

Eco-Innovation And Sustainable Performance In Restaurant Msmes In Romblon, Philippines: A Natural Resource Based View

Ms. Ellaine Joy G. Eusebio¹, Maria Victoria P. Tibon, DBA²

¹College of Business and Accountancy, Romblon State University, Philippines 5505,
eusebioellainejoy@rsu.edu.ph

²Ramon V. Del Rosario College of Business, De la Salle University, Philippines 2401
maria.victoria.tibon@dlsu.edu.ph

Abstract

This study investigates the influence of eco-innovation on the sustainable performance of Micro, Small and Medium-Sized Enterprises (MSMEs) in the food sector by drawing from the Natural Resource Based View. Using a cross-sectional survey of 89 business owners or managers of Quick Service Restaurants in Romblon, Philippines and employing a multiple regression analysis, this research examines the performance implications of eco-innovation, that is, the effect of eco-process, eco-product, eco-organizational and eco-marketing innovations on the economic, social and environmental performance of MSMEs. The findings reveal that a specific type of eco-innovation is directed towards the improvement of a specific type of performance. Eco-organizational and eco-marketing innovations boost MSMEs' economic performance, while eco-process innovation improves environmental and social performance. The study contributes theoretical insights and practical implications for sustainable performance of MSMEs anchored on reducing the environmental impact of operations.

Keywords: *environmental innovation, sustainable performance, natural-resource based view*

INTRODUCTION

Environmental challenges are currently faced by people and organizations (Della Corte, et al, 2025). For instance, the effects of climate change on the environment have been more apparent. Temperatures are rising, seasons are lengthening, sea levels are rising, hurricanes are becoming stronger, and droughts and heatwaves are becoming more intense. Scientists predict that global climate change will continue into the next century due to greenhouse gases emitted by human activity (NASA, 2021).

Forbes' (2021) article highlights the findings of one European study, which shows that the food we eat affects climate change, from production to consumption. Food systems account for 34% of all man-made greenhouse gas emissions, emitting an average of 2 tons of carbon dioxide equivalent (CO₂e) per person per year (Forbes, 2021). Indeed, food production processes can negatively impact the environment.

Innovation is an important factor in solving the problems on natural resources and climate change (Dogaru, 2020). Several businesses see innovation as the key to radically improving corporate environmental practices and performance. Innovation can solve environmental problems (Acciaro et al., 2014), and it can be a driver of economic growth and social welfare (OECD, 2009). Companies can proactively innovate products and services that are both economically attractive and environmentally sound while also contributing to the fulfillment of

a social need (Székely & Knirsch, 2005). Product and process innovation are believed to be essential to sustainable development by scholars and practitioners, alike (Della Corte, et al., 2025). The Organization for Economic Cooperation and Development (OECD) defines *innovation* as developing or enhancing new products, services, processes, or organizational methods (OECD, 2009). There are four levels of innovation practices: product, process, organizational (Klewitz & Hansen, 2013; OECD, 2005; Rennings, 2000) and marketing innovations (OECD, 2005). Product innovation is creating a new product or the enhancement of an existing one. Process innovations occur when output is produced with fewer inputs or changes or improvements in delivering goods and services. Organizational innovations occur when an organization reforms its structure or management or implements new organizational methods. Implementing new marketing methods (such as product design, promotion, and pricing) is an example of marketing innovation (OECD, 2005).

When innovation results in a lower environmental impact, it is referred to as eco-innovation (Ghisetti & Rennings, 2014; OECD, 2009). Moreover, when environmental expectations and business practices are in sync, the concept of eco-innovation emerges (Yurdakul & Kazan, 2020). Eco-innovation is the process of reducing the impact of economic activities on the environment and the sustainable use of natural resources (Dogaru, 2020). This occurs when new ideas, behaviors, products, and processes reduce environmental problems (Rennings, 2000). Cheng and Shiu (2012) define it as a coherent set of actions in carrying out eco-innovation projects when looking at it from an implementation standpoint. According to them, there are three types of eco-innovation implementations: eco-product, eco-process, and eco-organization innovation. They are similar to the definitions of the three types of innovations given by OECD. The only difference is that it focuses on innovation, resulting in lower environmental impact. Implementing eco-product and eco-process innovation are distinct from implementing eco-organizational innovation because these two involve many specific and necessary activities that contribute to overall eco-innovation implementation (Cheng & Shiu, 2012). Yurdakul and Kazan (2020) also added marketing-innovation as an eco-innovation dimension. It involves all dimensions of product design or packaging, product placement, product promotion, and prices. Eco-innovation is a core dimension of sustainability-oriented innovation (SOI), which involves making intentional changes to an organization's philosophy, values, products, and processes to create and realize the social and environmental value and economic returns (Adams et al., 2016). It focuses on meeting human needs and improving their quality of life while minimizing environmental impact (Putri & Sari, 2019). Eco-innovation is a critical component of the innovation that helps the world transition to a more sustainable economy (Dogaru, 2020).

Few studies have looked into the relationship between sustainability-oriented innovation practices and organizational performance. Some of these published studies used a qualitative method based on literature reviews and a case study approach (De et al., 2020; Maletič et al., 2016). Some were conducted in the manufacturing context (C. C. J. Cheng et al., 2014; Martínez-Alonso et al., 2019). Thus, through a quantitative study in the context of the foodservice sector, this research will broaden understanding of the performance implications of sustainability-

oriented innovation. In addition to eco-product innovation, eco-process innovation, and eco-organizational innovation, this study will consider eco-marketing innovation (OECD, 2005), as suggested by previous authors (Ch'ng et al., 2021; C. C. J. Cheng et al., 2014; Tumelero et al., 2019).

REVIEW OF LITERATURE

The term "sustainable performance" refers to the combination of environmental, economic, and social performance (Chardine-Baumann & Botta-Genoulaz, 2014). It employs a comprehensive approach that integrates the three types of performance. According to Gong et al.'s (2018) review of the literature on sustainable performance metrics, economic, environmental, and social perspectives can all be achieved simultaneously.

Economic performance is the most well-known and essential metric for measuring sustainability (Gong et al., 2018; Nor-Aishah et al., 2020). These are the financial benefits of green initiatives (Eltayeb et al., 2011). They include profitability, revenue growth, increased market share, and image improvement (Nor-Aishah et al., 2020).

Environmental performance is measured using an index that evaluates its efforts to reduce its environmental impact (Larrán Jorge et al., 2015; Schaltegger & Wagner, 2011). Environmental performance in food processors results from source reduction activities such as resource conservation (energy and water) and food and packaging recycling or reuse (Pullman et al., 2009). Companies can benefit the environment by designing environmentally friendly products that reduce waste and maximize resource utilization (Eltayeb et al., 2011). As a result, businesses are becoming more profitable and more environmentally friendly.

Social performance is the ability of a company to enrich its employees and customers (Rajak & Vinodh, 2015). Internal human resources, external population, stakeholder participation, and macro-social performance are the focus of the social sustainability perspective (Rajak & Vinodh, 2015). It is frequently absent from frameworks for measuring sustainability performance and reporting initiatives (Husgafvel et al., 2015).

Empirical studies on the long-term performance of sustainability-oriented innovation yielded varying results. The results on the relationship testing were mostly significant and positive for environment innovation and sustainable performance (Dong et al., 2014; Fernando et al., 2019; Maletič et al., 2014, 2016; Muangmee et al., 2021; Rodríguez-Espíndola et al., 2022). The same holds true for the relationship between environmental innovation and environmental performance (Küçükoğlu & Pınar, 2015; Li, 2014; Rehman et al., 2021; Wayan Edi Arsawan et al., 2021; Weng et al., 2015; Yurdakul & Kazan, 2020; Zandi et al., 2019). The relationship between environmental innovation and financial or economic performance (Alos-Simo et al., 2020; Cheng et al., 2014; Farza et al., 2021; Weng et al., 2015; Yurdakul & Kazan, 2020; Zandi et al., 2019) is also positive.

The effects of the three dimensions of eco-innovation were also assessed and were found to be significant and positive on sustainable performance. Eco-product innovation influences firm's financial performance (Martinez-Alonso et al., 2020) and environmental performance (El-Kassar

& Singh, 2019). Eco-process innovation positively affects economic (El-Kassar & Singh, 2019; Martínez-Alonso et al., 2019; Sezen & Çankaya, 2013), and social (Sezen & Çankaya, 2013) and environmental performances (El-Kassar & Singh, 2019; Sezen & Çankaya, 2013). Further, eco-product innovation, eco-organizational innovation, and eco-process innovation were found to enhance company's financial performance (Hizarci-Payne et al., 2021) and socioeconomic performance (Tumelero et al., 2019). Eco-marketing innovation improve environmental and economic performance (Geng et al., 2021). Eco-process and eco-product innovation have significant and positive effect on environmental performance, while eco-organizational innovation has a significant and positive effect on economic performance (Ch'ng et al., 2021). Eco-product and eco-process also positively affect environmental performance (Küçükoğlu & Pınar, 2015; Singh et al., 2020; Tantayanubutr & Panjakajornsak, 2017), and economic and social performance (Tantayanubutr & Panjakajornsak, 2017).

However, some relationships were not significant according to previous studies findings. Eco-innovation was found to have no significant effect on environmental (Ghisetti & Rennings, 2014; Li, 2014) and financial performance (Li, 2014). Likewise, Ganapathy et al. (2014) and Sezen & Çankaya (2013) found that eco-innovation has no significant effect on the three dimensions of sustainable performance. Additionally, Ch'ng et al. (2021) showed that eco-organizational innovation has no significant effect on environmental performance, and eco-process and eco-product innovations have no significant effect on economic performance, and all these three have no significant effect on social performance. Martínez-Alonso et al. (2019) also discovered that product innovation has no significant effect on sustainable economic performance. El-Kassar & Singh (2019) also proved that eco-product innovation has no significant effect on organizational performance (financial performance).

This study aims to test the effect of eco-innovation on sustainable performance of MSMEs in the food industry in Odiongan, Romblon. MSMEs play an important role in the development of global economies. In the Philippines, based on the Philippine Statistics Authority's (PSA) 2023 List of Establishments, there were 1,246,373 business enterprises operating in the country, of which 1,241,733 (99.63%) are MSMEs. Micro enterprises constitute 90.43% (1,127,058) of total establishments, followed by small enterprises at 8.82% (109,912) and medium enterprises at 0.38% (4,763). Furthermore, MSMEs generated a total of 6,351,466 jobs or 66.97% of the country's total employment. Micro enterprises produced the biggest share (33.95%) closely followed by small enterprises (26.26%) while medium enterprises lagged behind at 6.77%. Similarly, the roles of micro, small, and medium-sized enterprises (MSMEs) in creating a sustainable world are enormous. People anticipate MSMEs, whose collective impact is significant, to contribute to climate change adaptation and mitigation policies by responding to the increasing stress on ecosystems.

Theoretical Framework

This study utilizes the Natural Resource Based View to examine the relationship between eco-innovation and sustainable performance. It is built on the resource-based view (RBV), according

to which, firms' resources and capabilities determine its competitive advantage. RBV provides a theoretical basis for exploring the relationship between resources, capabilities, and performance. Hart (1995) extended the RBV to include the natural environment, resulting to the Natural Resource Based View (NRBV). According to NRBV, a company's competitive advantage can be achieved through its capabilities developed to nurture the relationship with the natural environment. It postulates that firms gain a sustainable competitive advantage by being environmentally responsible or preserving natural resources.

Conceptual Research Model

Grounded on NRBV, this study identified four types of eco-innovation, namely, eco-product, eco-process, eco-organizational, and eco-marketing innovations. The effects of these four types of eco-innovation on sustainable performance will be determined in terms of the three dimensions: economic, social and environmental.

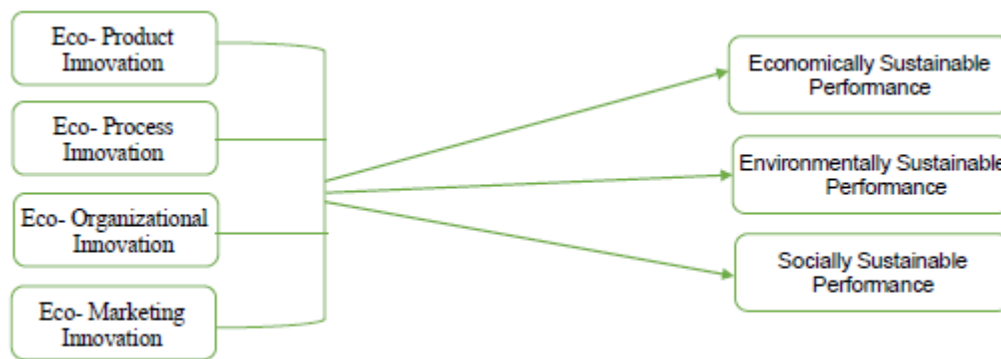


Figure 1. Conceptual Research Model

METHODOLOGY

This study used the quantitative method to test the relationships between Eco-Innovations and Sustainable Performance of MSMEs in the Food Service industry, specifically Quick-Service Restaurants (QSR) in Odiongan, Romblon. Romblon is located in Southern Luzon, Region IV-B. Odiongan is the business district in the province since the main campus of the only state university, which is the Romblon State University, is located in Odiongan, Romblon. Ninety-nine percent of QSRs in the province, especially in the chosen municipality, fall into the micro-medium size enterprise category because they generate less revenue and operate with a small workforce and assets. QSR is a restaurant that serves fast food that requires little preparation time. They typically serve fast food from a limited menu because it allows them to prepare food in less time with the least amount of variation.

There are about 115 quick-service restaurants which belong to the MSMEs in Odiongan, Romblon. Using the sample size calculator, 95% confidence level and 5% margin of error, the sample size derived for this study was 89 respondents. The stratified random sampling technique was used to the key respondents who are active business owners or managers of a QSR. There were 11 cafes, 22 casual dining, and 82 fast-food restaurants, from which the researchers identified 9, 17 and 63 respondents respectively using the random numbers generator. When the

respondent was unavailable or not reachable, the researchers generated random numbers to replace the said respondent.

Eco-Innovation refers to the efforts of a company to reducing its production's negative impact on the environment through efficient use of natural resources. Companies can attain these by improving the development of its products or services (Eco-Product Innovation), its production process (Eco-Process Innovation), its promotion, pricing and distribution of products to the customers (Eco-Marketing Innovation) and by setting up a system or methods that would make these efforts possible (Eco-Organizational Innovation). Meanwhile, Sustainable Performance is used to evaluate the efforts of a company in contributing to sustainability. It has three measures: Economic or how the company has improved its revenues and profitability, the Environment, or how the company has reduced its environmental impact, and Social, or how the company has improved the welfare of its stakeholders.

The measures for eco-innovation were adopted from Yurdakul and Kazan (2020), while the measures for sustainable performance were adopted from Nor-Aishah et al. (2020). Answers that can be given are within a 5-point Likert scale with 5 for strongly agree to 1 for strongly disagree. The instrument was pre-tested by administering it to 10 restaurant owners/managers. The results of the pre-test were subjected to Reliability Analysis to determine the reliability of the instrument. The alpha values obtained were found to be above the acceptable level of .70.

Multiple regressions were likewise carried out with the use of JASP software. Eco-innovation were regressed against sustainable performance.

RESULTS & DISCUSSION

There were 89 QSR respondents based in Odiongan, Romblon, majority (78.7%) of which are micro enterprises. In terms of type of restaurant, 58.4% offers fast-food service, 28.1% are in casual dining and 13.5% are in café business. 67.4% have been operating for 6 years and below while 32.6% were in the QSR business for 6 years and above.

Table 1. *Business Profile of the Respondents*

Business Profile		Frequency	Percentage
Business Size			
	Micro	70	78.7
	Small	15	16.9
	Medium	4	4.5
Type of Restaurant			
	Casual Dining	25	28.1
	Fast food	52	58.4
	Café	12	13.5
Years of Operation			
	6 years and below	60	67.4
	6 years and above	29	32.6

n=89

The adoption of eco-innovation is of moderate level because the lowest average is 3.60 while the highest average is 4.02. Descriptive statistics as shown in Table 2 indicate that eco-product, eco-process, eco-organizational and eco-marketing innovations are moderately practiced.

Table 2. *Level of implementation of Eco-innovation*

<i>Eco-product Innovation</i>	Mean
Our business develops products using less material.	3.82
Our business develops products that can be recycled easily.	3.82
Our business develops products that cause the least amount of waste.	3.92
Our business develops products that minimize the damage caused by waste.	3.93
Our business develops products to minimize energy use.	3.76
Our business develops easily separable products.	3.89
<i>Eco-process Innovation</i>	
Our business develops less polluting production processes than its alternatives.	3.9
Our business uses new technologies to save energy in production processes.	3.9
Our business has a recycling system in the production process.	3.89
Our business renews its production processes to meet the standards required by environmental laws.	3.84
<i>Eco-Organizational Innovation</i>	
Our business uses an environmental management and audit system	3.79
Our business cooperates with businesses in the supply chain to avoid environmental damage.	3.91
Our business makes high R&D investments to reduce environmental impacts.	3.79
Our business has ISO14001 environmental standard.	3.72
The raw material suppliers of our business have the ISO14001 environmental standard.	3.60
Our business has a separate department for environmental protection.	3.85
<i>Eco-Marketing Innovation</i>	
Our business uses new techniques in product promotion to reduce environmental impacts.	3.88
Our business uses new media for product promotion to reduce environmental impacts.	3.88
Our business uses new methods to place products to reduce environmental impacts.	3.98
Our business uses new pricing techniques in products aimed at reducing environmental impacts.	3.96
Our business pays attention to optimizing packaging in its products.	4.02

The MSMEs had good sustainable performance as evidenced by the resulting averages from the gathered responses as shown in Table 3. Among the three dimensions of sustainable performance,

the MSMEs were strongest in environmental performance, followed by social performance and least is economic performance.

Table 3. *Dimensions of Sustainable Performance*

<i>Economic Performance</i>	Mean
Our company has improved its market share.	3.71
Our company has improved its image.	3.8
Our company has increased its profits.	3.79
<i>Social Performance</i>	
Our company has improved or enhanced the overall stakeholder welfare.	3.78
Our company has improved the community's health and safety.	4.06
Our company has reduced environmental impacts and risks to the general public.	4.09
Our company has improved occupational health and safety of employees.	3.96
Our company has improved the awareness and protection of the claims and rights of the community served.	4.02
<i>Environmental Performance</i>	
Our company has improved compliance with environmental standards.	4.09
Our company has reduced energy consumption.	4.01
Our company has reduced material usage.	4.06
Our company has reduced the consumption of hazardous materials.	4.04

Eco-innovation was regressed against sustainable performance. Table 4 presents the results of the multiple regression of Economic Performance against Eco-Innovation.

Table 4. *Regression Results of Economic Performance against Eco-Innovation*

Variable	Coefficient	Standard Error	t-value	p-value
Constant	0.894	0.732	1.221	0.226
Eco-Product	0.086	0.159	0.539	0.591
Eco-Process	0.151	0.137	1.104	0.273
Eco-Organizational	0.270*	0.119	2.271	0.026
Eco-Marketing	0.237*	0.105	2.254	0.027
R-squared	0.195			
F-statistic	5.102			
P-value (F-stat)	<.001			

*indicates significance at the 5% level

The R² level indicates that 19.5% of the variation in Economic Performance is explained by eco-innovation. The findings indicate that eco-organizational and eco-marketing innovation have a positive effect on economic performance while the coefficients of eco-product and eco-process innovations are statistically insignificant. This means that eco-product and eco-process innovations have no effect on economic performance.

If a company wants to expand its market share, image, profitability, or long-term economic performance, it should focus on initiatives that will add value to the fulfillment of this goal. As a

result, they should invest in research and development to limit environmental consequences, establish a distinct department for environmental protection, and consider utilizing an environmental management and audit system. They should also work with their suppliers and distributors to prevent environmental damage and ensure that their company and its suppliers adhere to the ISO14001 environmental standard. Furthermore, enterprises, particularly MSMEs, should apply innovative strategies and new channels to sell their products, new methods to position their items, or new pricing approaches and packaging optimization to reduce the environmental impact of their business. These initiatives were discovered to improve organizations' economically sustainable performance.

Table 5. Regression Results of Social Performance against Eco-Innovation

Variable	Coefficient	Standard Error	t-value	p-value
Constant	2.339*	0.521	4.486	< .001
Eco-Product	0.064	0.114	0.567	0.572
Eco-Process	0.317*	0.097	3.256	0.002
Eco-Organizational	0.009	0.085	0.112	0.911
Eco-Marketing	0.032	0.075	0.429	0.669
R-squared	0.160			
F-statistic	4.011			
P-value (F-stat)	0.005			

*indicates significance at the 5% level

The R² level indicates that 16% of the variation in Social Performance is explained by eco-innovation. The findings indicate that eco-process innovation has a positive effect on social performance while the coefficients of eco-product, eco-organizational and eco-marketing innovations are statistically insignificant. This means that eco-product, eco-organizational and eco-marketing innovations have no effect on social performance.

Table 6. Regression Results of Environmental Performance against Eco-Innovation

Variable	Coefficient	Standard Error	t-value	p-value
Constant	1.609*	0.630	2.553	0.012
Eco-Product	0.158	0.137	1.151	0.253
Eco-Process	0.330*	0.118	2.802	0.006
Eco-Organizational	0.086	0.102	0.843	0.402
Eco-Marketing	0.058	0.090	0.639	0.525
R-squared	0.185			
F-statistic	4.757			
P-value (F-stat)	0.002			

*indicates significance at the 5% level

The R² level indicates that 18.5% of the variation in Environmental Performance is explained by eco-innovation. The findings indicate that eco-process innovation has a positive effect on environmental performance while the coefficients of eco-product, eco-organizational and eco-

marketing innovations are statistically insignificant. This means that eco-product, eco-organizational and eco-marketing innovations have no effect on environmental performance. Meanwhile, firms should explore eco-process innovation if they want to improve overall stakeholder welfare, the community's health and safety, employees' occupational health and safety and awareness and protection of the community's claims and rights. To reduce environmental impacts and risks to the public, they should focus on improving their process. MSMEs, in particular, should develop less polluting processes, adopt new energy-saving equipment, and set up a recycling system. They should assess their production techniques on a regular basis to ensure that they are in compliance with environmental standards. Finally, owners and managers should put in place a system to keep track of these actions.

CONCLUSION

A specific type of eco-innovation is directed towards the improvement of a specific type of performance. Eco-organizational and eco-marketing innovations boost MSMEs' economic performance, while eco-process innovation improves environmental and social performance. Given that different eco-innovation types resulted in varying effects on various measures of sustainable performance, firms, particularly MSMEs, should pursue eco-innovation based on their performance priorities. The study validated the Natural Resource Based View which postulates that firms innovate to address environmental challenges and achieve sustainable competitive advantage. It contributed to the theoretical literature on eco-innovation by incorporating four types. Although some of the relationships studied were not significant, they may nevertheless provide useful insights into the debate about the relationship between eco-innovation and sustainable performance. Future research may seek to confirm the findings in a different industry or country.

REFERENCES

- Acciaro, M., Vanelslander, T., Sys, C., Ferrari, C., Roumboutsos, A., Giuliano, G., Lam, J. S. L., & Kapros, S. (2014). Environmental sustainability in seaports: a framework for successful innovation. *Maritime Policy and Management*, 41(5), 480-500. <https://doi.org/10.1080/03088839.2014.932926>
- Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., & Overy, P. (2016). Sustainability-oriented Innovation: A Systematic Review. *International Journal of Management Reviews*, 18(2), 180-205. <https://doi.org/10.1111/ijmr.12068>
- Alos-Simo, L., Verdu-Jover, A. J., & Gomez-Gras, J. M. (2020). Does activity sector matter for the relationship between eco-innovation and performance? Implications for cleaner production. *Journal of Cleaner Production*, 263. <https://doi.org/10.1016/j.jclepro.2020.121544>
- Ch'ng, P. C., Cheah, J., & Amran, A. (2021). Eco-innovation practices and sustainable business performance: The moderating effect of market turbulence in the Malaysian technology industry. *Journal of Cleaner Production*, 283, 124556. <https://doi.org/10.1016/j.jclepro.2020.124556>
- Chardine-Baumann, E., & Botta-Genoulaz, V. (2014). A framework for sustainable performance assessment of supply chain management practices. *Computers and Industrial Engineering*, 76(1), 138-147. <https://doi.org/10.1016/j.cie.2014.07.029>

- Cheng, C. C. J., Yang, C. L., & Sheu, C. (2014). The link between eco-innovation and business performance: A Taiwanese industry context. *Journal of Cleaner Production*, 64, 81–90.
<https://doi.org/10.1016/j.jclepro.2013.09.050>
- Cheng, C. C., & Shiu, E. C. (2012). Validation of a proposed instrument for measuring eco-innovation: An implementation perspective. *Technovation*, 32(6), 329–344. <https://doi.org/10.1016/j.technovation.2012.02.001>
- De, D., Chowdhury, S., Dey, P. K., & Ghosh, S. K. (2020). Impact of Lean and Sustainability Oriented Innovation on Sustainability Performance of Small and Medium Sized Enterprises: A Data Envelopment Analysis-based framework. *International Journal of Production Economics*, 219(June 2018), 416–430.
<https://doi.org/10.1016/j.ijpe.2018.07.003>
- Della Corte, V., Amin, M., Sepe, F., Luongo, S., & Cobanoglu, C. (2025). Exploring the impact of environmental management on sustainable concerns in restaurants. *British Food Journal*, 127(6), 2147-2168.
- Dogaru, L. (2020). Eco-innovation and the contribution of companies to the sustainable development. *Procedia Manufacturing*, 46(2019), 294–298. <https://doi.org/10.1016/j.promfg.2020.03.043>
- Dong, Y., Wang, X., Jin, J., Qiao, Y., & Shi, L. (2014). Effects of eco-innovation typology on its performance: Empirical evidence from Chinese enterprises. *Journal of Engineering and Technology Management - JETM*, 34, 78–98.
<https://doi.org/10.1016/j.jengtecman.2013.11.001>
- 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(December), 483–498. <https://doi.org/10.1016/j.techfore.2017.12.016>
- Eltayeb, T. K., Zailani, S., & Ramayah, T. (2011). Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: Investigating the outcomes. *Resources, Conservation and Recycling*, 55(5), 495–506. <https://doi.org/10.1016/j.resconrec.2010.09.003>
- Farza, K., Ftiti, Z., Hlioui, Z., Louhichi, W., & Omri, A. (2021). Does it pay to go green? The environmental innovation effect on corporate financial performance. *Journal of Environmental Management*, 300(September).
<https://doi.org/10.1016/j.jenvman.2021.113695>
- Fernando, Y., Chiappetta Jabbour, C. J., & 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(July 2018), 8–20.
<https://doi.org/10.1016/j.resconrec.2018.09.031>
- Ganapathy, S. P., Natarajan, J., Gunasekaran, A., & Subramanian, N. (2014). Influence of eco-innovation on Indian manufacturing sector sustainable performance. *International Journal of Sustainable Development and World Ecology*, 21(3), 198–209. <https://doi.org/10.1080/13504509.2014.907832>
- Geng, D., Lai, K. hung, & Zhu, Q. (2021). Eco-innovation and its role for performance improvement among Chinese small and medium-sized manufacturing enterprises. *International Journal of Production Economics*, 231, 107869. <https://doi.org/10.1016/j.ijpe.2020.107869>
- Ghisetti, C., & Rennings, K. (2014). Environmental innovations and profitability: How does it pay to be green? An empirical analysis on the German innovation survey. *Journal of Cleaner Production*, 75, 106–117.
<https://doi.org/10.1016/j.jclepro.2014.03.097>
- Gong, M., Simpson, A., Koh, L., & Tan, K. H. (2018). Inside out: The interrelationships of sustainable performance metrics and its effect on business decision making: Theory and practice. *Resources, Conservation and*

- Recycling, 128, 155–166. <https://doi.org/10.1016/j.resconrec.2016.11.001>
- Hart, S. L. (1995). A Natural Resource View of the Firm. *Academy of Management Review*, 20(4), 986–1014.
 - Hizarci-Payne, A. K., İpek, İ., & Kurt Gümüş, G. (2021). How environmental innovation influences firm performance: A meta-analytic review. *Business Strategy and the Environment*, 30(2), 1174–1190. <https://doi.org/10.1002/bse.2678>
 - <https://climate.nasa.gov/effects/>
 - <https://psa.gov.ph/>
 - <https://www.forbes.com/sites/davidrvetter/2021/03/10/how-much-does-our-food-contribute-to-global-warming-new-research-reveals-all/?sh=447a0ff227d7>
 - <https://www.dti.gov.ph/resources/msme-statistics/>
 - Husgafvel, R., Pajunen, N., Virtanen, K., Paavola, I. L., Päällysaho, M., Inkinen, V., Heiskanen, K., Dahl, O., & Ekroos, A. (2015). Social sustainability performance indicators – experiences from process industry. *International Journal of Sustainable Engineering*, 8(1), 14–25. <https://doi.org/10.1080/19397038.2014.898711>
 - Klewitz, J., & Hansen, E. G. (2013). Sustainability-oriented innovation of SMEs: A systematic review. In *Journal of Cleaner Production* (Vol. 65, pp. 57–75). <https://doi.org/10.1016/j.jclepro.2013.07.017>
 - Küçükoğlu, M. T., & Pınar, R. İ. (2015). Positive Influences of Green Innovation on Company Performance. *Procedia - Social and Behavioral Sciences*, 195, 1232–1237. <https://doi.org/10.1016/j.sbspro.2015.06.261>
 - Larrán Jorge, M., Herrera Madueño, J., Martínez-Martínez, D., & Lechuga Sancho, M. P. (2015). Competitiveness and environmental performance in Spanish small and medium enterprises: is there a direct link? *Journal of Cleaner Production*, 101, 26–37. <https://doi.org/10.1016/j.jclepro.2015.04.016>
 - Li, Y. (2014). Environmental innovation practices and performance: Moderating effect of resource commitment. *Journal of Cleaner Production*, 66, 450–458. <https://doi.org/10.1016/j.jclepro.2013.11.044>
 - Maletič, M., Maletič, D., Dahlgaard, J. J., Dahlgaard-Park, S. M., & Gomišček, B. (2014). The Relationship between Sustainability- Oriented Innovation Practices and Organizational Performance: Empirical Evidence from Slovenian Organizations. *Orga*, 47(1), 3–13. <https://doi.org/10.2478/orga-2014-0001>
 - Maletič, M., Maletič, D., Dahlgaard, J. J., Dahlgaard-Park, S. M., & Gomišček, B. (2016). Effect of sustainability-oriented innovation practices on the overall organisational performance: an empirical examination. *Total Quality Management and Business Excellence*, 27(9–10), 1171–1190. <https://doi.org/10.1080/14783363.2015.1064767>
 - Martínez-Alonso, R., Martínez-Romero, M. J., & Rojo-Ramírez, A. A. (2019). Examining the impact of innovation forms on sustainable economic performance: The influence of family management. *Sustainability (Switzerland)*, 11(21). <https://doi.org/10.3390/su11216132>
 - Muangmee, C., Dacko-Pikiewicz, Z., Meekaewkunchorn, N., Kassakorn, N., & Khalid, B. (2021). Green entrepreneurial orientation and green innovation in small and medium-sized enterprises (Smes). *Social Sciences*, 10(4). <https://doi.org/10.3390/socsci10040136>
 - Nor-Aishah, H., Ahmad, N. H., & Thurasamy, R. (2020). Entrepreneurial leadership and sustainable performance of manufacturing SMEs in Malaysia: The contingent role of entrepreneurial bricolage. *Sustainability (Switzerland)*, 12(3100), 1–21. <https://doi.org/10.3390/SU12083100>
 - OECD. (2005). ORGANISATION FOR ECONOMIC CO-OPERATION. In *Communities: Vol. 3rd Ed.* <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Oslo+manual#0>
 - OECD. (2009). Policy Brief. *Journal of Health and Social Behavior*, 53(4), 395.

- <https://doi.org/10.1177/0022146512469014>
- Pullman, M. E., Maloni, M. J., & Carter, C. R. (2009). Food for thought: Social versus environmental sustainability practices and performance outcomes. *Journal of Supply Chain Management*, 45(4), 38–54. <https://doi.org/10.1111/j.1745-493X.2009.03175.x>
 - Putri, W. H., & Sari, N. Y. (2019). Eco-efficiency and eco-innovation: Strategy to improve sustainable environmental performance. *IOP Conference Series: Earth and Environmental Science*, 245(1), 1–7. <https://doi.org/10.1088/1755-1315/245/1/012049>
 - Rajak, S., & Vinodh, S. (2015). Application of fuzzy logic for social sustainability performance evaluation: A case study of an Indian automotive component manufacturing organization. *Journal of Cleaner Production*, 108, 1184–1192. <https://doi.org/10.1016/j.jclepro.2015.05.070>
 - Rehman, S. U., Kraus, S., Shah, S. A., Khanin, D., & Mahto, R. V. (2021). Analyzing the relationship between green innovation and environmental performance in large manufacturing firms. *Technological Forecasting and Social Change*, 163(xxxx), 120481. <https://doi.org/10.1016/j.techfore.2020.120481>
 - Rennings, K. (2000). Redefining innovation – eco-innovation research and the contribution from ecological economics. *Ecological Economics*, 32, 319–332. <https://doi.org/10.1057/9780230339286>
 - Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment*, 20(4), 222–237. <https://doi.org/10.1002/bse.682>
 - Sezen, B., & Çankaya, S. Y. (2013). Effects of Green Manufacturing and Eco-innovation on Sustainability Performance. *Procedia - Social and Behavioral Sciences*, 99, 154–163. <https://doi.org/10.1016/j.sbspro.2013.10.481>
 - 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 and Social Change*, 150(May 2019), 119762. <https://doi.org/10.1016/j.techfore.2019.119762>
 - Székely, F., & Knirsch, M. (2005). Responsible leadership and corporate social responsibility: Metrics for sustainable performance. *European Management Journal*, 23(6), 628–647. <https://doi.org/10.1016/j.emj.2005.10.009>
 - Tantayanubutr, M., & Panjakajornsak, V. (2017). Impact of green innovation on the sustainable performance of thai food industry. *Business and Economic Horizons*, 13(2), 192–209. <https://doi.org/10.15208/beh.2017.15>
 - Tumelero, C., Sbragia, R., & Evans, S. (2019). Cooperation in R & D and eco-innovations: The role in companies' socioeconomic performance. *Journal of Cleaner Production*, 207(July 2020), 1138–1149. <https://doi.org/10.1016/j.jclepro.2018.09.146>
 - Wayan Edi Arsawan, I., Koval, V., Duginets, G., Kalinin, O., & Korostova, I. (2021). The impact of green innovation on environmental performance of SMEs in an emerging economy. *E3S Web of Conferences*, 255. <https://doi.org/10.1051/e3sconf/202125501012>
 - Weng, H. H. R., Chen, J. S., & Chen, P. C. (2015). Effects of green innovation on environmental and corporate performance: A stakeholder perspective. *Sustainability (Switzerland)*, 7(5), 4997–5026. <https://doi.org/10.3390/su7054997>
 - Yurdakul, M., & Kazan, H. (2020). Effects of eco-innovation on economic and environmental performance: Evidence from Turkey's manufacturing companies. *Sustainability (Switzerland)*, 12(8), 3167. <https://doi.org/10.3390/SU12083167>

- Zandi, G. R., Ghani, E. K., Lestari, R. M. E., & Maimunah, S. (2019). The impact of management accounting systems, eco-innovations and energy efficacy on firm's environmental and economic performance. *International Journal of Energy Economics and Policy*, 9(6), 394-400. <https://doi.org/10.32479/ijeep.8364>