

Exploring the Drivers of Creative MSMEs' Green Competitive Advantage in Indonesia: A Natural Resource-Based View Perspective

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Abstract. This study examines the factors influencing the green competitive advantage of creative micro, small, and medium enterprises (MSMEs) in Indonesia through the lens of the natural resource-based view (NRBV). Drawing on survey data from 438 MSMEs in three provinces, the study investigates the role of business analytics, environmental orientation, green intellectual capital, green innovation, and green supply chain management in driving green competitive advantage. The data were analyzed using partial least squares structural equation modeling (PLS-SEM). The results reveal that business analytics, environmental orientation, green innovation, and green supply chain management have significant positive effects on green competitive advantage, while green intellectual capital indirectly influences green competitive advantage through its effects on green innovation and green supply chain management. The study contributes to the NRBV literature by providing empirical evidence on the key drivers of green competitive advantage in the context of creative MSMEs in a developing country. Practical implications for MSMEs and policymakers are discussed, along with limitations and future research directions.

Keywords: Business Analytics, Environmental Orientation, Green Competitive Advantage, Green Intellectual Capital, Green Innovation, Green Supply Chain

1. Introduction

In today's dynamic and rapidly changing business world, environmental issues are drawing serious attention from the public, governments, customers, and other parties, including in developing countries (Cheema & Javed, 2017). The condition is considered a more serious issue in developed countries due to their economic activities that ignore the environment. However, this issue currently becomes relevant to developing countries as they tend to put the emphasis on economic growth of the country at the cost of environmental degradation (Mishra & Yadav, 2021). As one of the developing countries with emerging markets and large population, Indonesia has become the eighth-largest emitter of greenhouse gases (GHG) in the world (Statista, 2023), following such countries as China, United States, and India. This occurs along with the country's growth in the economic sector as it becomes a country with tenth-largest economy in terms of purchasing power parity (World Bank, 2022). This rapid growth of the economy and numerous issues that are related to environment and resources have become a paradox for organizations in achieving sustainability (Kong et al., 2021).

In terms of research, there are three streams of research regarding corporate environmentalism in developing countries. The first one focuses on multinational companies (MNCs) and their activities that tend to ignore environmental issues in developing countries while the second focuses on the contrary as it views MNCs as the pioneer in carrying out environmental practices and achieving sustainability (Mishra & Yadav, 2021). The third stream of research focuses on examining the role of domestic firms in solving environmental issues in developing countries (Pulver, 2007) as these firms are now being seen as the potential actors in solving environmental problems. However, this third stream of research is still lacking and has not been examined within the lens of a certain theory, such as natural-resource based view (NRBV) (Salim et al., 2019; Lohmer et al., 2022; Wang, 2019).

The NRBV (Hart, 1995) emerges from the original RBV proposed by Barney (1991). It explains the influence of firms' resources and capabilities that are valuable, rare, inimitable, and complex in helping the firms to achieve competitive advantage without ignoring the condition of natural environment (Hart & Dowell, 2011). Empirically, NRBV has proved to be relevant in the context of firms in developed countries (Andersen, 2021), yet it remains lacking in developing countries (Mishra & Yadav, 2021), such as Indonesia (Wardani & Palupi, 2022). Therefore, the present study attempts to examine the resources and capabilities of domestic firms, namely creative MSMEs, in the context of developing countries through the tenet of NRBV.

The firms' transition towards sustainability is a crucial factor to note as it occurs when there is customer demand for environmentally-friendly goods and services (Abbas & Sağsan, 2019; Danso et al., 2019; Jiao et al., 2022). Nguyen et al. (2021) mentioned that a number of organizations have experienced financial loss during production due to a waste of resources and capital. Using NRBV as the basis for developing this study, we consider business analytics and environmental orientation as the MSMEs' resources and capabilities to gain green competitive advantage. The development of technology along with the proliferation of social media platforms have created a trend that has raised the attention on scientific research (Usero et al., 2022; Yang et al., 2022). The concept of business analytics is not new, yet it recently re-emerges as a new and important research direction for the development of organizational capabilities to achieve competitive advantage (Yang et al., 2022; Zameer et al., 2022; Zhang et al., 2022). Business analytics can assist organizations to promote each of their product or service in the digital market. Wang (2019) and Zameer et al. (2022) also stated that currently the issue of environmental degradation has become an important agenda for firms that wish to gain sustainability and competitive advantage. In addition to business analytics and environmental orientation, this study also considers intellectual capital as a potential solution to gain competitive advantage. Although intellectual capital and its implication have been widely recognized in the literature, its application to green concepts is still underexplored, especially in the context of manufacturing industry to gain green competitive advantage (Jirakraisiri et al., 2021; Yusoff et al., 2019; Tu & Wu, 2021).

Kindly similar to other countries, MSMEs in Indonesia face unique challenges and opportunities in adopting green practices to achieve green competitive advantage. Many of these creative MSMEs operate with limited financial and human resources (Sari & Kusumawati, 2022), thus it becomes challenging for them to invest in green technologies or sustainable practices. In addition, lack of awareness and understanding among these MSMEs actors regarding the benefits of green practice can be another challenge that hinder sustainability improvements. However, Shahrullah et al. (2021) also mentioned that creative MSMEs have their own opportunities in this aspect, such as partnerships and collaboration with various parties, as well as enabled innovation and differentiation. Based on these background and gaps mentioned, this study addresses the following research questions:

RQ1. How do business analytics and environmental orientation as the environmental resources and capabilities affect MSMEs to achieve green competitive advantage?

RQ2. How does green intellectual capital as the environmental resources and capabilities lead MSMEs to achieve green competitive advantage through the role of green innovation and green supply chain management?

From the overall findings on how organizational capabilities and resources (business analytics, environmental orientation, green intellectual capital, green innovation, and GSCM) lead to green competitive advantage of green-based MSMEs in Indonesia, this study contributes to the corporate environmentalism literature in several ways.

First, this study focuses its discussion on a specific context, presenting a rare opportunity to explore whether Western theories regarding corporate environmentalism and competitive advantage apply in the distinct landscape of developing countries. Through an empirical study with SEM PLS analysis, this study validates the connection between organizational environmental resources and capabilities, representing by a number of variables and competitive advantage within the context of MSMEs as domestic firms operating in Indonesia. Second, drawing upon the NRBV perspective, this study offers empirical evidence regarding the significance of environmental resources and capabilities of MSMEs, namely business analytics, environmental orientation, green intellectual capital, green innovation, and GSCM, in achieving green competitive advantage. It mainly highlights the antecedents of green competitive advantage through the role of business analytics and environmental orientation. Finally, the present study also offers insight into the process by which green intellectual capital can be directed to green innovation and GSCM, hence enabling MSMEs to achieve green competitive advantage.

This study is divided into five main sections. The first section presents problems and issues regarding the environment and previous literature. The second section explains relevant theories related to the research. The third section shows the research method and research type while the fourth section presents the results of the study. Finally, the fifth explains the conclusion and recommendation for future studies.

2.Literature Review

Natural Resource-Based View (NRBV)

Originally proposed as resource-based view (RBV) or resource-based theory (RBT) in 1991 (Barney, 1991), a firm is deemed to have a competitive advantage or achieve success within the industry by differentiating themselves from their competitors through internal strategic resources and capabilities. This theory has been widely used to discuss distinct resources and capabilities owned by firms such as marketing and operational capability (Kamboj et al., 2015), big data and predictive analysis (Dubey et al., 2019), or innovation capability (Najafi-Tavani et al., 2018; Ferreira et al., 2020; Mikalef et al., 2019). However, RBV has not yet considered the possible detrimental impact of firm activities toward the environment. Thus, Hart (1995) proposed an extension of RBV, namely natural resource-based view (NRBV).

The point of NRBV is that firms are capable of gaining competitive advantage while still considering the sustainability and welfare of the natural environment (Andersen, 2021). In contrast to the initial tenet of the theory that “ignored the interaction between an organization and its natural environment” (Hart & Dowell, 2011), NRBV takes the natural environment into account and assures that firms must also provide positive outcomes to the environment itself through the use of resources and capabilities (Hart, 1995). Several studies have proven the relevance of NRBV empirically, such as Andersen (2021) and Mishra and Yadav (2021) who attempt to explain the relationships of environmental capabilities, proactive environmental strategy, and competitive advantage.

In NRBV, there are three strategic capabilities of firms, including pollution prevention, product stewardships, and sustainable development (Hart, 1995). NRBV has a similar view with the original RBV, as the capabilities and resources owned by firm must be “valuable, inimitable, and have unique characteristics of causally ambiguous, path-dependent, and embeddedness” (Hart & Dowell, 2011). In the present study, using this tenet of NRBV, we examine the role of green intellectual capital in driving green innovation and green supply chain as the firm capability, as well as business analytics and environmental orientation in driving green competitive advantage within the context of domestic firms (MSMEs) in a developing country.

Business Analytics and Green Competitive Advantage

In facing the rapid change and volatility within the business environment, business analytics are crucial for firms to learn, innovate, and explore new knowledge and technologies (Zameer et al., 2022). Business analytics which use technology and social media network is considered a strategic tool that can be integrated into business practices, especially firm operations and management to achieve added value (Kongar & Adebayo, 2021; Zadeh et al., 2021). Recent developments in the use of business analytics and environmental management concepts are forcing firms to reposition their future development directions and gain competitive advantage (Choi et al., 2020; Garg et al., 2020; Yang et al., 2022). Therefore, business analytics becomes a basis for firms to produce their goods and increase their competitive advantage. Zameer et al. (2022) stated that the firms environmental management and business analytics play a crucial role in the corporate domain. In addition, Qiu et al. (2020) added that new product innovation through business analytics must provide environmental benefits. In short, many firms have advocated the use of business analytics and innovative solutions to environmental problems to effectively utilize scarce resources, reduce industrial waste, and achieve competitive advantage.

Business analytics through social media has the potential to provide value for firms in building and strengthening their competitive advantage (Hajli & Laroche, 2019). Using the lens of NRBV, business analytics is considered as the resources and capabilities seized by firms or organizations to achieve their green competitive advantage. Garg et al.'s (2020) study indicates that business analytics could improve data-driven culture in the firms, which enables them to carry out environmental scanning and develop competitive advantage. Furthermore, according to Wang et al. (2020), business analytics can also increase forecasting and decision making process for sustainable business development. One of the most important aspects of business analytics is knowledge built from obtained information. The study from Garg et al. (2020; Hajli & Laroche, 2019; Zameer et al., 2022) emphasized the importance of business analytics to obtain competitive advantage for the organization.

H1. Business analytics positively influences green competitive advantage

Environmental Orientation and Green Competitive Advantage

Theoretically, organization can be fully committed to carry out environmentally friendly activities in their business for two reasons: firstly, to gain competitive advantage and to allow access to valuable resources (Cheema et al., 2020), and secondly, to legitimate their operations by obtaining the approval of the community (Danso et al., 2019). Environmental orientation is the most important business principles to increase firm strength. In addition, the view from stakeholders, such as government, customers, competitors, and others, about environmental issues will also require firms to realize the

significance to be oriented to external environment in meeting their consumer needs (Zameer et al., 2022).

The level of environmental orientation will increase firms' strategic response toward environmental problems (Danso et al., 2019), and show that the strategy of environmental orientation has a positive influence on organizational performance. According to Cheema et al. (2020) and Zameer et al. (2022), when firms are oriented toward the environment, it will be able to lead to higher competitive advantage as it reduces costs for long term and help differs the firms' products and services. In general, firms can save costs through the use of recycled raw materials, energy savings, or process improvements. Moreover, the firms' production and customer consumption must abide by the regulation of ecological environment protection, apply clean production, and promote green consumption.

In NRBV, it is suggested that valuable, rare, and inimitable resources and capabilities that are environmentally-conscious can lead firms to achieve a competitive advantage and be beneficial for the natural environment (Hart & Dowell, 2011; Hart, 1995). Zameer et al. (2022) stated that products that are difficult to imitate can create sustainable advantages for firms as well as strengthen its core competencies (Ferreira et al., 2020; Cheema et al., 2020). Considering the current trend, many consumers are becoming increasingly aware of environmental issues. Therefore, an emphasis on environment may enable firms to obtain higher competitive advantage. Thus, the second hypothesis is proposed as follows:

H2. Environmental orientation positively influences green competitive advantage
Green Intellectual Capital, Green Innovation, and Green Supply Chain

Intellectual capital is an intangible asset that includes the value of knowledge, skills, ideas and training that is not listed on the balance sheet. According to Yong et al. (2019), the emphasis now lies not only on the products produced by the firms but also on its intangible assets that become the source of power (Asiaei et al., 2022; Jiao et al., 2022). In the context of NRBV, green intellectual capital has developed into an intangible asset crucial for gaining competitive advantage in relation to sustainability (Jiao et al., 2022; Ahmed et al., 2022). Similarly, in the perspective of dynamic capabilities, green intellectual capital has become a significant capability for firms to enhance and maintain their business performance. Asiaei et al. (2022) argued that sustainable competitive advantage can be achieved through environmental social responsibility as a key resource for certain firms.

A recent study from Garg et al. (2020) in IT and pharmacy industry in India revealed the positive influence of intellectual capital on firm performance. Green intellectual capital is an intangible asset that includes knowledge, skills, and ideas related to environmental protection or green innovation of individuals and organizations (Ali et al., 2021). Currently, firms manage not only products but also intangible assets that can become their competitive advantage (Yadiati, 2019; Mehmood & Hanaysha, 2022). Several studies have shown that regardless of the type of business, intellectual capital is important to improve organizational performance. The concept of green intellectual capital has become the basis for understanding environmental management in creating green innovations.

Green intellectual capital can be divided into three dimensions: green human capital, green structural capital, and green relational capital (Haldorai et al., 2022). Green human capital is conceptualized at the individual level. It represents employee knowledge, skills, attitudes, abilities and commitment to green innovation or environmental protection (Jirakraisiri et al., 2021). Green structural capital exists at the organizational or firm level. This dimension is represented through firm level issues such as firm capabilities, culture, human resource practices, knowledge management systems, and information technology systems for green innovation or environmental protection (Jiao et al., 2022). Finally, green relational capital is seen from the organization's relationship with stakeholders. According to Mehmood and Hanaysha (2022), these three dimensions have an influence on the formation of green innovation or environmental protection.

H3. Green intellectual capital positively influences green innovation

Today's firms have realized the importance of environmental knowledge in human resources to encourage green innovation and green management in response to external environmental pressures (Khan et al., 2021). The reason is because environmental issues are becoming increasingly important (Mehmood & Hanaysha, 2022). Thus, environmental knowledge and culture have become the main agenda for many firms by adopting green concepts from production, innovation, and supply chain. Given the importance of green trends in gaining competitive advantage, firms are trying to acquire more resources to promote their external relations based on their shared environmental interests. Green innovation can be a tool to reduce negative impacts on the environment and increase public trust. In addition, organizations could adopt a green supply chain approach to solve relevant problems (Singh et al., 2020; Haldorai et al., 2022; Dong et al., 2023), hence achieving competitive advantage.

Green supply chain signifies a firm relationship with suppliers, distributors, and consumers, in which firms try to participate in protecting the environment in this supply chain by developing intangible resources (Al Mashkour, 2022; Chanchaichujit et al., 2020). GSC implementation can increase competitive advantage in terms of profitability and green innovation by developing green products (Al-Khawaldah et al., 2022; Qiu et al., 2020). Xie et al. (2019) suggested that the number of organizations implementing green supply chain to gain competitive advantage has increased. It has now become a top agenda for firms to develop and implement innovative and environmentally oriented strategies. However, poor quality of resources, such as knowledge, skills, and ideas owned by the organization, may hamper its realization.

H4. Green intellectual capital positively influences green supply chain

Green Innovation and Green Competitive Advantage

According to Xie et al. (2019; Lee & Roh, 2023), green competitive advantage is closely related to increasing the efficiency of resource utilization and reducing environmental impacts. This brings benefits such as reducing production costs, increasing productivity, building company reputation and attracting environmentally conscious customers (Jirakraisiri et al., 2021; Ferreira et al., 2020). Firms with environmental knowledge are the main resource for implementing green innovation to gain organizational excellence (Ali et al., 2021; Nuryakin & Maryati, 2022). In general, the application of green concept in firms can effectively improve organizational performance, increase competitiveness, and reduce costs. El-Kassar and Singh (2019; Roh et al., 2021) mentioned that green innovation is a technological advancement produced by an organization to produce environmentally friendly products and services, prevent pollution, as well as recycle and improve environmental management practices that support organizational excellence. In practice, Zainalabideen et al. (2022) mentioned that green innovation consists of modifying the product design and production processes of materials, production, and delivery with the aim of reducing the negative impact on the environment (Fernando et al., 2019; Novitasari & Agustia, 2021). Mehmood and Hanaysha (2022) stated that many factors can affect green innovation, such as government regulations and limited resources. When firms focus on green innovation, it will result in greater product heterogeneity and generate new markets with competitive prices.

In facing increasing environmental challenges and pressures, organizations must realize that the concept of green innovation is an important factor in building corporate strategies to achieve competitive advantage, meet market needs and stakeholder expectations, and promote sustainable development to improve business performance (Singh et al., 2020). In addition, the relationship between green innovation and competitive advantage in firms can be explored using the NRBV approach (Qiu et al., 2020; Wang, 2019). According to Zameer et al. (2022), the green concept has become one of the strengths of firms as a prime mover in market share as it can improve reputation. Firms that apply green innovation will be able to survive and create new opportunities to compete in an increasingly competitive market (Yin & Yu, 2022; Yin et al., 2022). It will also enable firms to provide information

to stakeholders so that they have opportunities to develop and have advantages where they operate. Thus, the hypothesis is proposed as follows:

H5. *Green innovation positively influences green competitive advantage*

Green Supply Chain Management and Green Competitive Advantage

Green supply chain management (GSCM) has emerged as a way to combine elements of environmental management and supply chain management (Wang et al., 2020; Roh et al., 2022). GSCM can help integrate environmental understanding into supply chain management, from product design to end-of-life management (Laari et al., 2017; Khan et al., 2021). GSCM can also be seen as a mechanism that has the potential to reduce risk and waste, and can improve performance to achieve competitive advantage (Novitasari & Agustia, 2021; Li et al., 2020). Therefore, environmentally proactive organizations or firms could implement internal GSCM activities with extensions to their external supply chain partners (Astawa et al., 2021; Handayani et al., 2021). Moreover, recent literature suggests that the demand for shippers for eco-friendly logistics services has also increased (Al-Khawaldah, 2022; Astawa et al., 2021). Several theories have been applied to explain GSCM, such as institutional theory, stakeholder theory and resource-based views (Khan et al., 2021; Novitasari & Agustia, 2021). In addition, transaction cost economics (TCE) and resource dependence theory (RDT) have also been applied.

Al-Khawaldah et al. (2022) defined GSCM into two sets of practices: environmental monitoring and environmental collaboration. Environmental monitoring refers to activities using markets or transactions carried out by organizations to select suppliers that have implemented an environmental management system. Meanwhile, environmental collaboration refers to the organization's direct involvement with suppliers to jointly set and achieve environmental goals that result in organizational excellence. Given that each firm focuses on acting as a buyer for its suppliers and as a supplier for its customers, collaboration and environmental monitoring can be carried out simultaneously both upstream and downstream (Laari et al., 2017). Li et al. (2020) stated that the green supply chain implemented by the firm can increase their ability to gain competitive advantage. According to Astawa et al. (2021), environmental monitoring and collaboration can also be referred to as governance mechanisms, which are practices used by companies to manage relationships with their suppliers to generate competitive advantages for the organization. Therefore, the hypothesis is proposed as follows:

H6. *Green supply chain positively influences green competitive advantage*

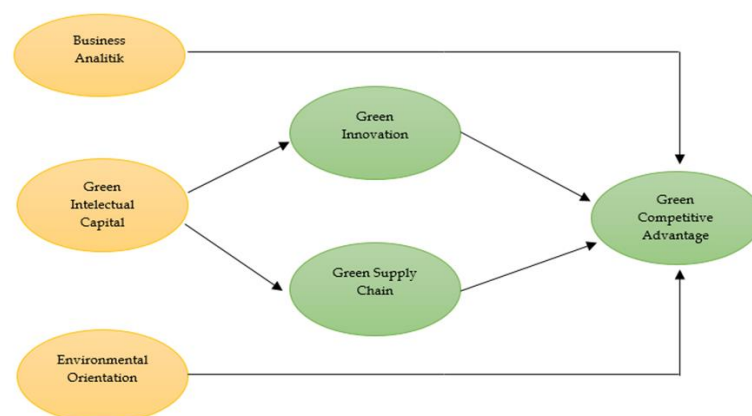


Fig.1: Conceptual Framework

3. Methodology

Many scholars have choices in terms of approach and research design. In this case, the research approach can be quantitative, qualitative, or both, which is called a mix method. In this study, a survey research design with a quantitative approach was chosen. In this design, quantitative data from prospective respondents was collected through distributed questionnaires. Quantitative approach allows researchers to obtain data for analysis to produce interpretations and conclusions (Hulland et al., 2018). In this study design, data was collected from a sample to generalize the findings.

Sampling and Data Collection

This study was carried out to assess the competitive advantage of MSMEs through the role of business analytics, green intellectual capital, environmental orientation, green innovation and green supply chain. In the present study, the data was collected from green-based MSMEs operating in three provinces in Indonesia: DKI Jakarta, Central Java and West Java. We used non-probability sampling with purposive sampling method to determine the research sample from the population. The sample criteria in this study were MSMEs that had implemented green-based processes in their business activities, for example by using environmentally friendly raw materials, paying attention to waste disposal process, and innovating for those with an environmental perspective. The reason for determining criteria for the sample was to ensure that the MSMEs were indeed eligible to provide an appropriate assessment in the research context, bearing in mind that they were pro-environmental and had initiatives for environmentally friendly programs.

Questionnaires were distributed to 480 green-based MSMEs in three provinces in Indonesia using online platforms. Of all the questionnaires distributed, 454 questionnaires were returned. After further analysis, 16 questionnaires were omitted because they contained missing values. Thus, the final number of questionnaires was 438. This number of respondents are considered adequate for data analysis with Structural Equation Modeling with Partial Least Square (SEM-PLS), according to Hair et al. (2019). For the representativeness of the sample, we have assured that these samples are equally divided from the three provinces chosen in the study.

As the data for the construct in this study was obtained from a single respondent (manager or owner of the MSMEs) which represented each MSME, there was a risk of common method bias which may affect the observed relationship between variables. To address this concern, we utilized several methods to minimize and manage the potential bias. First, we altered the sequence of questions in the questionnaire and reversed certain items to prevent respondents from establishing a cause-effect relationship between dependent and independent variables. Second, we ensured respondent anonymity to mitigate the potential social desirability bias.

Variable Measurement

Selection of measurement factors is an important step in data collection and empirical analysis as well as to test the validity and reliability. The key variables designed in this study were business analytics, green intellectual capital, environmental orientation, green innovation and green supply chain. Observable constructs were used from previous researchers. Some of the questionnaires are modified to make it more suitable to the context of this study, namely on MSMEs instead of large firms or companies.

Table 1. Source of Variable Measures

Variable	Number of Items	Source
Business Analytics	3 items	Yang et al. (2022)
Green Intellectual Capital	6 items	Asiaei et al. (2022; Mehmood & Hanaysha, 2022)
Environmental Orientation	4 items	Danso et al. (2019)

Green Innovation	4 items	Qiu et al. (2020; Tu & Wu, 2021)
Green Supply Chain	5 items	Sharma et al. (2017)
Green Competitive Advantage	4 items	Wang (2019)

Development of Questionnaire

As mentioned earlier, questionnaires are an important element in survey-based quantitative research; therefore, questions consisting of variables must be reliable, robust, and valid. The adapted scale was measured on a 5-point Likert scale consisting of the following points: (1) Strongly Disagree, (2) Disagree, (3) Neither Disagree nor Agree, (4) Agree, and (5) Strongly Agree. Details of the adapted scale are listed in Table 1.

4. Results and Data Analysis

Respondents Profile

Table 2 shows the profile of the participating MSMEs in this study. As explained in the previous section, the respondents in this study were green-based MSMEs. As can be seen in Table 2, the majority of the MSMEs ran businesses in the batik industry (63%), were in the business for more than 10 years (63%), and had fewer than 5 employees (47%).

Table 2. Respondents' Characteristics

Demographic Factor	N	%
Type of Business		
Batik Industry (Fashion)	276	63%
Production/Manufacturing Industry	79	18%
Crafts	83	19%
Age of Business		
<3 years	40	9%
3-6 years	70	16%
7-10 years	52	12%
>10 years	276	63%
Number of Employees		
<5 employees	205	47%
5-9 employees	141	32%
>10 employees	92	21%
Size		
Micro		
Small		
Medium		

Outer Model Evaluation

PLS-SEM was adopted to examine the relationship between the research framework and hypothesis testing. This study fulfilled the validity requirements related to the principle that measurements of different constructs should not be highly correlated (Hair et al., 2014). Table 3 shows that the outer loading values for all indicators met the acceptance criteria with a value of > 0.700 and the Average Variance Extracted value of > 0.50 . By achieving the values of outer loadings and Average Variance Extracted, it can be said that measurement indicators are valid in measuring latent variables. Furthermore, the Cronbach's Alpha and Composite Reliability values for all indicators had a value greater than 0.70, suggesting that all indicators showed accuracy and consistency of measuring research instruments. The detailed results of validity and reliability test, along with the measurement items used are presented in Appendix 1.

Results of Hypothesis Test

The results of the hypothesis test using inner model evaluation with SEM-PLS indicate that all the hypotheses proposed were accepted significantly, as presented in Table 3 below:

Table 3. T Test Scores

Model Causality	Path Coefficients	T Statistics	P Values
Business Analytics → Green Competitive Advantage	0.139	2.661	0.008
Environmental Orientation → Green Competitive Advantage	0.394	5.076	0.000
Green Intellectual Capital → Green Innovation	0.815	35.880	0.000
Green Intellectual Capital → Green Supply Chain Management	0.820	41.639	0.000
Green Innovation → Green Competitive Advantage	0.319	5.117	0.000
Green Supply Chain Management → Green Competitive Advantage	0.367	5.826	0.000

As seen in Table 3, the results of this study suggest that all hypotheses proposed are accepted. First, business analytics is proven to have a significant influence on green competitive advantage with a relationship level of 0.139 (H1 accepted). While it exhibits a statistically significant influence on green competitive advantage ($\beta = 0.139$, $p = 0.008$), the path coefficient appears to be relatively smaller compared to other factors in the model. This suggests that while business analytics plays a role in facilitating green competitive advantage, its impact might be more nuanced or indirect compared to other variables. Second, environmental orientation is found to have a significant influence on green competitive advantage (H2 accepted). With a substantial path coefficient of 0.394, this variable emerges as a significant driver of green competitive advantage. Third, the high path coefficients observed for green intellectual capital influencing both green innovation (0.815) and green supply chain management (0.820) highlight its critical role in fostering sustainability initiatives within MSMEs. Furthermore, while both green innovation ($\beta = 0.319$, $p = 0.000$) and green supply chain management ($\beta = 0.367$, $p = 0.000$) demonstrate significant direct effects on green competitive advantage, their effect sizes are somewhat smaller compared to the influence of environmental orientation and green intellectual capital. These findings underscore that environmental orientation and investments in green intellectual capital emerge as particularly influential drivers of green competitive advantage, with green innovation and supply chain management also playing significant lesser roles.

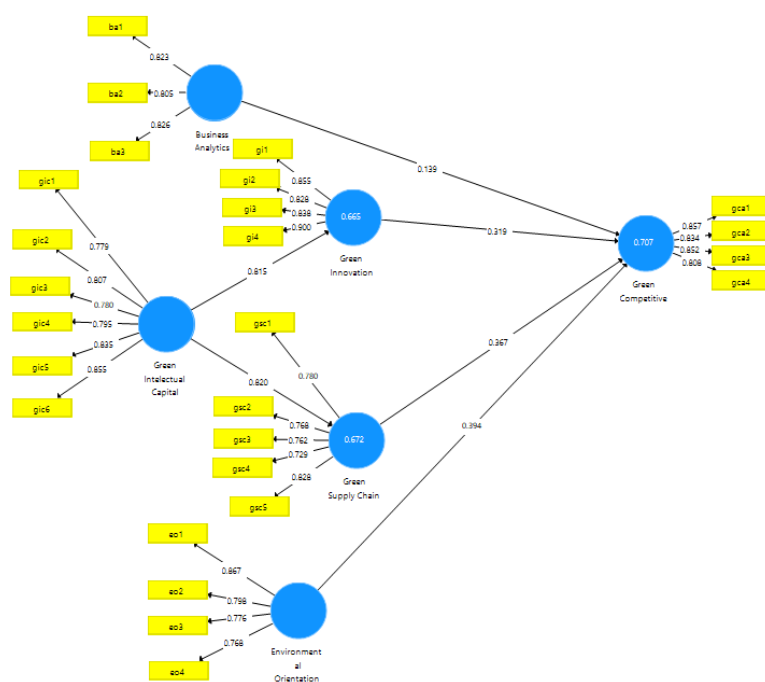


Fig.2: Output of Inner Model and Outer Model Evaluation

5. Discussion

Indonesia has undergone a transformation from an economy that previously relied on natural resources and agriculture, the manufacturing industry, and information technology to an economy driven by creative industries (MSMEs) made from natural materials such as batik, handicrafts, crafts and others which are starting to use an environmentally friendly production process. This is due to the raising awareness and encouragement from various parties to carry out environmentally oriented business activities. To survive in a dynamic business environment, a firm needs to build and maintain their competitive advantage. Thus, this study is conducted to identify aspects that become the key drivers of increasing green competitive advantage, especially in the context of MSMEs.

Green competitive advantage refers to the ability of firms to have more advantages in various aspects compared to their competitors by carrying out environmentally sound business practices (Tu & Wu, 2021). The results of the hypothesis testing show that business analytics may influence green competitive advantage (H1 accepted), which also support the findings of previous studies (Wang & Juo, 2021; Wang et al., 2020; Hajli & Laroche, 2019). These findings may contribute to the role of business analytics that should be implemented by firms, including MSMEs in order to achieve efficiency in running their business. Business analytics allows MSMEs to practice green economy as they can have the ability to analyze what is happening in the environment, understand changes in the mindset of stakeholders, and take the right steps to redirect their business processes. MSME business analytics may help them to explore new knowledge and technology, thereby increasing their opportunities and ability to compete with their competitors. In the end, business analytics allows companies to gain and maintain a green competitive advantage because they run a business based on an environmental paradigm.

In this era, firms need to look at issues of environmental degradation such as global warming, pollution, loss of biodiversity, depletion of natural resources, waste disposal, and other global issues (Danso et al., 2019; Asiaei et al., 2022). In fact, business activities carried out by firms, including MSMEs, may contribute significantly to environmental degradation. However, at the same time, when

businesses are run with an environmental orientation, they can improve environmental preservation. The environmental orientation of a firm may also indirectly signal that they give to stakeholders, that the firm recognizes and responds to their concerns over environmental degradation. The findings of this study indicate that there is a significant positive influence of environmental orientation on green competitive advantage (H2 accepted). This finding is in line with previous studies which also found that a firm's high environmental orientation will increase its competitive advantage (Danso et al., 2019; Zameer et al., 2022; Cheema et al., 2020). MSMEs that are environmentally oriented in various ways, for example using environmentally friendly raw materials and managing waste, can respond to pressure from stakeholders and have more value than their competitors. In addition, environmental orientation also allows MSMEs to save costs using recycled raw materials, energy savings, and process improvements. Products, processes, systems, technology, and environmentally oriented business practices run by MSMEs could increase their green competitive advantage.

The rapid development of large-scale industry and massive production has become a paradox that has resulted in increasingly serious ecological and environmental problems. This has encouraged firms to start to consider green intellectual capital, which refers to the utilization of knowledge, information, technology, attention to the environment, and the ability of green management to create value and provide green competitive advantages for business (Liu et al., 2021). From the findings, this study proves that green intellectual capital positively influences green innovation (H3 accepted) and GSCM (H4 accepted). This finding supports the findings of some previous studies which also found that green innovation and GSCM can increase when companies have green intellectual capital (Ali et al., 2021; Mehmood & Hanaysha, 2022; Jiao et al., 2022; Singh et al., 2020; Haldorai et al., 2022). MSMEs that have found ways to maximize their green intellectual capital will have capital of various levels to carry out better, more effective, and more environmentally sound business practices. The three aspects of green intellectual capital, which are green human capital, green structural capital, and green relational capital, can direct MSMEs to carry out green innovation in their various products, processes, procedures, and services. A set of employee skills and knowledge, a supportive organizational system, and good relations with stakeholders allow MSMEs to foster a more environmentally friendly business, including through more complex GSCM practices.

Green innovation is one of the steps taken by firms to overcome environmental problems. In this study, green innovation positively influences green competitive advantage possessed by SMEs (H5 accepted), and this finding is in line with those of several previous studies (Fernando et al., 2019; Novitasari & Agustia, 2021; Qiu et al. al., 2020). The implementation of green innovation by MSMEs may entail producing environmentally friendly products, reducing pollution, recycling waste, and improving environmental management practices in business. In essence, green innovation becomes an activity to produce products, services, and processes that are environmentally sound. Green innovation can also reduce production costs by prioritizing the use of minimal resources and reducing pollution or waste. This differ firms different from its competitors, has compliance with regulations related to the environment, and is able to attract new consumers who do have environmental awareness. Various activities in this green innovation may eventually direct MSMEs to achieve a green competitive advantage.

Finally, this study also confirms that GSCM positively increases green competitive advantage (H6 accepted). These findings corroborate the findings of a number of previous studies which found that GSCM practices can create various benefits for companies, from economic, social, and environmental perspectives, which may ultimately help them gain green competitive advantages (Li et al., 2020; Astawa et al., 2021; Al-Khawaldah et al., 2022). GSCM is a mechanism that has the potential to reduce risk, waste, and can improve performance in achieving competitive advantage. Through GSCM, MSMEs could deliberately choose suppliers that implement environmental management systems and collaborate to set and achieve environmental goals, so they can generate green competitive advantages for these MSMEs.

The theoretical implication that can be drawn from this study is that this finding empirically supports the NRBV theory. The present study highlights that the capabilities and resources of an organization, represented by business analytics, environmental orientation, green intellectual capital, green innovation, and GSCM, will lead to the organization's competitive advantage. This study also provides a more in-depth explanation of the driving factors of environment-based competitive advantage from the MSMEs' side, which so far are still underexplored. Practically, this study can be used as a reference for business owners, especially at the micro, small, and medium levels, to increase their competitive advantage. It is important for MSMEs to start exploring business analytics and make optimal use of it in their business. In addition, MSMEs also need to maximize their green intellectual capital by developing human resources, improving business processes, and establishing good relations with stakeholders. MSMEs must realize the importance of running an environmentally-oriented business and encouraging green business practices, such as green innovation and GSCM, because all these aspects can help them to have advantage over their competitors.

This study also has some limitations. First, the object of this study is MSMEs in the creative industry with green business practices whose business scale is still limited, so it is feared that this could limit the generalization of the research findings, especially when viewed in the context of a larger-scale manufacturing industry. Future research is suggested to be carried out on a broader object and to use two types of respondents, such as environmentally-sound business and conventional business, so that it can highlight the differences between the two. In addition, this study is also conducted using cross-sectional data; thus, future research is suggested to use a longitudinal approach to obtain more robust data. Furthermore, future scholars can also consider conditional factors that can act as moderators, so they can obtain a more comprehensive explanation of the influences that occur between variables. This study is still very interesting and has the potential to be developed further, bearing in mind that the role of creative economy is very large in increasing the country's division in Indonesia so that it is expected to have an impact on the business continuity ahead.

6. Conclusion

This study provides important insights into the factors influencing the green competitive advantage of creative MSMEs in Indonesia through the lens of the NRBV. The results show that business analytics, environmental orientation, green innovation, and green supply chain management are significant drivers of green competitive advantage, while green intellectual capital indirectly influences green competitive advantage through its effects on green innovation and green supply chain management. The study extends the NRBV literature by highlighting the role of these specific organizational capabilities and resources in achieving green competitive advantage in the context of MSMEs in a developing country.

The findings have important implications for MSMEs and policymakers. MSMEs should invest in developing their business analytics capabilities, fostering an environmental orientation, and building green intellectual capital to drive green innovation and green supply chain management practices. Policymakers should provide support and incentives for MSMEs to adopt green practices and develop green capabilities. However, the study also has some limitations, such as the focus on a specific industry and geographic context, the use of a non-probability sampling approach, and the cross-sectional nature of the data. Future research could examine the generalizability of the findings to other industries and countries, use probability sampling techniques, and employ longitudinal designs to capture the dynamic nature of green competitive advantage.

References

Abbas, J., & Sağsan, M. (2019). Impact of knowledge management practices on green innovation and corporate sustainable development: A structural analysis. *Journal of Cleaner Production*, 229, 611–620. <https://doi.org/10.1016/j.jclepro.2019.05.024>

Ahmed, M. D., Abd Alwahab, M. A. A., Ali, M. H., Zainalabideen, A. H., Abd Alhasan, S. A., Alasadi, S. R., & Hamdy, A. M. (2022). The relationship among digital innovation, digital marketing, digital technology, and corporate performance: Mediating role of green supply chain management of Iraq textile industry. *International Journal of Operations and Quantitative Management*, 28(2), 486-505. <https://doi.org/10.46970/2022.28.2.5>

Al-Khawaldah, R., Al-Zoubi, W., Alshaer, S., Almarshad, M., Al Shalabi, F., Al Tahrawi, M., & Al-Hawary, S. (2022). Green supply chain management and competitive advantage: The mediating role of organizational ambidexterity. *Uncertain Supply Chain Management*, 10(3), 961-972. <https://doi.org/10.5267/j.uscm.2022.2.017>

Al Mashkooor, I. A. (2022). The impact of green activity-based costing and green supply chain practices on environmental performance oil refineries in Iraq. *International Journal of Economics and Finance Studies*, 14(4), 96-113. <https://doi.org/10.34109/ijefs.20220106>

Ali, W., Wen, J., Hussain, H., Khan, N. A., Younas, M. W., & Jamil, I. (2021). Does green intellectual capital matter for green innovation adoption? Evidence from the manufacturing SMEs of Pakistan. *Journal of Intellectual Capital*, 22(5), 868-888. <https://doi.org/10.1108/JIC-06-2020-0204>

Andersen, J. (2021). A relational natural-resource-based view on product innovation: The influence of green product innovation and green suppliers on differentiation advantage in small manufacturing firms. *Technovation*, 104, 102254. <https://doi.org/10.1016/j.technovation.2021.102254>

Asiaei, K., Bontis, N., Alizadeh, R., & Yaghoubi, M. (2022). Green intellectual capital and environmental management accounting: Natural resource orchestration in favor of environmental performance. *Business Strategy and the Environment*, 31(1), 76-93. <https://doi.org/10.1002/bse.2875>

Astawa, I. K., Pirzada, K., Budarma, I. K., Widhari, C. I. S., & Suardani, A. A. P. (2021). The effect of green supply chain management practices on the competitive advantages and organizational performance. *Polish Journal of Management Studies*, 24(1), 45-60. <https://doi.org/10.17512/pjms.2021.24.1.03>

Chanchaichujit, J., Balasubramanian, S., Shukla, V., & Rosas, J. S. (2020). Multi-objective decision model for green supply chain management. *Cogent Business & Management*, 7(1), 1783177. <https://doi.org/10.1080/23311975.2020.1783177>

Cheema, S., & Javed, F. (2017). The effects of corporate social responsibility toward green human resource management: The mediating role of sustainable environment. *Cogent Business and Management*, 4(1). <https://doi.org/10.1080/23311975.2017.1310012>

Cheema, S., Afsar, B., & Javed, F. (2020). Employees' corporate social responsibility perceptions and organizational citizenship behaviors for the environment: The mediating roles of organizational identification and environmental orientation fit. *Corporate Social Responsibility and Environmental Management*, 27(1), 9-21. <https://doi.org/10.1002/csr.1769>

Choi, J., Yoon, J., Chung, J., Coh, B. Y., & Lee, J. M. (2020). Social media analytics and business intelligence research: A systematic review. *Information Processing and Management*, 57(6). <https://doi.org/10.1016/j.ipm.2020.102279>

Danso, A., Adomako, S., Amankwah-Amoah, J., Owusu-Agyei, S., & Konadu, R. (2019). Environmental sustainability orientation, competitive strategy and financial performance. *Business Strategy and the Environment*, 28(5), 885-895. <https://onlinelibrary.wiley.com/doi/abs/10.1002/bse.2291>

Dong, T., Yin, S., & Zhang, N. (2023). The interaction mechanism and dynamic evolution of digital green innovation in the integrated green building supply chain. *Systems*, 11(3), 122. <https://doi.org/10.3390/systems11030122>

Dubey, R., Gunasekaran, A., Childe, S. J., Blome, C., & Papadopoulos, T. (2019). Big data and predictive analytics and manufacturing performance: integrating institutional theory, resource-based view and big data culture. *British Journal of Management*, 30(2), 341-361. <https://doi.org/10.1111/1467-8551.12355>

El-Kassar, A. N., & Singh, S. K. (2019). Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices. *Technological Forecasting and Social Change*, 144, 483-498. <https://doi.org/10.1016/j.techfore.2017.12.016>

Fernando, Y., Jabbour, C. J. C., & Wah, W. X. (2019). Pursuing green growth in technology firms through the connections between environmental innovation and sustainable business performance: Does service capability matter? *Resources, Conservation and Recycling*, 141, 8-20. <https://doi.org/10.1016/j.resconrec.2018.09.031>

Ferreira, J., Coelho, A., & Moutinho, L. (2020). Dynamic capabilities, creativity and innovation capability and their impact on competitive advantage and firm performance: The moderating role of entrepreneurial orientation. *Technovation*, 92, 102061. <https://doi.org/10.1016/j.technovation.2018.11.004>

Garg, P., Gupta, B., Dzever, S., Sivarajah, U., & Kumar, V. (2020). Examining the Relationship between Social Media Analytics Practices and Business Performance in the Indian Retail and IT Industries: The Mediation Role of Customer Engagement. *International Journal of Information Management*, 52. <https://doi.org/10.1016/j.ijinfomgt.2020.102069>

Hajli, N., & Laroche, M. (2019). Applications of business intelligence and analytics in social media marketing. *International Journal of Information Management*, 48, 226-227. <https://doi.org/10.1016/j.ijinfomgt.2018.12.014>

Haldorai, K., Kim, W. G., & Garcia, R. L. F. (2022). Top management green commitment and green intellectual capital as enablers of hotel environmental performance: The mediating role of green human resource management. *Tourism Management*, 88, 104431. <https://doi.org/https://doi.org/10.1016/j.tourman.2021.104431>

Handayani, N. U., Wibowo, M. A., Rinawati, D. I., & Gabriella, T. (2021). Drivers and barriers in the adoption of green supply chain management in construction projects: A case of Indonesia. *International Journal of Construction Supply Chain Management*, 11(2), 89-106. <https://doi.org/10.14424/ijcsm110221-89-106>

Hart, S. L., & Dowell, G. (2011). Invited editorial: A natural-resource-based view of the firm: Fifteen years after. *Journal of management*, 37(5), 1464-1479. <https://doi.org/10.1177/0149206310390219>

Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review*, 20(4), 986-1014. <https://doi.org/10.5465/amr.1995.9512280033>

Jiao, X., Zhang, P., He, L., & Li, Z. (2022). Business sustainability for competitive advantage: identifying the role of green intellectual capital, environmental management accounting and energy efficiency. *Economic Research-Ekonomska Istrazivanja*, 0(0), 1-23. <https://doi.org/10.1080/1331677X.2022.2125035>

Jirakraisiri, J., Badir, Y. F., & Frank, B. (2021). Translating green strategic intent into green process innovation performance: the role of green intellectual capital. *Journal of Intellectual Capital*, 22(7), 43-67. <https://doi.org/10.1108/JIC-08-2020-0277>

Kamboj, S., Goyal, P., & Rahman, Z. (2015). A resource-based view on marketing capability, operations capability and financial performance: An empirical examination of mediating role. *Procedia-Social and Behavioral Sciences*, 189, 406-415. <https://doi.org/10.1016/j.sbspro.2015.03.201>

- Khan, N. U., Anwar, M., Li, S., & Khattak, M. S. (2021). Intellectual capital, financial resources, and green supply chain management as predictors of financial and environmental performance. *Environmental Science and Pollution Research*, 28(16), 19755–19767. <https://doi.org/10.1007/s11356-020-12243-4>
- Kong, H. M., Witmaier, A., & Ko, E. (2021). Sustainability and social media communication: How consumers respond to marketing efforts of luxury and non-luxury fashion brands. *Journal of Business Research*, 131, 640–651. <https://doi.org/10.1016/j.jbusres.2020.08.021>
- Kongar, E., & Adebayo, O. (2021). Impact of Social Media Marketing on Business Performance: A Hybrid Performance Measurement Approach Using Data Analytics and Machine Learning. *IEEE Engineering Management Review*, 49(1), 133–147. <https://doi.org/10.1109/EMR.2021.3055036>
- Laari, S., Töyli, J., & Ojala, L. (2017). Supply chain perspective on competitive strategies and green supply chain management strategies. *Journal of Cleaner Production*, 141, 1303–1315. <https://doi.org/10.1016/j.jclepro.2016.09.114>
- Lee, M. J., & Roh, T. (2023). Unpacking the sustainable performance in the business ecosystem: Coopetition strategy, open innovation, and digitalization capability. *Journal of Cleaner Production*, 412, 137433. <https://doi.org/10.1016/j.jclepro.2023.137433>
- Li, G., Li, L., Choi, T. M., & Sethi, S. P. (2020). Green supply chain management in Chinese firms: Innovative measures and the moderating role of quick response technology. *Journal of Operations Management*, 66(7), 958–988. <https://doi.org/10.1002/joom.1061>
- Liu, J., Feng, Y., & Zhu, Q. (2021). Involving second-tier suppliers in Green supply chain management: Drivers and heterogenous understandings by firms along supply chains. *International Journal of Production Research*, 1-21. <https://doi.org/10.1080/00207543.2021.2002966>
- Lohmer, J., Kossmann, F., & Lasch, R. (2022). Manufacturing strategy in multi-plant networks—a multi-case study on decision-making authority, network capabilities and competitive advantages. *International Journal of Production Research*, 60(16), 5108-5129. <https://doi.org/10.1080/00207543.2021.1950936>
- Mehmood, K. K., & Hanaysha, J. R. (2022). Impact of Corporate Social Responsibility, Green Intellectual Capital, and Green Innovation on Competitive Advantage: Building Contingency Model. *International Journal of Human Capital and Information Technology Professionals*, 14(1), 1–14. <https://doi.org/10.4018/IJHCITP.293232>
- Mikalef, P., Boura, M., Lekakos, G., & Krogstie, J. (2019). Big data analytics capabilities and innovation: the mediating role of dynamic capabilities and moderating effect of the environment. *British Journal of Management*, 30(2), 272-298. <https://doi.org/10.1111/1467-8551.12343>
- Mishra, P., & Yadav, M. (2021). Environmental capabilities, proactive environmental strategy and competitive advantage: A natural-resource-based view of firms operating in India. *Journal of Cleaner Production*, 291, 125249. <https://doi.org/10.1016/j.jclepro.2020.125249>
- Nguyen, T. H., Elmagrhi, M. H., Ntim, C. G., & Wu, Y. (2021). Environmental performance, sustainability, governance and financial performance: Evidence from heavily polluting industries in China. *Business Strategy and the Environment*, 30(5), 2313–2331. <https://doi.org/10.1002/bse.2748>
- Novitasari, M., & Agustia, D. (2021). Green supply chain management and firm performance: The mediating effect of green innovation. *Journal of Industrial Engineering and Management*, 14(2), 391–403.
- Nuryakin, N., & Maryati, T. (2022). Do green innovation and green competitive advantage mediate the effect of green marketing orientation on SMEs' green marketing performance?. *Cogent Business & Management*, 9(1), 2065948. <https://doi.org/10.1080/23311975.2022.2065948>

- Qiu, L., Jie, X., Wang, Y., & Zhao, M. (2020). Green product innovation, green dynamic capability, and competitive advantage: Evidence from Chinese manufacturing enterprises. *Corporate Social Responsibility and Environmental Management*, 27(1), 146–165. <https://doi.org/10.1002/csr.1780>
- Roh, T., Lee, K., & Yang, J. Y. (2021). How do intellectual property rights and government support drive a firm's green innovation? The mediating role of open innovation. *Journal of Cleaner Production*, 317, 128422. <https://doi.org/10.1016/j.jclepro.2021.128422>
- Roh, T., Noh, J., Oh, Y., & Park, K. S. (2022). Structural relationships of a firm's green strategies for environmental performance: The roles of green supply chain management and green marketing innovation. *Journal of cleaner production*, 356, 131877. <https://doi.org/10.1016/j.jclepro.2022.131877>
- Sari, N. T. P., & Kusumawati, A. (2022). Literature review: The efforts to strengthening of micro, small and medium-sized enterprises (MSME) in Indonesia. *Asian Journal of Management, Entrepreneurship and Social Science*, 2(01), 98-115.
- Shahrullah, R. S., Jaya, F., & Arifin, I. (2021). The Challenges of Micro, Small and Medium Enterprises in Indonesia in the Era of the ASEAN Economic Community. *Syiah Kuala Law Journal*, 5(1), 124-138.
- Sharma, V. K., Chandna, P., & Bhardwaj, A. (2017). Green supply chain management related performance indicators in agro industry: A review. *Journal of Cleaner Production*, 141, 1194-1208.
- Singh, S. K., Del Giudice, M., Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological Forecasting and Social Change*, 150. <https://doi.org/10.1016/j.techfore.2019.119762>
- Tu, Y., & Wu, W. (2021). How does green innovation improve enterprises' competitive advantage? The role of organizational learning. *Sustainable Production and Consumption*, 26, 504–516. <https://doi.org/10.1016/j.spc.2020.12.031>
- Usero, B., Hernández, V., & Quintana, C. (2022). Social Media Mining for Business Intelligence Analytics: An Application for Movie Box Office Forecasting. In *Intelligent Computing: Proceedings of the 2021 Computing Conference, Volume 1* (pp. 981-999). Springer International Publishing. https://doi.org/10.1007/978-3-030-80119-9_65
- Wang, C., Zhang, Q., & Zhang, W. (2020). Corporate social responsibility, Green supply chain management and firm performance: The moderating role of big-data analytics capability. *Research in Transportation Business and Management*, 37. <https://doi.org/10.1016/j.rtbm.2020.100557>
- Wang, C. H. (2019). How organizational green culture influences green performance and competitive advantage: The mediating role of green innovation. *Journal of Manufacturing Technology Management*, 30(4), 666–683. <https://doi.org/10.1108/JMTM-09-2018-0314>
- Wang, C. H., & Juo, W. J. (2021). An environmental policy of green intellectual capital: Green innovation strategy for performance sustainability. *Business Strategy and the Environment*, 30(7), 3241–3254. <https://doi.org/10.1002/bse.2800>
- Wardani, K., & Palupi, N. (2022). *The Circular Capability Framework: adopting circular economy in the agri-food supply chain* (Doctoral dissertation, Coventry University).
- Xie, X., Huo, J., & Zou, H. (2019). Green process innovation, green product innovation, and corporate financial performance: A content analysis method. *Journal of Business Research*, 101, 697–706. <https://doi.org/10.1016/j.jbusres.2019.01.010>
- Yadiati, W. (2019). The role of green intellectual capital and organizational reputation in influencing environmental performance. *International Journal of Energy Economics and Policy*, 9(3), 261–268. <https://doi.org/10.32479/ijeep.7752>

Yang, J., Xiu, P., Sun, L., Ying, L., & Muthu, B. (2022). Social media data analytics for business decision making system to competitive analysis. *Information Processing and Management*, 59(1). <https://doi.org/10.1016/j.ipm.2021.102751>

Yin, S., & Yu, Y. (2022). An adoption-implementation framework of digital green knowledge to improve the performance of digital green innovation practices for industry 5.0. *Journal of Cleaner Production*, 363, 132608. <https://doi.org/10.1016/j.jclepro.2022.132608>

Yin, S., Zhang, N., Ullah, K., & Gao, S. (2022). Enhancing digital innovation for the sustainable transformation of manufacturing industry: a pressure-state-response system framework to perceptions of digital green innovation and its performance for green and intelligent manufacturing. *Systems*, 10(3), 72. <https://doi.org/10.3390/systems10030072>

Yong, J. Y., Yusliza, M. Y., Ramayah, T., & Fawehinmi, O. (2019). Nexus between green intellectual capital and green human resource management. *Journal of Cleaner Production*, 215, 364–374. <https://doi.org/10.1016/j.jclepro.2018.12.306>

Yusoff, Y. M., Omar, M. K., Zaman, M. D. K., & Samad, S. (2019). Do all elements of green intellectual capital contribute toward business sustainability? Evidence from the Malaysian context using the Partial Least Squares method. *Journal of Cleaner Production*, 234, 626–637. <https://doi.org/10.1016/j.jclepro.2019.06.153>

Zadeh, A. H., Zolbanin, H. M., & Sharda, R. (2021). Incorporating Big Data Tools for Social Media Analytics in a Business Analytics Course. *Journal of Information Systems Education*, 32(3), 176–198.

Zainalabideen, A. H., Mohammed, I. H. S., Abd Alhasan, S. A., Ali, M. H., Al Seedi, K. F. K., & Ghena, A. A. (2022). The Relationship among Production Innovation, Technology Innovation, Process Innovation, Management Innovation and Business Performance of the Pharmaceutical Industry in Iraq: Mediating Role of Information System. *International Journal of Operations and Quantitative Management*, 28(2), 397-417. <http://doi.org/10.46970/2022.28.2.1>

Zameer, H., Wang, Y., Yasmeen, H., & Mubarak, S. (2022). Green innovation as a mediator in the impact of business analytics and environmental orientation on green competitive advantage. *Management Decision*, 60(2), 488–507. <https://doi.org/10.1108/MD-01-2020-0065>

Zhang, H., Zang, Z., Zhu, H., Uddin, M. I., & Amin, M. A. (2022). Big data-assisted social media analytics for business model for business decision making system competitive analysis. *Information Processing & Management*, 59(1), 102762. <https://doi.org/10.1016/j.ipm.2021.102762>

Appendix 1. Validity and Reliability Scores of Measurement Items

Variable	Cronbach's Alpha	Loading Factor	AVE	CR
Business Analytics	0.754		0.669	0.859
We use business analytics to understand context and information of past and present events		0.823		
We use statistical models and forecasts to project what will happen in the future and why it will happen		0.805		
We use optimization and simulation to recommend an action and show the result of each decision		0.826		
Green Intellectual Capital	0.868		0.609	0.902
Employee productivity and contribution related to environmental preservation in our organization are better than those of competitors		0.779		
Employee competence related to environmental preservation in our organization is better than that of competitors		0.807		
The design of our products and services comply with the wishes of customers, especially those related to the environment		0.780		
We have stable and cooperative relationships with suppliers and other strategic partners related to environmental preservation		0.795		
The management system of environmental preservation in our organization is better than that of competitors		0.835		
Innovations related to environmental preservation in our organization are worse than those of competitors (R)		0.855		
Environmental Orientation	0.817		0.645	0.879
Our organization promotes environmental awareness at work to raise employee awareness of the importance of environmental preservation		0.867		

Our organization has a clear policy regarding environmental awareness in each operational area		0.798		
Environmental preservation is highly valued by the members of our organization		0.776		
Environmental preservation is our company value		0.768		
Green Innovation	0.878		0.732	0.916
We use natural resources and environmentally friendly technology		0.855		
We recycle waste		0.828		
We do not emphasize energy efficiency in the production process (R)		0.838		
We develop environmentally friendly products		0.900		
Green Supply Chain Management	0.811		0.570	0.868
Our company emphasizes cross-functional cooperation for environmental improvement		0.780		
Our company emphasizes product design to reduce material/energy consumption		0.768		
Our company emphasizes product design for reuse, and repair of materials and component parts		0.762		
Our company does not cooperate with customers for cleaner production (R)		0.729		
Our company cooperates with customers for eco-design		0.828		
Green Competitive Advantage	0.858		0.702	0.904
Our company has a competitive advantage in terms of lower costs on environmental management than competitors		0.857		
The quality of environmentally friendly products/services offered by our company is better than that of competitors		0.834		
Our competitors have more capabilities in environmental		0.852		

research and development and
green innovation than our
company (R)

Our company is better at
environmental management
than competitors

0.808

(R): Reserved questions

Source: Processed data (2023)