

A Service of



Leibniz-Informationszentrum Wirtschaft Leibniz Information Centre for Economics

Lestari, Kurnia Cahya; Soewarno, Noorlailie

Article

Does green innovation improve firm performance? Testing the moderating effect of CEO tenure

Contemporary Economics

Provided in Cooperation with:

University of Finance and Management, Warsaw

Suggested Citation: Lestari, Kurnia Cahya; Soewarno, Noorlailie (2024) : Does green innovation improve firm performance? Testing the moderating effect of CEO tenure, Contemporary Economics, ISSN 2300-8814, University of Finance and Management in Warsaw, Faculty of Management and Finance, Warsaw, Vol. 18, Iss. 2, pp. 192-209, https://doi.org/10.5709/ce.1897-9254.533

This Version is available at: https://hdl.handle.net/10419/312949

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.



WWW.ECONSTOR.EU

https://creativecommons.org/licenses/by/4.0/

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



Does Green Innovation Improve Firm Performance? Testing the Moderating Effect of CEO Tenure

Kurnia Cahya Lestari^{1,2} o and Noorlailie Soewarno¹

ABSTRACT

Nowadays, green innovation has become a concern because of the global pressure to do business without neglecting environmental sustainability. Thus, this study aims to examine the impact of green innovation (both process and product) on improving firm performance and test whether CEO tenure can affect the relationship between green innovation and firm performance. This study uses panel data from the 2016–2021 period for 108 manufacturing firms in Indonesia, for a total sample of 597 firm-years. This study has executed feasible general least squares (FGLS) to examine the relationship between variables and to control for heteroscedasticity and serial correlation in the research model. In addition, we tested the robustness of the model to confirm the results. The results of the study show that green process innovation (both process and product) has a significant relationship with improving the performance of manufacturing firms in Indonesia. Meanwhile, CEO tenure moderates this relationship by weakening it. This finding suggests that CEO tenure plays an important role in green innovation implementation decisions. This study will be useful for researchers, managers, and policymakers in understanding issues related to the implementation of green innovation in firms.

KEY WORDS: Green innovation, firm performance, CEO tenure, SDGs.

JEL Classification: D20, Q50, O14.

¹Department of Accounting, Faculty of Economics and Business, Universitas Airlangga, Surabaya, Indonesia ²Universitas Qomaruddin, Indonesia

1. Introduction

Recently, firms have been required to consider sustainable development strategies due to public awareness that economic success jeopardizes the availability of resources for future generations (Brulhart et al., 2019; Fu et al., 2020). Therefore, many multinational firms are actively implementing relevant policies that stimulate green innovation to achieve sustainable development, particularly in response to the Sustainable Development Goals (SDGs) (Ogbeibu et al., 2021; van der Waal et al., 2021). Green innovation can help firms save energy (Chen & Chen, 2017; Corrocher & Solito, 2017; Zhang et al., 2017), prevent pollution (Cosimato & Troisi, 2015), recycle waste (Aid et al., 2017; Huang et al., 2019), and reduce other negative impacts of resource use (including energy use) (Albort-Morant et al., 2018; Castellacci & Lie, 2017).

The impact of green innovation on firm performance has been perceived as both positive and negative. On the one hand, green innovation can lead firms towards achieving competitive advantage (Aguilera-Caracuel & Ortiz-de-Mandojana, 2013; Dangelico, 2016; Du et al., 2018), increasing positive performance within the firm (Olson, 2014; Roy & Khastagir, 2016), and improving the economic performance of firms (Burki & Dahlstrom, 2017; Olsen et al., 2014). Green innovation can lower production costs and increase firm value because it allows firms to use resources more productively

Correspondence concerning this article should be addressed to: **Noorlailie Soewarn**, Department of Accounting, Faculty of Economics and Business, Universitas Airlangga, Surabaya, Indonesia. E-mail: noorlailie-s@feb.unair.ac.id

193

(Cainelli et al., 2011; Xie et al., 2019). On the other side, some researchers have countered that green innovation incurs higher costs (de Oliveira et al., 2018). A negative view of implementing green innovation is also expressed by Palmer et al. (1995), who state that firms involved in green innovation become ineffective and experience decreased productivity. Green innovation can also result in higher manufacturing costs and smaller profit margins (Rennings & Rammer, 2011).

In this study, we specifically focus on two types of green innovation: green process innovation and green product innovation. Based on resource-based (RBV) theory, we argue that firms with high levels of green innovation perform better. In particular, we view green innovation as a potentially valuable resource in developing products and processes that are integrated with environmental issues and provide sustainability advantages and superior performance over competitors (Asni & Agustia, 2022). We further examine the impact of CEO tenure combined with green innovation on firm performance. More specifically, we argue that long tenure CEO tend to be conservative towards changes within the firm. Therefore, green innovation will tend to decrease firm performance during a long CEO tenure. In developing our argument, we draw on the upper echelons theory, which states that manager demographic characteristics can influence strategic decisions (Hambrick & Mason, 1984). Tenure is one of the significant demographic characteristics that will affect the CEO ability to make firm strategic decisions (Hambrick & Fukutomi, 1991). Therefore, the CEO tenure can be a supporter or obstacle to applying green innovation to firm performance.

By linking green innovation to firm performance, we contribute in 3 important ways. First, we distinguish the impact of the two types of green innovation by testing green process innovation and green product innovation separately. Although the orientations of green process innovation and green product innovation are different, previous studies have often used green innovation as a single construct in the literature (Aastvedt et al., 2021; Agustia et al., 2019; Soewarno & Tjahjadi, 2020; Aguilera-Caracuel & Ortiz-de-Mandojana, 2013). Second, previous investigations into the impact of green innovation on firm performance have confirmed the inconsistent results. Therefore, we contribute to the literature by exploring the moderating role of CEO tenure in the relationship between green innovation and firm performance. Third, the research location is in Indonesia, one of the developing countries with the largest and fastest economic growth (Lee & Wie, 2015). However, the implementation of pro-environment programs in Indonesia is still lower than in other Asian countries (Mufidah et al., 2018). In addition, research that has been done on green innovation is still predominantly carried out in developed countries (Salim et al., 2019). Therefore, it is hoped that this research will provide a more comprehensive understanding of how Indonesia, as a developing country market, responds to companies' applications of green innovation.

2. Literature Review

2.1. Green Innovation and Firm Performance

RBV conceptualizes the firm as a collection of resources and capabilities that provide a sustainable advantage over competitors and provide superior performance for the firm (Barney et al., 2001; Guesalaga et al., 2018; Khanra et al., 2022). Firms can maintain their competitive advantage when these resources and capabilities are valuable, rare, imperfectly imitated, and cannot be replaced (Barney, 1991). In later iterations, RBV refers to a firm's ability to exploit resources or capabilities that are valuable, rare, and cannot be perfectly imitated (Barney, 1995). The resources a firm needs to achieve a sustainable competitive advantage depend on the firm's relationship with the natural environment (Hart, 1995) and social welfare (Tate & Bals, 2018).

Green innovation is a firm resource that can provide a competitive advantage. This refers to the innovation process of facilitating environmental impact, enabling firms to achieve environmental targets, and improving their corporate image, which in turn helps improve firm performance (Muangmee et al., 2021; Lee & Kim, 2011). Green innovation has become a relevant concept for management because it combines economic efficiency associated with saving resources and energy to increase innovation-based competitiveness with a focus on environmental performance resulting from "greening" innovation practices (Kallio & Nordberg, 2006; Szutowski, 2021). More specifically, green innovation contributes to economic performance by reducing costs, increasing returns on investment, and increasing profitability, income, and productivity (Sezen & Çankaya, 2013). In addition, green innovation has proven successful in increasing market position, attracting customers, providing green services, and gaining a competitive advantage (Takalo et al., 2021; Cai & Zhou, 2014; Li, 2014). Therefore, using the RBV perspective will provide the right theoretical basis for discussing the contribution of resources to building green innovation to achieve competitive advantage.

According to Tseng et al. (2013), green innovation can be divided into two general typologies: green process innovation and green product innovation. Green process innovation is related to improvements or new methods in production implementation (Buttol et al., 2012; Sezen & Çankaya, 2013), the use of cleaner production technologies (Klewitz & Hansen, 2013), including more efficient processes to reduce CO2 emissions (Brasil et al., 2016), reduction of energy and resource costs, and compliance with environmental regulations (Demirel & Kesidou, 2012). Firms involved in this technology can enjoy performance returns from the green process innovation (Seman et al., 2019). In essence, green process innovation has the potential to drive operational efficiency, cost reduction, and environmental performance (Hellström, 2007; Hizarci-Payne et al., 2021).

Meanwhile, green product innovation includes improvements that consider environmental and technological characteristics of products or services to minimize their impact on the environment (Brasil et al., 2016; Hansen et al., 2009; Klewitz & Hansen, 2013). Green product innovation aims to formulate product solutions with less waste or products containing renewable energy systems (De Souza et al., 2018; Roscoe et al., 2015). Green product innovation can be a source of competitive advantage by contributing to a firm's image or reputation in the market and ultimately by leading to an increase in product positioning (Chen, 2008; Chen et al., 2006). In particular, apart from public benefits, the customer benefits associated with green products have been considered a significant driver of environmental product innovation, resulting in greater market demand (Kammerer, 2009). Overall, by engaging in product environmental innovation, firms can meet accelerating consumer demand, improve their market position, and improve overall firm performance (Lin et al., 2013; Ling, 2019; Zhou et al., 2009). In line with the statement above, the hypothesis is as follows:

H1a: The greater the green process innovation, the greater the firm performance.

H1b: The greater the green product innovation, the greater the firm performance.

2.2. Moderating Effect of CEO Tenure

We use upper echelons theory based on the assumption that the demographic characteristics of managers can influence strategic decisions (Hambrick & Mason, 1984). The demographic background of managers, such as age, education, and tenure, reflects an orientation to the level of risk and investment with different horizons (Herrmann & Datta, 2002). It is based on psychological abilities such as values, cognition, knowledge, and managerial skills (Hambrick & Mason, 1984; Jaw & Lin, 2009). Different managers will have different or even conflicting goals, including differences in the decision-making process and problem identification (Dutton & Duncan, 1987), information search and processing (Cyert & March, 1963), and specifying alternatives in selecting actions (Herrmann & Datta, 2002). Thus, the firm's strategic choice reflects the privileges possessed by the manager.

Tenure is one of the important demographic characteristics that will influence the CEO decisions-making (Hambrick & Fukutomi, 1991). Furthermore, Hambrick & Fukutomi (1991) suggest cues that CEO with long tenure will shy away from information, lose interest in their work, and ignore calls for strategic change. Thus, while CEO with long tenure may expand and refine their risk-taking behavior, they will become overly committed to their own paradigm and prior gains (Simsek, 2007). CEO with long tenure will be risk-averse, whereas newcomer CEO can bring new perspectives to the organization and quickly jump onboard with necessary changes (Bendell & Nesij Huvaj, 2020). Therefore, we attempt to use an upper echelons theoretical perspective to confirm the moderating effect of CEO tenure on the relationship between green innovation and firm performance.

The success of implementing green process innovation and green product innovation as strategic resources must be able to overcome institutional innovations such as changes in values, beliefs, knowledge, norms, management, law, and governance systems, which reduce environmental impacts (Arundel & Kemp, 2009; Hizarci-Payne et al., 2021). Thus, green innovation can be understood as a process of systemic technological and social change requiring support from top management (Awan & Sroufe, 2021; Forcadell et al., 2021). In this regard, CEO tenure will play an important role in the influence of green process innovation and green product innovation on firm performance, where CEO tenure will act as an obstacle to green process innovation and green product innovation, which in turn can reduce firm performance. Barker & Mueller (2002) and Miller (1991) show that, for their self-satisfaction, long-serving CEO tend to resist change and avoid risk. CEO with long tenure will follow a lower innovation strategy because they may have greater difficulty accepting new ideas, thereby reducing their propensity to engage in innovative projects (Hambrick & Mason, 1984). This is corroborated by the findings from Naveen (2006) that R&D spending decreases as CEO tenure increases. CEO with long tenures will oversee failed corporate social and environmental behavior initiatives, thereby limiting the adoption of social and environmental innovations in their firms(Bendell & Nesij Huvaj, 2020).

Table 1

Operational Variables

Variable	Definition	Authors
TobinsQ	MVE + PS + DEBT	Agustia et al., 2019; Asni & Agustia,
	TA	2021; Yao et al., 2019
GI_Proc	total disclosure items	Asni & Agustia, 2021; Xie et al., 201)
	8	
GI_Prod	total disclosure items	Asni & Agustia, 2021; Xie et al., 2019
	8	
CEO tenure	the total years of the individual serving as the CEO in the firm	Le & Kroll, 2017
Controls		
Firm_Size	the natural logarithm of the number of firm employees.	Asni & Agustia, 2021
Firm_Age	the total year since the firm is established	Asni & Agustia, 2021; Xie et al., 2019
Financial_Constraint	asset-liability ratio	Xie et al., 2019
Asset_Turnover	ratio of main business income to total assets	Xie et al., 2019
CEO_Age	age of the CEO	Peni, 2014
Board_Size	the total directors influencing the initiation of the corporate gover-	Biswas et al., 2018
	nance for the firm performance	
Board_Gender	the ratio of the total number of female board members to the total	Peni, 2014
	number of directors	
Board_Independent	The ratio of the number of independent board members to the num-	Biswas et al., 2018
	ber of directors on theboard	
Foreign_Ownership	"0" if the firm has foreign ownership status and "1" if the firm has do-	Asni & Agustia, 2021
	mestic ownership status	

Otherwise, early-career CEO are more likely to have a long-term outlook and make investments that will pay off over a longer period of time (Li & Yang, 2019). They tend to make bold changes in strategy and activities to prove their worth and gain recognition from shareholders (Miller & Shamsie, 2001; Weng & Lin, 2014). Since the CEO is directly involved in corporate decision-making, tenure represents an important characteristic of the CEO having a moderating role in the relationship innovation and corporate between green performance. This is consistent with the finding that CEO make fewer changes in strategy as their tenure increases (Bendell & Nesij Huvaj, 2020; Grimm & Smith, 1991). CEO tenure will negatively moderate the influence of green innovation on firm performance. Expressed as a formal hypothesis:

H2a: The longer the CEO tenure, the weaker the effect of green process innovation on firm performance.

H2b: The longer the CEO tenure, the weaker the effect of green product innovation on firm performance.

3. Results and Discussion

3.1. Descriptive Statistics

The preparation of information pertaining to the study's variables serves as the first step in the data analysis procedure. Descriptive information between the variables is shown in table 2. In table 2, we note that the research data are 597 firm years, covering 108 publicly traded manufacturing firms in Indonesia for the period from 2015 to 2021, an unbalanced data panel. The minimum values for GI Proc and GI Prod are 0, indicating that some firms do not disclose information about their innovative endeavors in relation to both process and product. On the other hand, the maximum values for GI_Proc and GI_Prod are 1, indicating that the firms offer information regarding the process and product innovations made to prevent pollution, from the use of sustainable materials to the packaging of environment-friendly products. The mean value of CEO_Tenure is 13.05 shows that the average tenure of CEO in the manufacturing industry in Indonesia is approximately 13 years, with the lowest tenure being 1 year and the highest reaching 49 years. In accordance to the firm performance

Table 2

Descriptive Statistic.

Variable	Ν	min	max	Mean	Std. Dev.	Median
TobinsQ	597	.016	22.559	1.094	1.993	.532
GI Prod	597	0	1	.219	.302	.125
GI Proc	597	0	1	.479	.275	.5
CEO Tenure	597	1	49	13.05	11.291	8.5
Firm Size	597	3.836	7.411	5.467	.681	5.384
Firm Age	597	.778	2.033	1.593	.185	1.633
Financial Constraint	597	2.582	7.306	4.576	.775	4.48
Asset Turnover	597	.054	4.018	.903	.499	.792
CEO Age	597	1.505	1.914	1.745	.077	1.748
Board Size	597	.477	1.362	.966	.15	.954
Board Independent	597	0	.583	.261	.098	.25
Board Gender	597	0	7.652	1.145	1.235	1
Foreign Ownership	597	0	1	.452	.498	0

Variables	(1)	(2)	(3)	(4)	(5)	(6)
TobinsO	1.000					
GI Prod	0.180***	1.000				
GI_Proc	0.243***	-0.035	1.000			
CEO_Tenure	-0.112***	-0.103**	-0.022	1.000		
Firm_Size	0.171***	0.296***	-0.138***	-0.110***	1.000	
Firm_Age	0.155***	0.125***	0.061	0.042	0.227***	1.000
Financial_Cons~t	0.183***	-0.007	-0.022	-0.002	0.344***	0.519***
Asset_Turnover	0.259***	-0.052	0.707***	0.008	-0.185***	0.025
CEO_Age	-0.147***	-0.031	0.035	0.447***	-0.044	0.002
Board_Size	0.160***	0.219***	-0.060	-0.140***	0.641***	0.155***
Board_Indepen~t	0.140***	0.055	0.215***	-0.018	-0.054	-0.028
Board_Gender	0.208***	0.096**	0.148***	0.110***	-0.018	0.166***
Foreign_Owner~p	0.190***	0.186***	0.001	-0.166***	0.488***	0.123***
Variables	(7)	(8)	(9)	(10)	(11)	(12)
TobinsQ						
GI_Prod						
GI_Proc						
CEO_Tenure						
Firm_Size						
Firm_Age						
Financial_Cons~t	1.000					
Asset_Turnover	0.011	1.000				
CEO_Age	-0.098**	0.010	1.000			
Board_Size	0.204***	-0.039	-0.003	1.000		
D 1 I 1						
Board_Indepen~t	0.012	0.184***	-0.096**	-0.103**	1.000	
Board_Indepen~t Board_Gender	0.012 0.148***	0.184*** 0.134***	-0.096** 0.030	-0.103** 0.104**	1.000 0.132***	1.000

Pairwise Correlations

Note: *** p<0.01, ** p<0.05, * p<0.1

(TobinsQ), the scale lies from 0.016 to 22.559 and contains 1.094 mean value with a standard deviation of 1.993. This indicates that there has been TobinsQ variation in 597 companies. Therefore, the FGLS method is considerably more efficient estimating the developed model parameter to meet the requirements of heteroscedasticity. The mean values for control variables, such as Firm_Size, Firm_Age, Financial_Constraint, Asset_Turnover, CEO_Age, Board_Size, Board_Independent, Board_Gender, Foreign_Ownership are 5.467, 1.593, 4.576, 0.903, 1.745, 0.966, 0.261, 1.145, 0.452.

The study uses the pairwise correlations in table 3 to illustrate the relationship between the independent and dependent variables. Hence, it has been proven that the variables of GI_Proc and GI_Prod positively and significantly contribute to the firm performance. However, CEO_tenure significant negative to firm performance. The results for control variables indicate positive on Firm_Size, Firm_Age, Financial_Constraint, Asset_Turnover, Board_Size, Board_Independent, Board_Gender, Foreign Ownership, whereas significant negative on CEO_Age.

3.2. Empirical Evidence

This study uses the STATA program application to confirm the hypothesis. The results of the diagnostic checks revealed a mean VIF <10, so no multicollinearity. However, the test results show that there is heteroskedasticity where the variance is not constant, and the test results also conclude that the data has first-order autocorrelation. Due to issues with heteroscedasticity and autocorrelation during model testing, we used FGLS regression to address the issues. The first FGLS regression model showing the relationship between green innovation and firm performance is presented in table 4. The results show that green innovation has a positive impact on TobinsQ whether tested in a separate model (GI_Proc: $\beta = 0.729$, $\rho < 0.10$, GI_Prod: $\beta = 0.805$, $\rho < 0.01$) or in one model (GI_Proc: $\beta = 0.763$, $\rho < 0.05$, GI_Prod: $\beta = 0.820$, $\rho < 0.01$). The results support H1a and H1b. These findings indicate that the manufacturing industry are implementing green innovation (process and product) that will improve firm performance. This result is in line with RBV view that green innovation is a unique resource that focuses on improving the environment and creating better firm performance.

3.3. Robustness Analyses

We conducted several robustness tests to test the

Table 4

Variables	(1)	(2)	(3)
	TobinsQ	TobinsQ	TobinsQ
GI_Proc	0.729*		0.763**
	(1.906)		(2.011)
GI_Prod		0.805***	0.820***
		(3.073)	(3.140)
Firm_Size	0.361**	0.268*	0.257
	(2.274)	(1.661)	(1.594)
Firm_Age	0.454	0.349	0.259
	(0.966)	(0.743)	(0.551)
Financial_Constraint	0.169	0.216*	0.238**
	(1.440)	(1.828)	(2.012)
Asset_Turnover	0.723***	1.011***	0.722***
	(3.416)	(6.583)	(3.437)
CEO_Age	-3.611***	-3.411***	-3.486***
	(-3.722)	(-3.533)	(-3.620)
Board_Size	0.124	-0.028	0.044
	(0.183)	(-0.042)	(0.066)
Board_Independent	1.139	1.140	0.959
	(1.450)	(1.464)	(1.228)
Board_Gender	0.250***	0.237***	0.228***
	(3.993)	(3.796)	(3.657)
Foreign_Ownership	0.467***	0.456***	0.449***
	(2.666)	(2.617)	(2.582)
Intercept	2.007	2.199	2.317
	(1.025)	(1.127)	(1.192)
Wald chi2	144.52	151.69	156.76
Ν	597	597	597
Prob > chi2	0.000	0.000	0.000

Regression Results of Direct Effects

Note: t statistics in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Regression Results of Direct Effects Using an Alternative Proxy for Dependent Variable

Variables	(1)	(2)	(3)
	ROA	ROA	ROA
GI Proc	6.159***		6.356***
-	(3.135)		(3.342)
GI Prod		8.420***	8.492***
_		(6.272)	(6.380)
Firm_Size	3.898***	2.415***	2.322***
	(4.773)	(2.893)	(2.804)
Firm_Age	-3.115	-3.746	-4.475*
0	(-1.289)	(-1.588)	(-1.906)
Financial_Constraint	-1.391**	-0.593	-0.412
	(-2.312)	(-0.980)	(-0.684)
Asset_Turnover	4.062***	5.617***	3.200***
	(3.734)	(7.168)	(3.015)
CEO_Age	-6.974	-4.243	-4.866
	(-1.399)	(-0.871)	(-1.006)
Board_Size	-0.567	0.836	1.471
	(-0.162)	(0.244)	(0.433)
Board_Independent	8.077**	7.418*	5.920
	(2.002)	(1.889)	(1.511)
Board_Gender	1.135***	0.809**	0.735**
	(3.534)	(2.534)	(2.317)
Foreign_Ownership	1.254	0.948	0.885
	(1.394)	(1.077)	(1.015)
GI_Prod		8.420***	8.492***
		(6.272)	(6.380)
Intercept	-4.232	-5.519	-4.581
	(-0.421)	(-0.562)	(-0.470)
Adj.R2	0.19	0.23	0.24
Ν	597	597	597
F-stat	14.933	18.576	18.196

Note: t statistics in parentheses; * p<0.10, ** p<0.05, *** p<0.01

consistency of the previous test results. First, we use return on assets (ROA) as an alternative proxy for the dependent variable as in previous studies (Xie et al., 2019). ROA is obtained from earnings before interest and tax divided by total sales (Xie et al., 2019). The results presented in Table 5 are consistent with the findings reported in Table 4. These findings provide additional support for H1a and H1b which show the positive relationship between green innovation and firm performance is weakened by longer CEO tenure.

Second, as in previous research we deal with endo-

geneity issues in the independent and dependent variables that can affect the results (Yousaf et al., 2022). We use lag values for green process innovation and green product innovation variables. The results reported in table 6 by testing the lag of green process innovation and green product against TobinsQ are still the same as the previous test which confirms that green innovation is positive and significant to firm performance.

Finally, we also carried out Heckman's two-stage regression to retest the results previously presented to see if there is any possibility of self-selection bias. We

Regression Results of Direct Effects Using an Alternative Proxy for Dependent Variable

Variables	(1)	(2)	(3)
	TobinsQ	TobinsQ	TobinsQ
L_GI_Proc	0.909**		1.004**
	(2.313)		(2.569)
L_GI_Prod		0.840***	0.901***
		(2.825)	(3.039)
Firm_Size	0.366**	0.282	0.261
	(2.104)	(1.594)	(1.487)
Firm_Age	0.654	0.598	0.456
	(1.245)	(1.139)	(0.868)
Financial_Constraint	0.154	0.184	0.221*
	(1.199)	(1.420)	(1.705)
Asset_Turnover	0.680***	0.986***	0.654***
	(3.132)	(5.701)	(3.038)
CEO_Age	-3.589***	-3.318***	-3.275***
	(-3.368)	(-3.108)	(-3.085)
Board_Size	0.249	0.090	0.190
	(0.324)	(0.118)	(0.250)
Board_Independent	1.143	1.247	0.963
	(1.306)	(1.437)	(1.107)
Board_Gender	0.229***	0.219***	0.204***
	(3.305)	(3.157)	(2.944)
Foreign_Ownership	0.392**	0.369*	0.355*
	(2.013)	(1.898)	(1.834)
Intercept	1.566	1.642	1.540
	(0.730)	(0.767)	(0.724)
Adj.R2	0.18	0.19	0.20
Ν	480	480	480
F-stat	11.763	12.088	11.721
Ν	597	597	597
F-stat	14.933	18.576	18.196

Note: t statistics in parentheses; * p<0.10, ** p<0.05, *** p<0.01

use the instrument variable GI MEAN innovation as a determinant of green innovation in the first probit regression. GI_Mean is calculated from the average level of green innovation of other enterprises in the same industry and in the same year. The reason is that the GI_Mean can have an impact on the green innovation level of a listed firm but will not directly affect the firm performance (Dai & Xue, 2022). Parameter estimation from the first regression is used to calculate the inverse Mills ratio (MILLS), and this MILLS value will be included in the second stage of the regression model. Based on the results presented in table 7 the results confirm the previous test results.

3.3. Moderating Effects

In table 8 we present the estimation results for the moderation equation which show the interaction between the CEO_tenure variable and TobinsQ is negative and significant. In Model 1 we tested the interaction between GI_Proc and CEO_Tenure variables on TobinsQ showing a coefficient value of 0.080 with a negative and significant sign. As in model 2, we tested

Heckman Selection Model Results

Variables	(1)	(2)	_
	GI	TobinsQ	
GI_Mean	3.154***		
	(2.624)		
GI		0.690**	
		(2.139)	
Firm_Size	0.160	0.289*	
	(1.138)	(1.752)	
Firm_Age	0.163	0.432	
	(0.417)	(0.909)	
Financial_Constraint	-0.196*	0.205*	
	(-1.959)	(1.703)	
Asset_Turnover	-0.109	1.026***	
	(-0.844)	(6.572)	
CEO_Age	0.235	-3.452***	
	(0.284)	(-3.526)	
Board_Size	2.289***	-0.092	
	(3.700)	(-0.133)	
Board_Independent	1.611**	1.127	
	(2.481)	(1.424)	
Board_Gender	0.030	0.249***	
	(0.541)	(3.946)	
Foreign_Ownership	-0.054	0.450**	
	(-0.353)	(2.542)	
MILLS		-0.206	
		(-1.579)	
Intercept	-3.207*	2.063	
	(-1.885)	(1.044)	
Adj.R2		0.18	
Ν	597	597	
F-stat		13.031	

Note: t statistics in parentheses; * p<0.10, ** p<0.05, *** p<0.01

the interaction between GI_Prod and CEO_Tenure variables on TobinsQ showing a coefficient value of 0.078 with a negative and significant sign. Consistent with these results, we retest GI_proc and GI_Prod in one model and show a negative and significant relationship with coefficient values of 0.067 and 0.074, respectively. These results confirm H2a and H2b indicating that the longer the CEO tenure, the weaker the effect of green innovation on increasing firm performance. The same results are shown in table 9 after we

replaced tobinsQ with ROA as an alternative measurement of the dependent variable.

4. Conclusions

This study aims to examine the effect of green innovation which is divided into two types, namely green process innovation and green product innovation on firm performance and the moderating effect of CEO tenure in the context of developing countries. Using a sample of Indonesian manufac-

The Moderating Effects

Variables	(1)	(2)	(3)
	TobinsQ	TobinsQ	TobinsQ
GI_Proc	1.636***		1.747***
	(3.463)		(3.738)
GI_Prod		1.727***	1.708***
		(4.300)	(4.241)
CEO_Tenure	0.029**	0.006	0.040***
	(2.195)	(0.704)	(2.989)
GI_ProcxTenure	-0.080***		-0.074***
	(-3.339)		(-3.017)
GI_ProdxTenure		-0.078***	-0.067***
		(-3.075)	(-2.584)
Firm_Size	0.385**	0.238	0.236
	(2.447)	(1.483)	(1.482)
Firm_Age	0.631	0.294	0.321
	(1.348)	(0.629)	(0.689)
Financial_Constraint	0.123	0.207*	0.196*
	(1.055)	(1.769)	(1.675)
Asset_Turnover	0.759***	1.065***	0.749***
	(3.613)	(6.944)	(3.623)
CEO_Age	-3.358***	-3.112***	-3.504***
	(-3.099)	(-2.892)	(-3.282)
Board_Size	0.251	0.041	0.300
	(0.369)	(0.060)	(0.447)
Board_Independent	1.383*	1.233	1.205
	(1.772)	(1.597)	(1.564)
Board_Gender	0.250***	0.225***	0.207***
	(4.009)	(3.590)	(3.333)
Foreign_Ownership	0.415**	0.422**	0.390**
	(2.374)	(2.426)	(2.264)
Intercept	0.846	1.773	1.717
	(0.406)	(0.852)	(0.833)
Wald chi2	159.69	164.72	183.85
Ν	597	597	597
F-stat	0.000	0.000	0.000

Note: t statistics in parentheses; * p<0.10, ** p<0.05, *** p<0.01

turing firms for the 2016-2020 period, this paper provides evidence of the positive effects of green process innovation and green product innovation on firm performance. Referring to the RBV theory, green process innovation and green product innovation are valuable and unique resources that can build a sustainable competitive advantage and have a positive impact on economic growth. More specifically, we find that the impact of green product innovation is greater than that of green process innovation in driving firm performance. This can be explained by the fact that green product innovation helps firms explore new market areas, increase their market share, and increase their sales revenue.

The Moderating Effects

Variables	(1)	(2)	(3)
	ROA	ROA	ROA
GI_Proc	11.159***		13.251***
	(4.591)		(9.128)
GI_Prod		13.044***	11.246***
		(8.833)	(4.932)
CEO_Tenure	0.227***	0.109***	0.267***
	(3.313)	(2.836)	(4.159)
GI_ProcxTenure	-0.416***		-0.577***
	(-3.357)		(-6.213)
GI_ProdxTenure		-0.603***	-0.326***
		(-6.566)	(-2.740)
Firm_Size	3.981***	2.201***	2.115***
	(4.911)	(2.727)	(2.667)
Firm_Age	-2.387	-3.366	-3.672
	(-0.991)	(-1.476)	(-1.626)
Financial_Constraint	-1.662***	-0.762	-0.712
	(-2.763)	(-1.302)	(-1.230)
Asset_Turnover	4.150***	5.527***	2.782***
	(3.842)	(7.297)	(2.729)
CEO_Age	-10.721*	-6.040	-8.486
	(-1.923)	(-1.142)	(-1.627)
Board_Size	0.848	3.797	5.433
	(0.242)	(1.132)	(1.643)
Board_Independent	9.198**	8.429**	7.472**
	(2.290)	(2.219)	(1.986)
Board_Gender	1.067***	0.626**	0.494
	(3.329)	(2.015)	(1.613)
Foreign_Ownership	1.194	0.813	0.642
	(1.328)	(0.949)	(0.762)
Intercept	-2.485	-5.309	-4.491
	(-0.232)	(-0.521)	(-0.448)
Adj.R2	0.20	0.28	0.31
Ν	597	597	597
F-stat	13.674	20.206	19.725

Note: t statistics in parentheses; * p<0.10, ** p<0.05, *** p<0.01

However, both are able to create positive value by helping firms achieve their economic goals.

In addition, the longer CEO tenure exerts a negative moderating effect on the relationship. Referring to the perspective of upper echelons theory, tenure is one of the characteristics of the CEO that can influence the CEO actions in firm policy to implement green innovation. CEO with shorter tenures may be able to access a wider range of information sources, adapt more easily to change, and be more open to innovative competitive strategies. Thus, CEO with short tenure will be effective in increasing the impact of green innovation on firm performance compared to CEO with relatively longer tenure because they tend to rely on the past and are closed to new strategies to improve firm performance.

This study contributes to the previous literature in several ways. Previous studies on the relationship between green innovation and firm performance have found mixed results: some reported a positive relationship, others reported a negative relationship. This investigation is usually associated with the characteristics of the CEO which play an important role in the direction of the firm's strategic decisions. Thus, this study expands the literature by further exploring the characteristics of CEO, namely CEO tenure, which can serve as a moderating variable in revealing why there are conflicting results.

In context, we expand the literature on green innovation by photographing the application of green innovation in developing countries, namely Indonesia. The topic of green innovation has become a hot topic in developed countries while it is rarely discussed in developing countries. The findings of the implementation of green innovation in the context of developed countries will clearly differ from those in developing countries. Cultural, social, political, and economic conditions will result in the implementation of green innovation that differs from one country to another, and environmental regulations in developing countries are considered less strict than those in developed countries. In addition, the process of developing green management for developing countries is complex and dynamic, because their industry must face global competition.

Methodologically, we use feasible generalized least squares to control for heteroscedasticity and serial correlation problems that occur in the model. More over, one of the main contributions of this paper is examining endogeneity problems in several ways, namely: alternative proxies of dependent variables, lag of independent variables, and Heckman selection models.

This study presents an understanding of the relationship between green process innovation, green product innovation, firm performance, and CEO tenure. Understanding how green process innovation and green product innovation are combined with CEO tenure has certain implications for managers, shareholders, and other stakeholders, as well as for policymakers. In this regard, and as a practical implication, it must be emphasized that the positive capital market reaction to manufacturing firms implementing green process innovation and green product innovation indicates that both green process innovation and green product innovation are capable of achieving superior economic performance. Given the results of this study, managers need to continue to develop heterogeneous knowledge and resources, and firms must be able to establish close communication with suppliers, customers, and investors to maintain the sustainability of the development of green process innovation and green product innovation effectively so as to improve firm performance.

Furthermore, considering the moderating effect of CEO tenure, our findings suggest that management should pay attention to the people and procedures that can encourage green process innovation and green product innovation and how they are involved in utilizing knowledge in the process of implementing green process innovation and green product innovation because firms need to use them in implementing related green innovations. Management should pay great attention to the CEO roles in the knowledge acquisition, use, and transference processes on behavior and knowledge because these roles might vary in terms of how well they support green innovation. Thus, management needs to reconsider whether the CEO should be more or less involved in green process innovation and green product innovation processes.

This research also provides valuable implications for policymakers and governments in Indonesia, a developing country. Policymakers and governments need to develop effective guidelines to support firms implementing green innovation. In addition, there is a need to strengthen regulations on financial reporting and sustainable reporting and commit to enhancing the assurance of quality, reliability, integrity, and trust in financial reports and sustainability reports, which are used to see progress and the relevance of sustainable development. 205

More significantly, environmental restrictions can be tightened by policymakers in emerging nations to promote investment in green innovation.

Like other studies, this research is also inseparable from several limitations which we summarize as follows: First, the study only collects 597 firmyear observations of specific manufacturing firms in Indonesia in 2016–2021. The sample size in the study may be categorized as small for testing the proposed hypotheses. The researcher of this study proposes to use a larger scale and a more varied industry type to increase the generalization from the findings of the study.

Secondly, the study only applies two types of green innovation: green process innovation and green product innovation. In the future, the study is expected to cover more dimensions than green innovation, such as green marketing innovation and green organization innovation. Examination of implementation by including another dimension of green innovation will provide useful insights into the practical implications for improving firm performance.

Lastly, the significant findings on the role of moderation in the study have proven that further exploration of other characteristics from the top management in influencing green innovation towards firm performance is required. By implementing green innovation, firms will be involved with internal stakeholders to provide new insights that can be applied as a main indicator in determining the correlation between green innovation and corporate performance or otherwise. Even though the researcher in the study has found a negative result in the CEO tenure, it is potentially possible for the future researcher to obtain the opposite result when reviewing other characteristics of top management. As a result, a beneficial approach to explaining the different top characteristics of management in green innovation and corporate performance, particularly in developing countries, will be produced.

Acknowledgments

The authors thank LPDP-Ministry of the Finance Republic of Indonesia for supporting the research.

References

- Aastvedt, T. M., Behmiri, N. B., & Lu, L. (2021). Does green innovation damage financial performance of oil and gas companies? *Resources Policy*, 73(July), 1–10. https://doi.org/10.1016/j.resourpol.2021.102235
- Aguilera-Caracuel, J., & Ortiz-de-Mandojana, N. (2013). Green Innovation and Financial Performance: An Institutional Approach. Organization and Environment, 26(4), 365–385. https://doi. org/10.1177/1086026613507931
- 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/ijeep.7438
- Aid, G., Eklund, M., Anderberg, S., & Baas, L. (2017). Expanding roles for the Swedish waste management sector in inter-organizational resource management. *Resources, Conservation and Recycling*, 124(April), 85–97. https://doi.org/10.1016/j.resconrec.2017.04.007
- Albort-Morant, G., Leal-Rodríguez, A. L., & De Marchi, V. (2018). Absorptive capacity and relationship learning mechanisms as complementary drivers of green innovation performance. *Journal of Knowledge Management*, 22(2), 432–452. https:// doi.org/10.1108/JKM-07-2017-0310
- Arundel, A., & Kemp, R. (2009). Measuring eco-innovation. Unu - Merit, 20(2), 146–146. http://www. globe-expert.eu/quixplorer/filestorage/Interfocus/3-Economie/34-Places_Financieres/34-SRCN-L-UNU-MERIT/200903/Measuring_ecoa??innovation.pdf
- Asni, N., & Agustia, D. (2022). Does corporate governance induce green innovation? An emerging market evidence. *Corporate Governance (Bingley)*, 22(7), 1375–1389. https://doi.org/10.1108/CG-10-2021-0389
- Awan, U., & Sroufe, R. (2021). Exploring the effect of buyer engagement on green product innovation : Empirical evidence from manufacturers. *Business Strategy and the Environment*, 30(1), 463–477. https://doi.org/10.1002/bse.2631
- Barker, V. L., & Mueller, G. C. (2002). CEO characteristics and firm R&D spending. *Management Science*, 48(6), 782–801. https://doi.org/10.1287/ mnsc.48.6.782.187
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of*

Management, 17(1), 99–120. https://doi. org/10.1177/014920639101700108

- Barney, J. B. (1995). Looking inside for competitive advantage. Academy of Management Perspectives, 9(4), 49–61. https://doi.org/10.5465/ ame.1995.9512032192
- 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/10.1016/S0149-2063(01)00114-3
- Bendell, B. L., & Nesij Huvaj, M. (2020). Does stakeholder engagement through corporate social and environmental behaviors affect innovation? *Journal of Business Research*, *119*(2020), 685–696. https://doi.org/10.1016/j. jbusres.2018.10.028
- Brasil, M. V. de O., Abreu, M. C. S. de, da Silva Filho, J. C. L., & Leocádio, A. L. (2016). Relationship between eco-innovations and the impact on business performance: an empirical survey research on the Brazilian textile industry. *Revista de Admini*stração, 51(3), 276–287. https://doi.org/10.1016/j. rausp.2016.06.003
- Brulhart, F., Gherra, S., & Quelin, B. V. (2019). Do stakeholder orientation and Environmental proactivity impact firm profitability? *Journal of Business Ethics*, 158(1), 25–46. https://doi.org/10.1007/ s10551-017-3732-y
- Burki, U., & Dahlstrom, R. (2017). Mediating effects of green innovations on interfirm cooperation. *Australasian Marketing Journal*, 25(2), 149–156. https://doi.org/10.1016/j.ausmj.2017.05.001
- Buttol, P., Buonamici, R., Naldesi, L., Rinaldi, C., Zamagni, A., & Masoni, P. (2012). Integrating services and tools in an ICT platform to support eco-innovation in SMEs. *Clean Technologies and Environmental Policy*, 14(2), 211–221. https://doi. org/10.1007/s10098-011-0388-7
- Cai, W. G., & Zhou, X. L. (2014). On the drivers of ecoinnovation: Empirical evidence from China. *Journal of Cleaner Production*, 79, 239–248. https:// doi.org/10.1016/j.jclepro.2014.05.035
- Cainelli, G., Mazzanti, M., & Zoboli, R. (2011). Environmental innovations, complementarity and local/global cooperation: Evidence from North-East Italian industry. *International Journal of Technology, Policy and Management*, 11(3–4), 328–368. https://doi.org/10.1504/IJTPM.2011.042090
- Castellacci, F., & Lie, C. M. (2017). A taxonomy of green innovators: Empirical evidence from South Korea. *Journal of Cleaner Production*, 143, 1036–1047. https://doi.org/10.1016/j.jclepro.2016.12.016

- Chen, Y. S. (2008). The driver of green innovation and green image - Green core competence. *Journal* of Business Ethics, 81(3), 531–543. https://doi. org/10.1007/s10551-007-9522-1
- Chen, Y. Shan., Lai, S. Bao., & Wen, C. T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal* of Business Ethics, 67(4), 331–339. https://doi. org/10.1007/s10551-006-9025-5
- Chen, Z., & Chen, G. H. (2017). The influence of green technology cognition in adoption behavior: On the consideration of green innovation policy perception's moderating effect. *Journal of Discrete Mathematical Sciences and Cryptography*, 20(6– 7), 1551–1559. https://doi.org/10.1080/09720529 .2017.1390839
- Corrocher, N., & Solito, I. (2017). How do firms capture value from environmental innovations? An empirical analysis on European SMEs. *Industry* and Innovation, 24(5), 569–585. https://doi.org/1 0.1080/13662716.2017.1302792
- Cosimato, S., & Troisi, O. (2015). Green supply chain management Practices and tools for logistics competitiveness and sustainability. The DHL case study. *The TQM Journal*, 27(2), 256–276.
- Cyert, R., & March, J. (1963). A behavioral theory of the firm. Englewood Cliffs, NJ: Prentice-Hal.
- Dai, D., & Xue, Y. (2022). The Impact of Green Innovation on a Firm's Value from the Perspective of Enterprise Life Cycles. Sustainability (Switzerland), 14(3). https://doi.org/10.3390/su14031226
- Dangelico, R. M. (2016). Green Product Innovation: Where we are and Where we are Going. Business Strategy and the Environment, 25(8), 560–576. https://doi.org/10.1002/bse.1886
- de Oliveira, J. A. S., Basso, L. F. C., Kimura, H., & Sobreiro, V. A. (2018). Innovation and financial performance of companies doing business in Brazil. *International Journal of Innovation Studies*, 2(4), 153–164. https://doi.org/10.1016/j. ijis.2019.03.001
- De Souza, W. J. V., Scur, G., & Hilsdorf, W. D. C. (2018). Ecoinnovation practices in the Brazilian ceramic tile industry: The case of the Santa Gertrudes and Criciúma clusters. *Journal of Cleaner Production*, 199, 1007–1019. https://doi.org/10.1016/j.jclepro.2018.06.098
- Demirel, P., & Kesidou, E. (2012). Stimulating Different Types of Eco-Innovation in the UK: Government Policies and Firm Motivations. SSRN Electronic Journal. https://doi.org/10.2139/ ssrn.1718708

- Du, L., Zhang, Z., & Feng, T. (2018). Linking green customer and supplier integration with green innovation performance: The role of internal integration. *Business Strategy and the Environment*, 27(8), 1583– 1595. https://doi.org/10.1002/bse.2223
- Dutton, J. E., & Duncan, R. B. (1987). The creation of momentum for change through the process of strategic issue diagnosis. *Strategic Management Journal*, 8(3), 279–295. https://doi.org/10.1002/smj.4250080306
- Forcadell, F. J., Úbeda, F., & Aracil, E. (2021). Technological Forecasting & Social Change Effects of environmental corporate social responsibility on innovativeness of. *Technological Forecasting & Social Change*, 162, 120355. https://doi.org/10.1016/j. techfore.2020.120355
- Fu, R., Tang, Y., & Chen, G. (2020). Chief sustainability officers and corporate social (Ir)responsibility. *Strategic Management Journal*, 41(4), 656–680. https:// doi.org/10.1002/smj.3113
- Grimm, C. M., & Smith, K. G. (1991). Research Notes And Communications Management And Organizational Change: A Note On The Railroad Industry. *Strategic Management Journ*, 12(7), 557–562.
- Guesalaga, R., Gabrielsson, M., Rogers, B., Ryals, L., & Marcos Cuevas, J. (2018). Which resources and capabilities underpin strategic key account management? *Industrial Marketing Management*, 75(May), 160–172. https://doi.org/10.1016/j.indmarman.2018.05.006
- Hambrick, D. C., & Fukutomi, G. D. S. (1991). The Seasons of a CEO's Tenure. Academy of Management, 16(4), 719–742.
- Hambrick, D. C., & Mason, P. A. (1984). Upper Echelons: The Organization as a Reflection of Its Top Managers. Academy of Management Review, 9(2), 193–206. https://doi.org/10.5465/amr.1984.4277628
- Hansen, E. G., Grosse-Dunker, F., & Reichwald, R. (2009). Sustainability innovation cube - A framework to evaluate sustainability-oriented innovations. *International Journal of Innovation Management*, 13(4), 683–713. https://doi.org/10.1142/ S1363919609002479
- Hart, S. L. (1995). A Natural-Resource-Based View of the Firm Author (s): Stuart L. Hart Source: The Academy of Management Review, Oct., 1995, Vol. 20 , No. 4 (Oct., 1995), pp. Published by: Academy of Management Stable URL: https://www.jstor.org/ stable/258963. 20(4), 986–1014.
- Hellström, T. (2007). Dimensions of Environmentally Sustainable Innovation : the Structure of Eco-Innovation Concepts. Sustainable Development, 15(3), 148–159.

- Herrmann, P., & Datta, D. K. (2002). CEO Successor Characteristics and the Choice of Foreign Market Entry M An Empirical Study. *Journal Of International Business Studies*, 33(3), 551–569.
- 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
- Huang, Z., Liao, G., & Li, Z. (2019). Loaning scale and government subsidy for promoting green innovation. *Technological Forecasting and Social Change*, 144(April), 148–156. https://doi.org/10.1016/j. techfore.2019.04.023
- Jaw, Y. L., & Lin, W. T. (2009). Corporate elite characteristics and firm's internationalization: CEO-level and TMT-level roles. *International Journal of Human Resource Management*, 20(1), 220–233. https://doi. org/10.1080/09585190802528797
- Kallio, T. J., & Nordberg, P. (2006). The Evolution of organizations and natural environment discourse: Some critical remarks. Organization and Environment, 19(4), 439–457. https://doi. org/10.1177/1086026606294955
- Kammerer, D. (2009). The effects of customer bene fi t and regulation on environmental product innovation . Empirical evidence from appliance manufacturers in Germany ☆. Ecological Economics, 68(8–9), 2285–2295. https://doi.org/10.1016/j.ecolecon.2009.02.016
- Khanra, S., Kaur, P., Joseph, R. P., Malik, A., & Dhir, A. (2022). A resource-based view of green innovation as a strategic firm resource: Present status and future directions. *Business Strategy and the Environment*, 31(4), 1395–1413. https://doi.org/10.1002/bse.2961
- Klewitz, J., & Hansen, E. G. (2013). Sustainability-oriented innovation of SMEs : a systematic review. *Journal of Cleaner Production*. https://doi.org/10.1016/j. jclepro.2013.07.017
- Lee, J. W., & Wie, D. (2015). Technological change, skill demand, and wage inequality: Evidence from Indonesia. World Development, 67, 238–250. https://doi. org/10.1016/j.worlddev.2014.10.020
- Lee, K. H., & Kim, J. W. (2011). Integrating suppliers into green product innovation development: An empirical case study in the semiconductor industry. *Business Strategy and the Environment*, 20(8), 527–538. https://doi.org/10.1002/bse.714
- Li, M., & Yang, J. (2019). Effects of CEO duality and tenure on innovation. *Journal of Strategy and Management*, 12(4), 536–552. https://doi.org/10.1108/ JSMA-04-2019-0049

- 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
- Lin, R. J., Tan, K. H., & Geng, Y. (2013). Market demand, green product innovation, and firm performance: Evidence from Vietnam motorcycle industry. *Journal of Cleaner Production*, 40, 101–107. https://doi. org/10.1016/j.jclepro.2012.01.001
- Ling, Y. H. (2019). Examining green policy and sustainable development from the perspective of differentiation and strategic alignment. *Business Strategy* and the Environment, 28(6), 1096–1106. https://doi. org/10.1002/bse.2304
- Miller, D. (1991). Stale in the saddle: CEO tenure and the match between organization and environment. *Management Science*, 37(1), 34–52. https://doi. org/10.1287/mnsc.37.1.34
- Miller, D., & Shamsie, J. (2001). Learning across the life cycle: Experimentation and performance among the Hollywood studio heads. *Strategic Management Journal*, 22(8), 725–745. https://doi.org/10.1002/ smj.171
- Muangmee, C., Dacko-Pikiewicz, Z., Meekaewkunchorn, N., Kassakorn, N., & Bilal, K. (2021). Green Entrepreneurial Orientation and Green Innovation in. *Social Sciences*, 10(4), 1–15. https://doi. org/10.3390/socsci10040136
- Mufidah, I., Jiang, B. C., Lin, S. C., Chin, J., Rachmaniati, Y. P., & Persada, S. F. (2018). Understanding the consumers' behavior intention in using green ecolabel product through Pro-Environmental Planned Behavior model in developing and developed regions: Lessons learned from Taiwan and Indonesia. *Sustainability (Switzerland)*, 10(5), 1–15. https:// doi.org/10.3390/su10051423
- Naveen, L. (2006). Organizational complexity and succession planning. *Journal of Financial and Quantitative Analysis*, 41(3), 661–683. https://doi. org/10.1017/S002210900000257X
- Ogbeibu, S., Jabbour, C. J. C., Gaskin, J., Senadjki, A., & Hughes, M. (2021). Leveraging STARA competencies and green creativity to boost green organisational innovative evidence: A praxis for sustainable development. *Business Strategy and the Environment*, 30(5), 2421–2440. https://doi.org/10.1002/bse.2754
- Olsen, M. C., Slotegraaf, R. J., & Chandukala, S. R. (2014). Green claims and message frames: How green new products change brand attitude. *Journal of Marketing*, 78(5), 119–137. https://doi. org/10.1509/jm.13.0387
- Olson, E. L. (2014). Green Innovation Value Chain

analysis of PV solar power. Journal of Cleaner Production, 64, 73-80. https://doi.org/10.1016/j.jclepro.2013.07.050

- Palmer, K., Oates, W. E., & Portney, P. R. (1995). Tightening Environmental Standards: The Benefit-Cost or the No-Cost Paradigm? *Journal of Economic Perspective*, 9(4), 119–132. https://doi.org/10.1257/ jep.9.4.119
- Rennings, K., & Rammer, C. (2011). The Impact of Regulation-Driven Environmental Innovation on Innovation Success and Firm Performance The Impact of Regulation-Driven Environmental Innovation on Innovation Success and Firm Performance. *Industry & Innovation*, 18(3), 255–283. https://doi. org/10.1080/13662716.2011.561027
- Roscoe, S., Cousins, P. D., & Lamming, R. C. (2015). Developing eco-innovations : a three-stage typology of supply networks. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2015.06.125
- Roy, M., & Khastagir, D. (2016). Exploring role of green management in enhancing organizational efficiency in petro-chemical industry in India. *Journal of Cleaner Production*, 121, 109–115. https://doi.org/10.1016/j.jclepro.2016.02.039
- Salim, N., Ab Rahman, M. N., & Abd Wahab, D. (2019). A systematic literature review of internal capabilities for enhancing eco-innovation performance of manufacturing firms. *Journal of Cleaner Production*, 209, 1445–1460. https://doi.org/10.1016/j.jclepro.2018.11.105
- Seman, N. A. A., Govindan, K., Mardani, A., Zakuan, N., Saman, M. Z. M., Hooker, R. E., & Ozkul, S. (2019). The mediating effect of green innovation on the relationship between green supply chain management and environmental performance. *Journal of Cleaner Production*, 229, 115–127. https://doi.org/10.1016/j. jclepro.2019.03.211
- 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
- Simsek, Z. (2007). CEO tenure and organizational performance: An intervening model. *Strategic Management Journal*, 28(6), 653–662. https://doi. org/10.1002/smj.599
- Soewarno, N., & Tjahjadi, B. (2020). Mediating effect of strategy on competitive pressure, stakeholder pressure and strategic performance management (SPM): evidence from HEIs in Indonesia. *Benchmarking*, 27(6), 1743–1764. https://doi.org/10.1108/ BIJ-06-2019-0292

- Szutowski, D. (2021). The impact of eco-innovation on the stock returns of technology-based KIBS: role of eco-innovation type and its degree of novelty. Sustainability Accounting, Management and Policy Journal, 12(1), 130–155. https://doi.org/10.1108/SAM-PJ-10-2019-0375
- Takalo, S. K., Tooranloo, H. S., & Parizi, Z. S. (2021). Green innovation: A systematic literature review. *Journal* of Cleaner Production, 279, 122474. https://doi.org/10.1016/j.jclepro.2020.122474
- Tate, W. L., & Bals, L. (2018). Achieving Shared Triple Bottom Line (TBL) Value Creation: Toward a Social Resource-Based View (SRBV) of the Firm. *Journal of Business Ethics*, 152(3), 803–826. https://doi.org/10.1007/ s10551-016-3344-y
- Tseng, M. L., 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
- van der Waal, J. W. H., Thijssens, T., & Maas, K. (2021). The innovative contribution of multinational enterprises to the Sustainable Development Goals. *Journal* of Cleaner Production, 285. https://doi.org/10.1016/j. jclepro.2020.125319
- Weng, D. H., & Lin, Z. (John). (2014). Beyond CEO Tenure: The Effect of CEO Newness on Strategic Changes. *Journal of Management*, 40(7), 2009–2032. https://doi. org/10.1177/0149206312449867
- Xie, X., Huo, J., & Zou, H. (2019). Green process innovation, green product innovation, and corporate financial performance: A content analysis method. *Journal* of Business Research, 101, 697–706. https://doi.org/10.1016/j.jbusres.2019.01.010
- Yousaf, U. Bin, Ullah, I., Wang, M., Junyan, L., & Rehman, A. U. (2022). Does board capital increase firm performance in the Chinese tourism industry? *Corporate Governance (Bingley)*, 22(4), 653–679. https://doi. org/10.1108/CG-04-2021-0165
- Zhang, Q., Zhang, J., & Tang, W. (2017). Coordinating a supply chain with green innovation in a dynamic setting. 4or, 15(2), 133–162. https://doi.org/10.1007/ s10288-016-0327-x
- Zhou, K. Z., Brown, J. R., & Dev, C. S. (2009). Market orientation, competitive advantage, and performance: A demand-based perspective. *Journal of Business Research*, 62(11), 1063–1070. https://doi.org/10.1016/j. jbusres.2008.10.001