City. This is in line with the research results [7], which state that there is a significant influence between green human capital and green innovation. Green human capital includes employees' knowledge, skills, and awareness of environmentally friendly practices. In the food and beverage industry sector, employees who have

green human capital tend to understand the importance of using more environmentally friendly raw materials, reducing waste, and tend to be more creative and innovative in developing new sustainable products and processes. This encourages the creation of green innovation in the business being run.

Based on the results of the structural model evaluation in table 15, the influence of green structural capital on green innovation (Green Structural Capital □ Green Innovation) produces a p-value of 0.008< α = 5%. Thus, the H0 hypothesis is rejected, meaning that green structural capital has a significant effect on green innovation in MSMEs in Pematangsiantar City. This is in line with the results of research, which states that there is a significant influence between green structural capital and green innovation.

Green structural capital includes infrastructure, systems, and processes designed to support environmentally friendly practices. MSMEs in the food and beverage industry sector that have structures that support sustainability, such as environmental policies, efficient operational procedures, and environmental management systems, are more likely to implement green innovation. With strong green structural capital, MSMEs in the food and beverage industry sector can be more effective in developing and implementing green innovation in the businesses they run.

Based on the results of the structural model evaluation in table 15, the influence of green relational capital on green innovation (Green Relational Capital □ Green Innovation) produces a p-value 0,001 < α = 5%. Thus, the H0 hypothesis is rejected, meaning that green relational capital has a significant effect on green innovation in MSMEs in Pematangsiantar City. This is in line with the results of research [7], which states that there is a significant effect between green relational capital and green innovation.

Green relational capital includes good relationships between MSMEs and suppliers and partners who are committed to sustainability. MSMEs in the food and beverage industry sector that partner with suppliers who provide environmentally friendly raw materials or innovative technology can accelerate the development of greener products and processes. By having strong and positive relationships with various stakeholders, it gives companies access to the knowledge resources needed to create green innovation. Green innovation often requires access to specialized technology and knowledge, and external partners can play an important role in providing this support.

Based on the results of the structural model evaluation in table 15, the influence of green human capital on sustainable competitive advantage (Green Human Capital □ Sustainable Competitive Advantage) produces a p-value 0,000 < α = 5%. Thus, the H0 hypothesis is rejected, meaning that green human capital has a significant effect on sustainable competitive advantage in MSMEs in Pematangsiantar City. This is in line with the results of research [13], which states that there is a significant effect between green human capital and competitive advantage.

Green human capital includes employee knowledge, skills, and expertise in environmentally friendly practices. Employees who are trained and have environmental awareness can help MSMEs in the food and beverage industry develop and implement sustainable practices, such as the use of more environmentally friendly raw materials and efficient waste management. This gives MSMEs an advantage over competitors who do not have skilled human resources in sustainable practices. This advantage can help MSMEs survive and thrive in a business environment that is increasingly focused on sustainability.

Based on the results of the structural model evaluation in table 15, the influence of green structural capital on sustainable competitive advantage (Green Structural Capital □ Sustainable Competitive Advantage) produces a p-value 0,220 > α = 5%. Thus, the hypothesis H0 is accepted, meaning that green structural capital has no significant effect on sustainable competitive advantage in MSMEs in Pematangsiantar City. This is contrary to the results of the study [13], which stated that there is a significant effect between green structural capital and competitive advantage.

Although green structural capital is generally expected to make a positive contribution to sustainable competitive advantage in MSMEs, there are still many MSMEs in the food and beverage industry sector that do not have adequate resources to develop the infrastructure and systems needed to support green structural capital. One of the main problems faced by MSMEs, especially micro-enterprises, is the limited capital that prevents them from implementing effective sustainability practices. In addition, in the food and beverage industry sector, product innovation and rapid response to changes in consumer preferences are often more important than internal structure. MSMEs in the food and beverage industry sector generally focus more on product innovation or sustainable marketing, so that green structural capital becomes less relevant in the context of creating sustainable competitive advantage.

The difficulty of accessing financing from financial institutions also makes it difficult for MSMEs to obtain loans to overcome the problems of limited capital they face. Thus, in order for green structural capital to be able to provide a positive contribution to sustainable competitive advantage, support is needed from the Pematangsiantar City Government to facilitate MSMEs, especially micro businesses, in obtaining loans from financial institutions with affordable interest rates so that they can get additional capital to develop better infrastructure and environmental management systems. This can encourage the optimization of green innovation in products and services as well as the production processes carried out so that they can support the implementation of effective sustainability practices, which will later become a sustainable competitive advantage for the business being run.

Based on the results of the structural model evaluation in table 15, the influence of green relational capital on sustainable competitive advantage (Green Relational Capital $\square$ Sustainable Competitive Advantage) produces a p-value 0,000 < α = 5%. Thus, the H0 hypothesis is rejected, meaning that green relational capital has a significant effect on sustainable competitive advantage in MSMEs in Pematangsiantar City. This is in line with the results of research [13], which states that there is a significant effect between green relational capital and competitive advantage.

Green relational capital includes strong relationships with suppliers and partners who are committed to sustainability. By establishing good partnerships, MSMEs can obtain more environmentally friendly raw materials and innovative technologies that support sustainable production practices. This relationship can reduce costs and risks, and provide access to the resources needed to increase competitiveness. MSMEs with strong green relational capital are better able to respond to changes in market demand related to sustainability. Engagement with customers and other stakeholders provides valuable insights into consumer trends and preferences who are increasingly concerned about the environmental impacts of the products and services they use. With this information, MSMEs in the food and beverage industry sector can adjust their products and services to meet the needs of an environmentally friendly market so that they can create a sustainable competitive advantage in the business they run.

Based on the results of the structural model evaluation in table 15, the influence of green innovation on sustainable competitive advantage (Green Innovation $\square$ Sustainable Competitive Advantage) produces a p-value 0,000 < α = 5%. Thus, the H0 hypothesis is rejected, meaning that green innovation has a significant effect on sustainable competitive advantage in MSMEs in Pematangsiantar City. This is in line with the results of research [15,33], which states that there is a significant effect between green innovation and sustainable competitive advantage.

Green innovation allows MSMEs in the food and beverage industry sector to create new products that are more environmentally friendly, such as organic food, biodegradable packaging, or products that use sustainable raw materials. These products are attractive to consumers who are increasingly aware of environmental issues, thereby increasing demand and competitiveness in the market. In addition, green innovation also helps MSMEs to adapt quickly to changing trends and preferences of consumers who are increasingly aware of environmental issues. By developing new solutions that are in line with market needs, MSMEs can maintain their relevance in a competitive industry and strengthen their position in the long term. By utilizing the potential of green innovation, MSMEs in the food and beverage industry sector can increase their competitiveness in a market that is increasingly focused on sustainability.

Based on the results of the structural model evaluation in table 15, the influence between green human capital and sustainable competitive advantage mediated by green innovation (Green Human Capital $\square$ Green Innovation $\square$ Sustainable Competitive Advantage) produces a p-value 0,048 < α = 5%. Thus, the H0 hypothesis is rejected, meaning that green innovation is able to mediate the influence between green human capital on sustainable competitive advantage in MSMEs in Pematangsiantar City. This is supported by the results of research [7], which states that there is a significant influence between green human capital on green innovation and the results of research [15,33], which states that there is a significant influence between green innovation on sustainable competitive advantage.

Green innovation mediates the influence of green human capital on sustainable competitive advantage because green innovation is one of the tools that allows MSMEs in the food and beverage sector to translate the green knowledge and skills possessed by employees into more environmentally friendly products, services, and processes. Without green innovation, this green knowledge and skills may not be translated effectively into tangible results for the business. Green innovation strengthens the competitive advantage of MSMEs through operational efficiency, better reputation, products that are more relevant to market needs, and compliance with environmental regulatory standards, all of which contribute to sustainable

competitive advantage in the market. For example, employee knowledge on how to reduce production waste can be applied through green innovation, such as the application of more efficient waste processing processes, so as to create competitive advantages in terms of cost efficiency and improve the positive image of consumers towards MSMEs.

Based on the results of the structural model evaluation in table 15, the influence of green structural capital on sustainable competitive advantage mediated by green innovation (Green Structural Capital □ Green Innovation □ Sustainable Competitive Advantage) produces a p-value $0,024 < α = 5\%$. Thus, the H0 hypothesis is rejected, meaning that green innovation is able to mediate the influence between green structural capital on sustainable competitive advantage in MSMEs in Pematangsiantar City. This is supported by the results of research, which states that there is a significant influence between green structural capital on green innovation and the results of research [15,33], which states that there is a significant influence between green innovation on sustainable competitive advantage.

Green innovation is able to mediate the influence between green structural capital on sustainable competitive advantage because green structural capital provides infrastructure and technology that allows green innovation to develop. With strong green structural capital, MSMEs in the food and beverage sector can more easily develop and implement green innovation, which will later increase efficiency, improve reputation, and meet the needs of an increasingly environmentally conscious market. Green innovation also allows companies to adapt quickly to market changes and environmental regulations, all of which contribute to achieving sustainable competitive advantage.

Based on the results of the structural model evaluation in table 15, the influence of green relational capital on sustainable competitive advantage mediated by green innovation (Green Relational Capital □ Green Innovation □ Sustainable Competitive Advantage) produces a p-value $0,019 < α = 5\%$. Thus, the H0 hypothesis is rejected, meaning that green innovation is able to mediate the influence between green relational capital on sustainable competitive advantage in MSMEs in Pematangsiantar City. This is supported by the results of research [7] which states that there is a significant influence between green relational capital on green innovation and the results of research [15,33], which states that there is a significant influence between green innovation on sustainable competitive advantage.

Green innovation is able to mediate the influence between green relational capital on sustainable

competitive advantage in MSMEs in the food and beverage industry sector because the existence of strong green relational capital, which includes company partnerships with various external stakeholders, such as customers, suppliers, business partners, and government, is able to provide access to knowledge, resources, and collaboration opportunities that are relevant to sustainability. Green innovation then translates the potential that arises from this partnership into actual innovation that increases sustainable competitive advantage.

MSMEs can work with organic food suppliers to create more environmentally friendly organic food products. In addition, MSMEs can also listen to input from customers and communities who care about the environment to produce products through a production process that minimizes waste. This innovation will later improve the company's reputation, which in turn strengthens customer loyalty and creates a sustainable competitive advantage for the business being run.

4. Conclusions

Based on the results of the analysis that have been presented, the researcher draws the following conclusions:

1.   Green human capital has a significant effect on green innovation in MSMEs in Pematangsiantar City.
2.   Green structural capital has a significant effect on green innovation in MSMEs in Pematangsiantar City.
3.   Green relational capital has a significant effect on green innovation in MSMEs in Pematangsiantar City.
4.   Green human capital has a significant effect on sustainable competitive advantage in MSMEs in Pematangsiantar City.
5.   Green structural capital has no significant effect on sustainable competitive advantage in MSMEs in Pematangsiantar City.
6.   Green relational capital has a significant effect on sustainable competitive advantage in MSMEs in Pematangsiantar City.
7.   Green innovation has a significant effect on sustainable competitive advantage in MSMEs in Pematangsiantar City.
8.   Green innovation is able to mediate the influence between green human capital and sustainable competitive advantage in MSMEs in Pematangsiantar City.
9.   Green innovation is able to mediate the influence between green structural capital on sustainable competitive advantage in MSMEs in Pematangsiantar City.

10. Green innovation is able to mediate the influence between green relational capital on sustainable competitive advantage in MSMEs in Pematangsiantar City.

Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper
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- **Data availability statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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