

COMPETITIVE ADVANTAGE AS A MEDIATING EFFECT IN THE IMPACT OF GREEN INNOVATION AND FIRM PERFORMANCE

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Abstract. The objective of this study was to measure or assess competitive advantage in mediating the effect of green innovation on firm performance. The data in the study were PROPER companies for the 2010–2018 period and the sample was selected using purposive sampling so that 369 companies were obtained. The results of this study proved that positive effect of green innovation on competitive advantage, positive effect of competitive advantage on firm performance, no effect of green innovation on firm performance, and competitive advantage mediated the effect of green innovation on firm performance. In reducing environmental problems, companies can apply green innovation to increase the company's competitive advantage and firm performance.

Keywords: green innovation, competitive advantage, firm performance, PROPER companies.

JEL Classification: E01, M21, Q56.

Introduction

Environmental problems and limited resources that have caused environmental pollution and sustainable resource use have become global issues. The Indonesian government in the 40th UNESCO General Conference in 2019 was committed to maintaining environmental conservatism to achieve sustainable development (Ministry of Foreign Affairs, 2020). Many companies implement green innovation as a sustainability effort that aims to create competitive advantage and improve firm performance, where these companies can use resources to overcome environmental sustainability issues and face stakeholder pressure (Singh et al., 2020; Song & Yu, 2017; Zameer et al., 2022). Environmental issues are currently the center of attention of communities, governments, and residents around the world, so that companies need to take responsibility to solve environmental problems. Green innovation describes an innovation strategy for green processes and green products that aims to reduce energy consumption, prevent pollution, design products that do not harm the environment, recycle waste, and manage the environment well (Agustia et al., 2019; El-kassar & Kumar, 2017). In making the company's performance increase, companies can apply green operating practices to address

environmental impacts, such as green innovation, showing is green technology for the creation of products with an environmentally friendly system to create a competitive advantage.

Green innovation, as a company's effort in procuring new products and existing products, does not harm the environment in its process. Green innovation is a strategic company effort that offers great opportunities to meet customer needs and demands without damaging the ecosystem, reducing negative impacts on the environment, and making environmentally friendly products (Albort-Morant et al., 2016; Tjahjadi et al., 2020). The green innovation classification consists of aspects of the manufacturing process and product design. First, on the manufacturing process, green innovation can reduce environmental damage in product procurement, production, and material delivery. Then, on the product design aspect, green innovation modifies existing product designs to reduce environmental damage (Chiou et al., 2011). In the recent competitive environment, green innovation shows the way a company is transformed in terms of production, construction, procedures, and systems that have positive advantages for the environment (Xue et al., 2019). By adopting green innovation, companies can have the opportunity to expand market share which can increase firm performance.

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Competitive advantage is a company's position in which its successful strategy cannot be imitated by its competitors and they receive sustainable benefits from the successful strategy. There are several advantages to competitive advantage, including low cost, increased managerial ability, good profitability and different characteristics from competitors. The characteristics of the competitive advantage that can be utilized by a company include value, scarcity, imitability, and unsubstitutability (Chen et al., 2009; Nanath & Pillai, 2017; Porter, 1981). Porter highlighted that innovation is the main determinant of increasing competitive advantage, in which companies that are committed to environmental regulations can create competitive advantage (Skordoulis et al., 2020; Zameer et al., 2022). Companies have a lot of pressure to face consumers and suppliers, such as public environmental policies and government regulations, to develop market share and competitive advantage to improve firm performance (Tang et al., 2017; Weng et al., 2015). By having a competitive advantage, companies can expand market share, increase customer trust and increase firm performance.

Various studies on green innovation and firm performance, whereas the previous literature shows different results (Liu et al., 2019; Somjai et al., 2020; Zhang et al., 2019). Green innovation has an effect to the firm performance. The practice of green innovation for companies will consider limited resources and emphasize more on market developments and the design of transaction mechanisms, this can make the firm performance increase (Arfi et al., 2018; Ma et al., 2018). Green innovation practices have been proven to address global warming problems and the challenges of reducing environmental impacts. Green innovation has no relationship to firm performance. This shows that there is a special need for innovation management, product production processes and technology application (Palcic & Prester, 2020; Takalo et al., 2020; Tseng et al., 2013). There is a significant effect between green innovation and competitive advantage, in which the application of green innovation can create a positive company image, increase market share, and increase customer satisfaction. These three items highly contribute to creating competitive advantage (Khaksar et al., 2015; Sellitto et al., 2020), in which green innovation has a major effect on companies to increase competitive advantage. Competitive advantage gives a good signal for firm performance, in which Porter's strategy is a competitive strategy that is often used in measuring the competitive advantage of a company that can make firm performance far superior (Anwar, 2018; Anwar et al., 2018). Competitive advantage can show that the company can create a market share with a broader reach make high sales and have a very good impact on firm performance.

Based on these research gaps, this study aims to empirically test competitive advantage mediating the relationship between green innovation and firm performance. This study investigates the direct and indirect effects that can expand the literature and information on companies in Indonesia regarding the competitive advantage

resulting from green innovation that can improve firm performance. Furthermore, green innovation is currently a technological advancement to protect the environment that can create better product quality and can improve environmental performance (Handayani et al., 2017). In the application of green innovation, there is no internal and external knowledge, so that the first major contribution is external considerations in green innovation projects to improve firm performance (Arfi et al., 2018). Green innovation is not only beneficial for the environment, but also for the company. Producing products that do not damage the environment is an important competitive advantage because it can provide product differentiation, improve company reputation, and reduce production costs (Arenhardt et al., 2016). The application of technological innovation in the formation of competitive advantage will be able to influence the improvement of firm performance (Potjanjaruwit, 2018). An important role for competitive advantage in strategic and operational management is to expand market share and obtain customer trust to improve firm performance. This study will solve the problem: 1) can green innovation and competitive advantage improve firm performance, 2) can green innovation improve competitive advantage, and 3) can green innovation improve firm performance through competitive advantage?

Reaching successful competitive advantage and firm performance by preserving the environment through green innovation is an important symbol of measuring the company's success. This study introduces competitive advantage as a mediating variable between green innovation and firm performance. This research contributes theoretically by analyzing green innovation that can affect firm performance through competitive advantage. Besides, it will provide an understanding for publicly listed companies in Indonesia to protect the environment with green innovation to create an environmentally friendly product, which will create a competitive advantage and can increase firm performance.

1. Literature review

1.1. Green innovation

Green innovation part of a technological novelty that results in energy savings, pollution prevention, waste recycling, environmentally friendly product design, and the company's environmental management. Green innovation can provide opportunities for companies to increase competitive advantage and other benefits, such as high prices, goodwill, and stakeholder trust (Albort-Morant et al., 2016; Ho et al., 2016; Tariq et al., 2017). By implementing the practice of green innovation, there are several opportunities that the company gets. Namely, it can add environmental issues in determining the primary strategy or be consolidated in other plans. This will create a competitive advantage and make firm performance grow (Khan & Johl, 2019). In creating products, green innovation uses an environmentally friendly process. The use of fewer

materials during product design aims to reduce emissions, reduce consumption of water, electricity, and other raw materials (Gunasekaran & Spalanzani, 2012; Singh et al., 2020). In facing competition in the era of environmental concern, carrying out green innovation is the primary and appropriate strategy for the company. The driving factors for green innovation include customer expectations, resources and capabilities, export intensity, female leaders, absorption, and compensation executives.

Green innovation is an integration of environmental benefits and company benefits, so that manufacturing companies are required to apply green innovation. Green innovation is a new process or modification of techniques, practices, systems, and products that must be avoided or reduced to diminish environmental impacts with the aim of reducing costs and improving product quality (Kunapatarawong & Martínez-Ros, 2016; Rennings, 2000). Kunapatarawong and Martínez-Ros (2016) argued that there are two determining factors for green innovation consisting of technology push (material efficiency, product quality, energy efficiency) and regulatory push (existing environmental law, existing standards, expected laws and regulations). These two determining factors can create market pull (market share, competitions, new markets, customer demand, and good image). Green innovation emphasises reducing waste, reducing pollution, and implementing an environmental management system. The company's strategy in implementing green innovation is very crucial to overcome external pressures, such as customers, competitors, and regulators.

1.2. Competitive advantage

Competitive advantage shows the company's achievement in occupying a special position in the hearts of customers, as a product excellent value creator, as an indication that customers will buy product offerings from the company and this will contribute to improving firm performance. The company applies its competitive advantage to the market scope through cost leadership and product differentiation (Kamukama et al., 2017; Porter, 1985). Competitive advantage is a condition in which a company operates more efficiently and with quality, so that this can improve the firm performance and differentiate the company from its competitors (Chuang et al., 2016). Competitive advantages can create new market shares and new technology in increasing the quality and quantity of making environmentally friendly products (Koentjoro & Gunawan, 2020). Companies will find it easier to gain a competitive advantage with greater resources and capabilities of social capital. The purposes of competitive advantage are increased efficiency, increased quality, increased productivity, and cost savings (Lee et al., 2016). A company that has a competitive advantage over its competitors can last a long time if it is able to create more economic value and sustainable competitive advantage (Maury, 2018). The benefits of a sustainable competitive advantage can make the firm performance

develop to outperform competitors in the long term (Maury, 2018; Porter, 1985).

Every company must have a competitive strategy, both explicitly and implicitly, based on how the company will face competition and what goals and policies must be taken to achieve competitive advantage. A company can achieve a sustainable competitive advantage if it adds value that competitors cannot publish or imitate (Obeidat et al., 2020). Competitive advantage is defined as the development of a strategy to add value that is not available to competitors and a weapon for the company to deal with competitors effectively (Barney, 1991; Obeidat et al., 2020). Competitive advantage shows a company position that can dominate the area of business competition, has the advantage of a product that is not easily imitated, so that the company can defend and seize the market to lead (Kuncoro & Suriani, 2018). Several aspects must be considered for competitive advantage, including quality strategy, customer service, team development innovation, company activities flexibility, and market responsiveness. This can make the company dominate the market and be able to outperform competitors (Kuncoro & Suriani, 2018; Srivastava et al., 2013).

1.3. Firm performance

Firm performance shows that a company's achievement in economic indicators, such as sales growth, market share, profitability, and return on investment. The firm performance can show the company's financial position in the current year and be a goal for shareholders or investors. Measuring firm performance is very important to business goals and targets that have been achieved in the financial year and is able to attract investors to invest in the company (Khan & Johl, 2019). The firm performance shows the results obtained by the company from operational activities by using resources and has a goal of evaluating and analyzing financial statements (Agustia et al., 2020). Firm performance is a company responsibility that consists of some combined dimensions, such as environmental performance, social performance, and economic performance (Agyabeng-Mensah et al., 2020). In competition in the global market, companies encounter external and internal pressures to produce environmentally friendly products (Kushwaha & Sharma, 2015). Thus, the company must be able to make the company's performance much better in intense competition by paying attention to the environment.

1.4. Hypothesis development

Green innovation shows a system in achieving sustainable development to prevent environmental damage. To achieve green development, green innovation can be a company strategy to obtain results in increasing competitive advantage, corporate profits, and social benefits. Green innovation and total quality management become increasingly important in building companies' competitive

advantage and achieving sustainable development (Li et al., 2017). Developing green innovation is a strategy of corporate commitment, knowledge for the company, combining several functions and increasing employee capabilities. This means that companies can develop unique resource structures and patterns that cannot be replicated, so that they can increase sustainable competitive advantage (Barney et al., 2001; Ge et al., 2018; Groenewegen & Vergragt, 1991). Green innovation can affect competitive advantage (Khaksar et al., 2016), which shows that companies implementing green innovation to create environmentally friendly products can help companies to increase their competitive advantage. Many companies develop environmentally friendly programs, including green products and green technologies that aim to increase green innovation. Companies also apply green innovation in an effort to achieve a more sustainable competitive advantage (Khazeal & Majeed, 2020; Song & Yu, 2017).

Hypothesis 1. Green innovation has a positive effect on competitive advantage.

Competitive advantages are the advantages of differentiation, cost leadership, and firm performance consisting of product, strategy, process, and financial performance. Competitive advantages have the advantage to create environmentally friendly products, higher quality, higher trust, higher added value, long-term company growth, better environmental improvements, better customer support, and satisfaction (Dechant et al., 1994; Do, 2020; Nadkarni & Narayanan, 2007; Porter, 1985). For companies, competitive advantage aims to gain a higher advantage than competitors, such as cost, technological innovation, unique product brands, company management, etc (Barney, 1991; Tu & Wu, 2020). Competitive advantage can affect firm performance (Munsung & Stephens, 2020), in which Porter (1985) argued that competitive advantage can create and maintain excellent firm performance. The company's competitive advantage can provide more capabilities than its competitors, so this will make firm performance superior (Tupamahu et al., 2019).

Hypothesis 2. Competitive advantage has a positive effect on firm performance.

Green Innovation can be interpreted as a company strategy that is able to contribute to creating new technology and products that aim to reduce environmental impacts and negative effects from resource exploitation. External pressure drives companies to apply green innovation as an internal driver, such as company resources, company structure, and core capabilities (Cai & Li, 2018). Green innovation can affect firm performance (Agustia et al., 2020; Palmer & Truong, 2017), so that companies that apply green innovation to maintain environmental sustainability coveted can reduce operational resources and reduce energy waste. The implementation of green innovation in companies will be able to increase company revenues than those that do not apply green innovation (Doran et al., 2012; Hojnik & Ruzzier, 2016). Green

innovation considers environmental factors in the use of materials and energy consumption into product design, both for new products and for modifications to existing products, which aim to reduce environmental damage (Chan et al., 2016; Chang, 2011). Companies that are consistent with green innovation in the long term can determine the company's commitment to environmental protection and conservation (Singh et al., 2016).

Hypothesis 3. Green innovation has a positive effect on firm performance.

Competitive advantage illustrates an excellent position in the market share where the company can outperform its competitors. The company is able to form a positive value that is more than its competitors to establish a competitive advantage (Wang, 2019). To achieve and obtain a competitive advantage, companies must implement green marketing activities in creating product advantages (Chang & Chen, 2013; Lin & Chen, 2017). Competitive advantage can be a differential for the company, in the long run, to compete better than its competitors. Porter and Linde (1995) proposed that competitive advantage is supported by environmental performance to form an innovation and strategic environmental management. The uniqueness of the company's resources and capabilities shows the main factors of competitive advantage originating from its strength to form sustainable economic activity (Hart, 1995; Singjai et al., 2018; Wernerfelt, 1984). To create a competitive advantage, companies must continue to expand new products and new processes that differentiate brand advantages through product uniqueness, service, and market share (Liao, 2016; Nadkarni & Narayanan, 2007). With the competitive advantage, it is able to support the role of green innovation to increase firm performance.

Hypothesis 4 (H3). Competitive advantage is able to mediate the effect of green innovation on firm performance.

This section explains the literature review and hypotheses. This study explores the mediation of competitive advantage in green innovation and firm performance. This study aims to examine the competitive advantage mediating between green innovation and firm performance. Figure 1 explains this relationship.

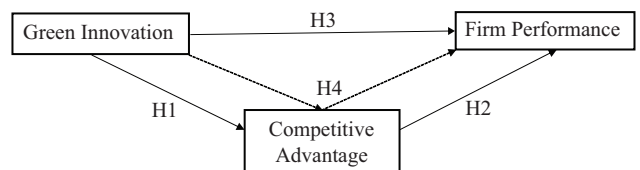


Figure 1. Theoretical framework

2. Methodology

2.1. Research design

This type of research was a quantitative study that focused on the variables of green innovation, firm performance,

and competitive advantage. There were two tests in this study. First, testing the direct relationship of the effect of green innovation on competitive advantage and the effect of green innovation and competitive advantage on firm performance. Second, testing the indirect relationship of the effect of green innovation on firm performance, which was mediated by competitive advantage. Variable testing in this study used STATA.

$$\text{CompetitiveAdvantage} = \alpha_1 + \beta_1 \text{GreenInnovation} + e; \tag{1}$$

$$\text{FirmPerformance} = \alpha_2 + \beta_2 \text{GreenInnovation} + \beta_3 \text{CompetitiveAdvantage} + \beta_4 \text{FirmAge} + \beta_5 \text{FirmSize} + \beta_6 \text{BoardSize} + \beta_7 \text{Big4} + \beta_8 \text{Tangibility}. \tag{2}$$

2.2. Data collection

The population in this study were PROPER companies on the Indonesia Stock Exchange. PROPER is a program of the Ministry of Environment of the Republic of Indonesia, where companies listed in PROPER are companies that contribute to reducing environmental problems (Chariri et al., 2019). This study uses data in the annual report and OSIRIS. The sample selection was carried out using purposive sampling, by requiring the companies to provide financial reports and annual reports in 2010–2018. The sample selected in this study was 369 companies.

2.3. Measurement

The company’s performance shows its ability to maximize profits which can attract investors to invest their capital. The firm performance has two items: financial measures (investment profit and equity profit) and profit measures (sales profit, net profit margin, and turnover) (Siswoyo et al., 2020). Firm performance shows an assessment of the type of company, employee and customer satisfaction, market share competition, and a company overview. According to Vithessonthi and Racela (2016), firm performance can be assessed by the return on assets (ROA), which is calculated using the formula of earnings before interest and tax on total assets.

Green innovation concentrates on a product, process, market share, and management innovation that can bring companies to improve their competitive advantage in an environmentally friendly manner. The implementation of green innovation must be supported by top management, so that it will be able to help companies to create a good reputation and build relationships with government agencies (Huang et al., 2016). The measurement of green innovation uses an analysis of indicators measured in ratios in annual report. Indicators used in measuring green innovation include: (1) Materials or production materials that can be recycled or reconditioned, (2) Products use environmentally friendly materials (non-hazardous or non-polluting substances), (3) Production processes using

new technologies to reduce water, energy, and waste, and (4) Use environmentally friendly packaging (Agustia et al., 2019).

Competitive advantage shows the company’s strategy with a rare system that has unique and complex abilities that can differentiate it from its competitors. In maintaining a competitive advantage, it can be carried out by creating value on high innovation and market share competition (Pratono et al., 2019). Kuo et al. (2017), Reilly and Tushman (2008) argued that competitive advantage can apply asset utilization in dealing with the impact of environmental changes. Asset utilization can be assessed using asset turnover (Wolf et al., 2020). According to (Ullah et al., 2020), asset turnover (ATO) is calculated using the formula of net sales on total assets.

The firm age formula is the natural logarithm of the years since the company was founded (Chen et al., 2020). The firm size formula is the natural logarithm of total assets (Gao et al., 2017). The board size formula is the number of commissioners on the board members (Jatiningrum et al., 2016). The formula for big 4 is a value of 1 if audited by Big 4 and a value of 0 if audited by others (Abid et al., 2018). And the tangibility formula is the net fixed assets on total assets (Abdulla, 2016).

3. Results

3.1. Descriptive statistics and correlation

Table 1 presents the descriptive statistics. As shown in Table 1, indicated that the firm performance values were minimum value of -0.090 and maximum value of 0.850, green innovation minimum value of 0.000 and maximum value of 1.000, and competitive advantage minimum value of -5.116 and maximum value of 6.294.

Table 1. Descriptive statistics

	N	Mean	Median	Std	Minimum	Maximum
FP	369	0.127	0.110	0.104	-0.090	0.850
GI	369	0.503	0.500	0.292	0.000	1.000
CA	369	2.646	2.685	1.052	-5.116	6.294
FirmAge	369	3.495	3.640	0.564	0.000	4.760
FirmSize	369	13.803	14.870	3.636	4.190	18.340
BoardSize	369	8.965	5.000	17.783	0.000	200.000
Big4	369	0.436	0.000	0.497	0.000	1.000
Tangibility	369	0.403	0.390	0.186	0.010	0.830

Table 2 shows the Pearson correlation matrix. Green innovation has no correlation with firm performance. This shows the need for contingent variables in the relationship. Green innovation shows a significant correlation with a competitive advantage. Competitive advantage shows a significant correlation with firm performance.

Table 2. Pearson correlation

	FP	GI	CA	FirmAge	FirmSize	BoardSize	Big4	Tangibility
FP	1.000							
GI	0.001 (0.990)	1.000						
CA	0.123** (0.018)	0.154*** (0.003)	1.000					
FirmAge	0.130** (0.012)	0.149*** (0.004)	0.291*** (0.000)	1.000				
FirmSize	0.211*** (0.000)	-0.016 (0.755)	-0.071 (0.175)	0.135*** (0.009)	1.000			
BoardSize	0.114** (0.029)	0.030 (0.568)	-0.011 (0.830)	0.013 (0.798)	0.029 (0.573)	1.000		
Big4	0.170*** (0.001)	0.151*** (0.004)	0.068 (0.190)	-0.004 (0.938)	0.025 (0.628)	0.131** (0.012)	1.000	
Tangibility	-0.104** (0.045)	0.071 (0.173)	0.029 (0.584)	0.140*** (0.007)	-0.046 (0.374)	-0.057 (0.274)	-0.085 (0.104)	1.000

3.2. Normality test

Table 3 shows the normality test. The normality test in this study showed a significance of 0.185 (sig >5%). This indicates that the data in this study are normally distributed.

Table 3. Normality results

Kolmogorov-Smirnov Test (sig)	0.185
N	369

3.3. Structural model analysis

In Table 4 and Table 6, model 1 shows the test results to prove H1 (Equation 1). Equation 1 shows that green innovation has a positive and significant effect on competitive advantage, with a significance value of 0.003 ($\beta = 0.556$, sig <1%). Thus, **H1 was accepted**.

In Table 4 and Table 6, model 2 shows H2 and H3 (Equation 2). Equation 2 shows that competitive advantage has a positive and significant effect firm performance, with a significance value of 0.035, ($\beta = 0.011$, sig < 5%). Thus, **H2 was accepted**. Green innovation has no significant effect on firm performance, with a significance value 0.361 ($\beta = -0.016$, sig > 10%). This indicated that **H3 was rejected**. In the control variables, firm age has a positive and significant firm performance, with a significance value of 0.089 ($\beta = 0.017$, sig < 10%). Firm size has a positive and significant firm performance, with a significance value of 0.000 ($\beta = 0.005$, sig < 1%). Board size has a positive and significant firm performance, with a significance value of 0.092 ($\beta = 0.000$, sig < 10%). Big 4 has a positive and significant firm performance, with a significance value of 0.003 ($\beta = 0.031$, sig < 1%). Tangibility has a positive and significant firm performance, with a significance value of 0.075 ($\beta = -0.050$, sig < 10%).

Table 4. Structural model regression results

	(1) CA	(2) FP
GI	0.556*** (3.00)	-0.016 (-0.91)
CA		0.011** (2.11)
FirmAge		0.017* (1.70)
FirmSize		0.005*** (3.89)
BoardSize		0.000* (1.68)
Big4		0.031*** (2.93)
Tangibility		-0.050* (-1.78)
_cons	2.367*** (21.97)	-0.026 (-0.71)
N	488	488

3.4. Mediation effects

Table 5 and Table 6 shows the results of the mediation test. The indirect relationship between green innovation and firm performance mediated by competitive advantage, with a significance value of 0.085 ($\beta = 0.006$, sig < 10%). Thus, **H4 was accepted**.

Table 5. Mediation test results

	β Koefisien	Std. Error	t	P Value
GI - CA - FP	0.006	0.003	1.72	0.085*

Table 6. Summary of hypothesis test results

		B	t	P
H1	GI -> CA	0.556	3.00	0.003***
H2	CA -> FP	0.011	2.11	0.035**
H3	GI -> FP	-0.016	-0.91	0.361
H4	GI -> CA -> FP	0.006	1.72	0.085*

4. Discussion

This study shows the results of the effect of green innovation on firm performance through competitive advantage. The direct relationship tested the effect of green innovation on competitive advantage and the effect of green innovation and competitive advantage on firm performance. The indirect relationship tested competitive advantage in mediating between green innovation and firm performance. The test results of this study mostly supported the hypotheses.

Green innovation can improve competitive advantage. Companies implementing green innovation by producing environmentally friendly products will gain a good competitive advantage. The results of this study strengthened and provided an additional empirical theory of evidence to previous studies (Ardyan et al., 2017; Gürlek & Tuna, 2017), in which green innovation ability can form an environmentally friendly technological innovation to improve competitive advantage. Importance of green innovation in generating a competitive advantage in high global competition. Companies in Indonesia must implement green innovation to produce products that do not damage the environment to outperform competitors and have a wider reach in market share. Thus, a competitive advantage will be created so that the company is able to perform better than its competitors.

Competitive advantage can increase firm performance. This provided evidence that the presence of competitive advantage in the company will be able to increase competitive advantage. The results of this study strengthened and provided an additional empirical theory of evidence to previous studies (Ferreira et al., 2020; Munsung & Stephens, 2020), where competitive advantage is the company's primary strategy to respond quickly to the challenges of competing with the business environment both internally and externally to improve company performance. In the era of global market share competition, companies must be able to outperform competitors by creating unique and not easily imitated environmentally friendly products. Besides, companies in Indonesia must have an understanding of the importance of competitive advantage that will encourage company performance is increasing.

Competitive advantage was able to mediate between green innovation on firm performance. The results of this study strengthened and provided an additional empirical theory of evidence to research in Indonesian companies. This study showed an understanding that green innovation can increase competitive advantage and create an

excellent firm performance. In the global market competition, competitive advantage is very important for companies in Indonesia. Thereby, green innovation is crucial to be applied in the company in fulfilling customers' needs that are environmentally friendly to be able to create a competitive advantage over competitors and improve firm performance.

Conclusions

The objective of this study was to test competitive advantage in mediating between green innovation on firm performance. Companies must consider implementing green innovations and not using toxic substances in their products to reduce adverse environmental impacts. Competitive advantages will be established by innovating environmentally friendly products and unique products that are not able to be imitated by competitors. By implementing green innovation, companies will be able to create a competitive advantage and firm performance will improve.

This study proved that competitive advantage was able to mediate between green innovation and firm performance. Manufacturing companies have a big impact on environmental problems in Indonesia. Thus, in continuing to run the business, companies need to pay attention to economic, social, and environmental factors. Besides, the application of green innovation is the right solution to reduce the environmental impact that can improve competitive advantage and firm performance.

Companies that have high environmental awareness are able to show an innovation that can change the world for the better. Green innovation describes a company's readiness for challenges and opportunities to create business goals and fulfill social responsibility (Zhang et al., 2020). Companies that apply green innovation are able to present a high environmental innovation so that it can increase product value and firm performance. The company's compliance with concern for the environment and cultural values of the community can increase the sustainability of green innovation.

Implication

This research can provide knowledge and information to companies in Indonesia and the company's efforts to generate a competitive advantage from green innovation to make the firm performance far superior. This study expands deeper knowledge about the application of green innovation and the existence of competitive advantages in developing countries, one of which is Indonesia.

With the pressure from company stakeholders in Indonesia, it is expected that they can implement green innovation in the product manufacturing process so that it does not pollute the environment. Green innovation gives advantages for the Indonesian government to reduce environmental impacts. This is because the application of green innovation is able to create competitive advantages that can improve firm performance.

This study broadens the literature on green innovation to improve firm performance through competitive advantage. It can also add a more specific understanding of concepts about green innovation in Indonesia. Besides, it adds comprehensive knowledge for companies in Indonesia to improve firm performance in sustainable development.

Limitation and future research

This study used PROPER companies on the Indonesia Stock Exchange. PROPER is a firm performance rating appraisal program, which in testing green innovation and competitive advantage on firm performance, it can be subjective and biased. The sample size of 369 companies indicated the conclusive findings. Future research is recommended to use other variables that play a role in environmental impacts and other contingents.

Second, this study only analyzes and tests competitive advantage as a mediating variable on green innovation and competitive advantage. Future research is suggested to use other variables to observe how the company's performance is improving by implementing other green and competitive strategies.

References

- Abdulla, Y. (2016). Capital structure in a tax-free economy: Evidence from UAE. *International Journal of Islamic and Middle Eastern Finance and Management*, 10(1), 102–116. <https://doi.org/10.1108/IMEFM-11-2015-0144>
- Abid, A., Shaique, M., & Anwar, M. (2018). Do big four auditors always provide higher audit quality? Evidence from Pakistan. *International Journal of Financial Studies*, 6(2), 1–22. <https://doi.org/10.3390/ijfs6020058>
- Agustia, D., Permatasari, Y., Fauzi, H., & Sari, M. N. A. (2020). Research and development intensity, firm performance, and green product innovation. *Journal of Security and Sustainability Issues*, 9(3), 1039–1049. [https://doi.org/10.9770/jssi.2020.9.3\(27\)](https://doi.org/10.9770/jssi.2020.9.3(27))
- Agustia, D., Sawarjuwono, T., & Dianawati, W. (2019). The mediating effect of environmental management accounting on green innovation – firm value relationship. *International Journal of Energy Economics and Policy*, 9(2), 299–306. <https://doi.org/10.32479/ijeeep.7438>
- Agyabeng-Mensah, Y., Ahenkorah, E., Afum, E., Agyemang, A. N., Agnikpe, C., & Rogers, F. (2020). Examining the influence of internal green supply chain practices, green human resource management and supply chain environmental cooperation on firm performance. *Supply Chain Management*, 25(5), 585–599. <https://doi.org/10.1108/SCM-11-2019-0405>
- Albert-Morant, G., Leal-Millán, A., & Cepeda-Carrión, G. (2016). The antecedents of green innovation performance: A model of learning and capabilities. *Journal of Business Research*, 69(11), 4912–4917. <https://doi.org/10.1016/j.jbusres.2016.04.052>
- Anwar, M. (2018). Business model innovation and SMEs performance – does competitive advantage mediate? *International Journal of Innovation Management*, 1850057, 1–31. <https://doi.org/10.1142/S1363919618500573>
- Anwar, M., Khan, S. Z., & Shah, S. Z. A. (2018). Big data capabilities and firm's performance: A mediating role of competitive advantage. *Journal of Information and Knowledge Management*, 17(4). <https://doi.org/10.1142/S0219649218500454>
- Ardyan, E., Nurtantiono, A., Istiyanto, B., & Rahmawan, G. (2017). Green Innovation capability as driver of sustainable competitive advantage and SMEs marketing. *International Journal of Civil Engineering and Technology*, 8(8), 1114–1122.
- Arenhardt, D. L., Battistella, L. F., & Grohmann, M. Z. (2016). The influence of the green innovation in the search of competitive advantage of enterprises of the electrical and electronic Brazilian sectors. *International Journal of Innovation Management*, 20(1), 1–21. <https://doi.org/10.1142/S1363919616500043>
- Arfi, W. B., Hikkerova, L., & Sahut, J. M. (2018). External knowledge sources, green innovation and performance. *Technological Forecasting & Social Change*, 129(August 2017), 210–220. <https://doi.org/10.1016/j.techfore.2017.09.017>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Barney, J., Wright, M., & Ketchen, D. J. (2001). The resource-based view of the firm: Ten years after 1991. *Journal of Management*, 27(6), 625–641. <https://doi.org/10.1177/014920630102700601>
- Cai, W., & Li, G. (2018). The drivers of eco-innovation and its impact on performance: Evidence from China. *Journal of Cleaner Production*, 176, 110–118. <https://doi.org/10.1016/j.jclepro.2017.12.109>
- Chan, H. K., Yee, R. W. Y., Dai, J., & Lim, M. K. (2016). The moderating effect of environmental dynamism on green product innovation and performance. *International Journal of Production Economics*, 181, 384–391. <https://doi.org/10.1016/j.ijpe.2015.12.006>
- Chang, C.-H., & Chen, Y.-S. (2013). Managing green brand equity: The perspective of perceived risk theory. *Quality and Quantity*, 48, 1753–1768. <https://doi.org/10.1007/s11135-013-9872-y>
- Chang, C. (2011). The influence of corporate environmental ethics on competitive advantage: The mediation role of green innovation. *Journal of Business Ethics*, 104, 361–370. <https://doi.org/10.1007/s10551-011-0914-x>
- Chariri, A., Nasir, M., Januarti, I., & Daljono, D. (2019). Determinants and consequences of environmental investment: An empirical study of Indonesian firms. *Journal of Asia Business Studies*, 13(3), 433–449. <https://doi.org/10.1108/JABS-05-2017-0061>
- Chen, Y. K., Coviello, N., & Ranaweera, C. (2020). How does dynamic network capability operate? A moderated mediation analysis with NPD speed and firm age. *Journal of Business & Industrial Marketing*, 36(2). <https://doi.org/10.1108/JBIM-01-2020-0050>
- Chen, Y., Lin, M. J., & Chang, C. (2009). Industrial marketing management the positive effects of relationship learning and absorptive capacity on innovation performance and competitive advantage in industrial markets. *Industrial Marketing Management*, 38(2), 152–158. <https://doi.org/10.1016/j.indmarman.2008.12.003>
- Chiou, T. Y., Chan, H. K., Lettice, F., & Chung, S. H. (2011). The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. *Transportation Research Part E: Logistics and Transportation Review*, 47(6), 822–836. <https://doi.org/10.1016/j.tre.2011.05.016>

- Chuang, M.-Y., Chen, C., & Lin, M. J. (2016). The impact of social capital on competitive advantage: The mediating effects of collective learning and absorptive capacity. *Management Decision*, 54(6), 1443–1463. <https://doi.org/10.1108/MD-11-2015-0485>
- Dechant, K., Altman, B., Downing, R. M., Keeney, T., Swaine, A., Miller, R. A., & Post, J. (1994). Environmental leadership: Environmental compliance to from competitive advantage. *Academy of Management Executive*, 8(3), 7–27. <https://doi.org/10.5465/ame.1994.9503101163>
- Do, B. (2020). The links between proactive environmental strategy, competitive advantages and firm performance: An empirical study in Vietnam. *Sustainability*, 12(4962), 1–22. <https://doi.org/10.3390/su12124962>
- Doran, J., Ryan, G., Doran, J., & Ryan, G. (2012). Regulation and firm perception, eco-innovation and firm performance. *European Journal of Innovation Management*, 15(4), 421–443. <https://doi.org/10.1108/14601061211272367>
- El-Kassar, A., & Kumar, S. (2017). Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices. *Technological Forecasting & Social Change*, 144, 483–498. <https://doi.org/10.1016/j.techfore.2017.12.016>
- Ferreira, J., Cardim, S., & Coelho, A. (2020). Dynamic capabilities and mediating effects of innovation on the competitive advantage and firm's performance: The moderating role of organizational learning capability. *Journal of the Knowledge Economy*, 12, 620–644. <https://doi.org/10.1007/s13132-020-00655-z>
- Gao, Y., Wu, J., & Hafsi, T. (2017). The inverted U-Shaped relationship between corporate philanthropy and spending on research and development: A case of complementarity and competition moderated by firm size and visibility. *Corporate Social Responsibility and Environmental Management*, 24(6), 465–477. <https://doi.org/10.1002/csr.1420>
- Ge, B., Yang, Y., Jiang, D., Gao, Y., Du, X., & Zhou, T. (2018). An empirical study on green innovation strategy and sustainable competitive advantages: Path and boundary. *Sustainability*, 10(10), 1–18. <https://doi.org/10.3390/su10103631>
- Groenewegen, P., & Vergragt, P. (1991). Environmental issues as threats and opportunities in technological innovation. *Technology Analysis and Strategic Management*, 3(1), 43–55. <https://doi.org/10.1080/09537329108524031>
- Gunasekaran, A., & Spalanzani, A. (2012). Sustainability of manufacturing and services: Investigations for research and applications. *International Journal of Production Economics*, 140(1), 35–47. <https://doi.org/10.1016/j.ijpe.2011.05.011>
- Gürlek, M., & Tuna, M. (2017). Reinforcing competitive advantage through green organizational culture and green innovation. *Service Industries Journal*, 38(7–8), 1–25. <https://doi.org/10.1080/02642069.2017.1402889>
- Handayani, R., Wahyudi, S., & Suharnomo, S. (2017). The effects of corporate social responsibility on manufacturing industry performance: The mediating role of social collaboration and green innovation. *Business: Theory and Practice*, 18, 152–159. <https://doi.org/10.3846/btp.2017.016>
- 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>
- Ho, Y., Wang, W. B., Shieh, W. L., Ho, Y., Wang, W. B., & Shieh, W. L. (2016). An empirical study of green management and performance in Taiwanese electronics firms. *Cogent Business & Management*, 3(1). <https://doi.org/10.1080/23311975.2016.1266787>
- Hojnik, J., & Ruzzier, M. (2016). The driving forces of process eco-innovation and its impact on performance: Insights from Slovenia. *Journal of Cleaner Production*, 133, 812–825. <https://doi.org/10.1016/j.jclepro.2016.06.002>
- Huang, X., Hu, Z., Liu, C., Yu, D., & Yu, L. (2016). The relationships between regulatory and customer pressure, green organizational responses, and green innovation performance. *Journal of Cleaner Production*, 112, 3423–3433. <https://doi.org/10.1016/j.jclepro.2015.10.106>
- Jatiningrum, C., Abdul-Hamid, M. A., & Popoola, O. M. J. (2016). The impact of disclosure quality on corporate governance and earnings management: Evidence from companies in Indonesia. *International Journal of Economics and Financial*, 6(4S), 118–125.
- Kamukama, N., Kyomuhangi, D. S., Akisimire, R., & Orobia, L. A. (2017). Competitive advantage mediator of managerial competence and financial performance of commercial bank in Uganda. *African Journal of Economic and Management Studies*, 8(2), 221–234. <https://doi.org/10.1108/AJEMS-10-2016-0142>
- Kemlu. (2020). *Indonesia Tegaskan Komitmen untuk SDGs, Konservasi Lingkungan dalam UNESCO General Conference*. <https://kemlu.go.id/portal/id/read/793/berita/indonesia-tegaskan-komitmen-untuk-sdgs-konservasi-lingkungan-dalam-unesco-general-conference>
- Khaksar, E., Abbasnejad, T., & Esmaeili, A. (2015). The effect of green supply chain management practices on environmental performance and competitive advantage: A case study of the cement industry. *Technological and Economic Development of Economy*, 4913(November). <https://doi.org/10.3846/20294913.2015.1065521>
- Khaksar, E., Abbasnejad, T., Esmaeili, A., & Tamošaitienė, J. (2016). The effect of green supply chain management practices on environmental performance and competitive advantage: A case study of the cement industry. *Technological and Economic Development of Economy*, 22(2), 293–308. <https://doi.org/10.3846/20294913.2015.1065521>
- Khan, P. A., & Johl, S. K. (2019). Nexus of comprehensive green innovation, environmental management system-14001-2015 and firm performance. *Cogent Business & Management*, 6(1). <https://doi.org/10.1080/23311975.2019.1691833>
- Khazeal, B. K., & Majeed, M. H. (2020). The successive impact of the green organizational strategies and green innovation in enhancing the sustainable competitive advantage. *Pervasive Health: Pervasive Computing Technologies for Healthcare*, 2, 1222–1236. <https://doi.org/10.4108/eai.28-6-2020.2297936>
- Koentjoro, S., & Gunawan, S. (2020). Managing knowledge, dynamic capabilities, innovative performance, and creating sustainable competitive advantage in family companies: A case study of a family company in Indonesia. *Journal of Open Innovation*, 6(3), 1–21. <https://doi.org/10.3390/joitmc6030090>
- Kunapatarawong, R., & Martínez-Ros, E. (2016). Towards green growth: How does green innovation affect employment? *Research Policy*, 45(6), 1218–1232. <https://doi.org/10.1016/j.respol.2016.03.013>
- Kuncoro, W., & Suriani, W. O. (2018). Achieving sustainable competitive advantage through product innovation and market driving. *Asia Pacific Management Review*, 23(3), 186–192. <https://doi.org/10.1016/j.apmr.2017.07.006>
- Kuo, S., Lin, P., & Lu, C. (2017). The effects of dynamic capabilities, service capabilities, competitive advantage, and organizational performance in container shipping. *Transportation Research Part A*, 95, 356–371. <https://doi.org/10.1016/j.tra.2016.11.015>

- Kushwaha, G. S., & Sharma, N. K. (2015). Green initiatives: A step towards sustainable development and firm's performance in the automobile industry. *Journal of Cleaner Production*, 121, 116–129. <https://doi.org/10.1016/j.jclepro.2015.07.072>
- Lee, V.-H., Foo, A. T.-L., Leong, L.-Y., & Ooi, K.-B. (2016). Can competitive advantage be achieved through knowledge management? A case study on SMEs. *Expert Systems With Applications*, 65, 136–151. <https://doi.org/10.1016/j.eswa.2016.08.042>
- Li, D., Zhao, Y., Zhang, L., Chen, X., & Cao, C. (2017). Impact of quality management on green innovation. *Journal of Cleaner Production*, 170, 462–470. <https://doi.org/10.1016/j.jclepro.2017.09.158>
- Liao, Z. (2016). Temporal cognition, environmental innovation, and the competitive advantage of enterprises. *Journal of Cleaner Production*, 135, 1045–1053. <https://doi.org/10.1016/j.jclepro.2016.07.021>
- Lin, Y., & Chen, Y. (2017). Determinants of green competitive advantage: The roles of green knowledge sharing, green dynamic capabilities, and green service innovation. *Quality & Quantity*, 51(4), 1663–1685. <https://doi.org/10.1007/s11135-016-0358-6>
- Liu, Z., Li, X., Peng, X., Lee, S., Li, X., Peng, X., & Lee, S. (2019). Green or nongreen innovation? Different strategic preferences among subsidized enterprises with different ownership types. *Journal of Cleaner Production*, 245, 118786. <https://doi.org/10.1016/j.jclepro.2019.118786>
- Ma, Y., Yin, Q., Pan, Y., Cui, W., Xin, B., & Rao, Z. (2018). Green product innovation and firm performance: Assessing the moderating effect of novelty-centered and efficiency-centered business model design. *Sustainability*, 10(6), 1–13. <https://doi.org/10.3390/su10061843>
- Maury, B. (2018). Sustainable competitive advantage and profitability persistence: Sources versus outcomes for assessing advantage. *Journal of Business Research*, 84(October 2016), 100–113. <https://doi.org/10.1016/j.jbusres.2017.10.051>
- Munsung, R., & Stephens, A. R. (2020). Innovation-orientated technology assimilation strategy and Korean SMEs' enhancing innovation capability, competitive advantage and firm performance. *International Journal of Innovation Management*, 24(6). <https://doi.org/10.1142/S1363919620500814>
- Nadkarni, S., & Narayanan, V. K. (2007). Strategic schemas, strategic flexibility, and firm performance: The moderating role of industry clockspeed. *Strategic Management Journal*, 28(3), 243–270. <https://doi.org/10.1002/smj.576>
- Nanath, K., & Pillai, R. R. (2017). The influence of green is practices on competitive advantage: Mediation role of green innovation performance. *Information Systems Management*, 34(1), 3–19. <https://doi.org/10.1080/10580530.2017.1254436>
- Obeidat, U., Obeidat, B., Alrowwad, A., Alshurideh, M., Masa'deh, R., & Mohammad, A. (2020). The effect of intellectual capital on competitive advantage: The mediating role of innovation. *Management Science Letters*, 11, 1331–1344. <https://doi.org/10.5267/j.msl.2020.11.006>
- Palcic, I., & Prester, J. (2020). Impact of advanced manufacturing technologies on green innovation. *Sustainability*, 12(8), 3499. <https://doi.org/10.3390/su12083499>
- Palmer, M., & Truong, Y. (2017). The impact of technological green new product introductions on firm profitability. *Ecological Economics*, 136, 86–93. <https://doi.org/10.1016/j.ecolecon.2017.01.025>
- Porter, M. E., & van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives*, 9(4), 97–118. <https://doi.org/10.1257/jep.9.4.97>
- Porter, M. E. (1981). The contributions of industrial organization to strategic management. *The Academy of Management Review*, 6(4), 609–620. <https://doi.org/10.2307/257639>
- Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. Free press.
- Potjanjaruwit, P. (2018). Competitive advantage effects on firm performance: A case study of startups in Thailand. *Journal of International Studies*, 11(3), 104–111. <https://doi.org/10.14254/2071-8330.2018/11-3/9>
- Pratono, A. H., Darmasetiawan, N. K., Yudianto, A., & Jeong, B. G. (2019). Achieving sustainable competitive advantage through green entrepreneurial orientation and market orientation: The role of inter-organizational learning. *Bottom Line*, 32(1), 2–15. <https://doi.org/10.1108/BL-10-2018-0045>
- Reilly, C. A. O., & Tushman, M. L. (2008). Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Research in Organizational Behavior*, 28, 185–206. <https://doi.org/10.1016/j.riob.2008.06.002>
- Rennings, K. (2000). Redefining innovation – eco-innovation research and the contribution from ecological economics. *Ecological Economics*, 32(2), 319–332. [https://doi.org/10.1016/S0921-8009\(99\)00112-3](https://doi.org/10.1016/S0921-8009(99)00112-3)
- Sellitto, A. M., Camfield, G. C., & Buzuku, S. (2020). Green innovation and competitive advantages in a furniture industrial cluster: A survey and structural model. *Sustainable Production and Consumption*, 23, 94–104. <https://doi.org/10.1016/j.spc.2020.04.007>
- Singh, M. P., Chakraborty, A., & Roy, M. (2016). The link among innovation drivers, green innovation and business performance: Empirical evidence from a developing economy. *World Review of Science, Technology and Sustainable Development*, 12(4), 316–334. <https://doi.org/10.1504/WRSTSD.2016.082191>
- Singh, S. K., Giudice, M. Del, Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological Forecasting & Social Change*, 150, 1–12. <https://doi.org/10.1016/j.techfore.2019.119762>
- Singjai, K., Winata, L., & Kummer, T. (2018). Green initiatives and their competitive advantage for the hotel industry in developing countries. *International Journal of Hospitality Management*, 75, 131–143. <https://doi.org/10.1016/j.ijhm.2018.03.007>
- Siswoyo, M., Kustiyadji, G., Wijayani, A., & Hartati, W. (2020). Competitive advantage of environmental management and green innovation. *Utopía y Praxis Latinoamericana*, 25(10), 533–544.
- Skordoulis, M., Ntanos, S., & Kyriakopoulos, G. L. (2020). Environmental innovation, open innovation dynamics and competitive advantage of medium and large-sized firms. *Journal of Open Innovation*, 6(4), 1–30. <https://doi.org/10.3390/joitmc6040195>
- Somjai, S., Fongtanakit, R., & Laosillapacharoen, K. (2020). Impact of environmental commitment, environmental management accounting and green innovation on firm performance: An empirical investigation. *International Journal of Energy Economics and Policy*, 10(3), 204–210. <https://doi.org/10.32479/ijeep.9174>
- Song, W., & Yu, H. (2017). Green innovation strategy and green innovation: The roles of green creativity and green organizational identity. *Corporate Social Responsibility and Environmental Management*, 25(2), 135–150. <https://doi.org/10.1002/csr.1445>

- Srivastava, M., Franklin, A., & Martinette, L. (2013). Building a sustainable competitive advantage. *Journal of Technology Management and Innovation*, 8(2), 47–60. <https://doi.org/10.4067/S0718-27242013000200004>
- Takalo, K. S., Tooranloo, S. H., & Parizi, S. Z. (2020). Green innovation: A systematic literature review. *Journal of Cleaner Production*, 279, 122474. <https://doi.org/10.1016/j.jclepro.2020.122474>
- Tang, M., Walsh, G., Lerner, D., Fitza, M. A., & Li, Q. (2017). Green Innovation, managerial concern and firm performance: An empirical study. *Business Strategy and the Environment*, 27(1), 39–51. <https://doi.org/10.1002/bse.1981>
- Tariq, A., Badir, Y. F., Tariq, W., & Bhutta, U. S. (2017). Drivers and consequences of green product and process innovation: A systematic review, conceptual framework and future outlook. *Technology in Society*, 51, 8–23. <https://doi.org/10.1016/j.techsoc.2017.06.002>
- Tjahjadi, B., Soewarno, N., Hariyati, H., & Nafidah, L. N. (2020). The role of green innovation between green market orientation and business performance: Its Implication for open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 1–18. <https://doi.org/10.3390/joitmc6040173>
- Tseng, M., Wang, R., Chiu, A. S. F., Geng, Y., & Lin, Y. H. (2013). Improving performance of green innovation practices under uncertainty. *Journal of Cleaner Production*, 40, 71–82. <https://doi.org/10.1016/j.jclepro.2011.10.009>
- Tu, Y., & Wu, W. (2020). 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>
- Tupamahu, K. H., Ghozali, I., & Hp, P. T. B. (2019). Lean management, competitive advantage, and firm performance: The role of management control systems (evidence from Indonesia manufacturing firms). *Academic Journal of Interdisciplinary Studies*, 8(3), 221–233. <https://doi.org/10.36941/ajis-2019-0020>
- Ullah, A., Pinglu, C., Ullah, S., Zaman, M., & Haider, S. (2020). The nexus between capital structure, firm-specific factors, macroeconomic factors and financial performance in the textile sector of Pakistan. *Heliyon*, 6(8), 1–10. <https://doi.org/10.1016/j.heliyon.2020.e04741>
- Vithessonthi, C., & Racela, O. C. (2016). Short-and long-run effects of internationalization and R&D intensity on firm performance. *Journal of Multinational Financial Management*, 34, 28–45. <https://doi.org/10.1016/j.mulfin.2015.12.001>
- Wang, C. (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>
- Weng, H. H. R., Chen, J. S., & Chen, P. C. (2015). Effects of green innovation on environmental and corporate performance: A stakeholder perspective. *Sustainability*, 7(5), 4997–5026. <https://doi.org/10.3390/su7054997>
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171–180. <https://doi.org/10.1002/smj.4250050207>
- Wolf, C. A., Black, J. R., & Stephenson, M. W. (2020). Benchmarking upper midwest dairy farm profitability. *Agricultural Finance Review*, 80(5), 733–744. <https://doi.org/10.1108/AFR-02-2020-0022>
- Xue, M., Boadu, F., & Xie, Y. (2019). The penetration of green innovation on firm performance: effects of Absorptive capacity and managerial environmental concern. *Sustainability*, 11(9), 1–24. <https://doi.org/10.3390/su11092455>
- Zameer, H., Wang, Y., & Yasmeen, H. (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, D., Rong, Z., & Ji, Q. (2019). Green innovation and firm performance: Evidence from listed companies in China. *Resources, Conservation & Recycling*, 144, 48–55. <https://doi.org/10.1016/j.resconrec.2019.01.023>
- Zhang, Y., Sun, J., Yang, Z., & Wang, Y. (2020). Critical success factors of green innovation: Technology, organization and environment readiness. *Journal of Cleaner Production*, 264, 1–9. <https://doi.org/10.1016/j.jclepro.2020.121701>