

Green innovation strategy and green innovation

Green
innovation
strategy

The roles of green organizational identity and environmental organizational legitimacy

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Abstract

Purpose – The purpose of this paper is to explore whether green innovation strategy has a positive effect on green innovation. Furthermore, this study investigates whether both green organizational identity and environmental organizational legitimacy mediate the relationship between green innovation strategy and green innovation.

Design/methodology/approach – This study is designed as a quantitative research using questionnaires to collect data and employing a variance-based or partial least squares structural equation modeling to test the hypotheses.

Findings – The empirical results show that green innovation strategy positively affects green innovation. This study also demonstrates that green innovation strategy positively affects green innovation indirectly via green organizational identity and environmental organizational legitimacy in manufacturing companies in Indonesia as a developing country. This study suggests that firms should develop green innovation strategy and it must be reflected as green organizational identity to get environmental organizational legitimacy, and then firms will achieve a better green innovation performance.

Research limitations/implications – This study has the following limitations. First, a structural equation modeling is used as an approach to test the hypotheses and this may raise the issue of causality. Second, although examining the antecedents of green innovation, this study does not investigate its consequences. Third, the sample size used in this study is relatively small and limited to companies in the Surabaya Industrial Estate Rungkut, Indonesia. Finally, this study employs a cross-sectional survey and the data obtained are based on the Likert scales that may raise the issue of perception bias of the sampled managers.

Practical implications – The results of this study suggest that managers need to verify the roles of green organizational identity and environmental organizational legitimacy in their companies. In the era of environmentally conscious society, managers need to start with developing a green innovation strategy. However, managers also need to understand that having a strategy is not sufficient enough to directly enhance green innovation performance. Managers need to seek approaches on how to cultivate a strong green organizational identity and use the identity to get environmental organizational legitimacy from the stakeholders.

Social implications – This research model and results provide the empirical evidence of the importance of green innovation and its antecedents, namely, a green innovation strategy, green organizational identity and environmental organizational legitimacy. When manufacturing companies in Indonesia implement this model of managing environmental issues, the society will get more benefits in terms of the reduction of environmental degradation, the availability of more green products and programs, the improvements in resource efficiencies and economic development and the enhancement of the quality of life.

Originality/value – A research framework exploring the mediating roles of green organizational identity and environmental organizational legitimacy on green innovation strategy–green innovation relationship is developed to provide the empirical evidence for the organizational identity theory and the organizational legitimacy theory. This study also provides practical implications for managers who are facing the environmental awareness business environment. If they want to achieve a better green innovation performance, managers should enhance their awareness in managing the antecedents of green innovation performance, namely, green innovation strategy, green organizational identity and environmental organizational legitimacy.

Keywords Green innovation, Green organizational identity, Environmental organizational legitimacy, Green innovation strategy

Paper type Research paper



Introduction

Environmental issues have become a serious problem of the world today; hence, there is a need to give these issues a special attention. These issues have been affecting both economic development and firms' performance (Tseng *et al.*, 2013). Firms around the world are currently under strict environmental pressures. There is a strong trend among government institutions around the world for strengthening the environmental laws and regulations to address degradation. For example, the Chinese Government has changed various laws and policies for environment improvements (Chan, 2005). In Indonesia, environmental protection has been regulated since 2009, which grants autonomy to regional governments to implement regulations. These national and regional regulations are needed by the government to decrease the rate of emissions to 29–41 percent by 2030 to meet the international agreements (Alisjahbana and Busc, 2017).

Strict environmental regulations and pressures also shape a new competitive landscape (Porter and Van der Linde, 1995; Chen *et al.*, 2012). Green consumers are growing significantly. Although some of them are reluctant, they are moving to greener products (Alfonso *et al.*, 2018). Firms also need to consider green competitors in their business strategy (DeBoer *et al.*, 2017). No doubt, post-modern firms are required to successfully deal with and keep innovating on the environmental issues to gain sustainable competitive advantage. Green innovation becomes strategically important from time to time.

Manufacturing firms that operate while disregarding environmental quality were major contributors to environmental damage. Stakeholders require firms to reduce greenhouse gases such as carbon monoxide (CO), carbon dioxide (CO₂) and fly ash as outputs of the manufacturing process and start conducting resource efficiency. Stakeholders also keep pressing firms to implement resource efficiency (Bundgaard *et al.*, 2017). Resource efficiency can be done by implementing the concept of cleaner production (CP), which traditionally means to reduce, reuse, recycle or reformulate. There is a tendency that the CP approach is also used in companies other than manufacturing. Future companies are not only responsible for economic and environmental performance, but also contribute to resolving issues of human rights, ethics and community participation (Hens *et al.*, 2018).

Manufacturing firms need to implement green innovation to reduce the impacts of manufacturing processes on the environment. Green innovation refers to an innovation that puts emphasis on the reduction of waste, pollution prevention and environmental management system implementation (Eiadat *et al.*, 2008). The fundamental strategy of continuous innovation is crucial to overcoming external pressures, such as customers, competitors and regulators (Porter and Van der Linde, 1995). Thus, to satisfy those stakeholders, manufacturing firms need to adopt green innovation (Lin *et al.*, 2014).

Some scholars provided empirical evidence on the external and internal factors affecting green innovation and competitive advantage. Chen *et al.* (2006) found a positive association between green innovation and competitiveness in Taiwan. The external factors affecting green innovation include green suppliers (Chiou *et al.*, 2011), market demand on green products (Lin *et al.*, 2014), and environmental regulations (Ford *et al.*, 2014). Meanwhile, the internal factors include environmental ethics (Chang, 2011), environmental commitment, green human capital and green adaptive ability (Chang, 2014). A further study by Chen *et al.* (2012) on the origins of innovations revealed both internal and external origins. The internal origin consists of environmental leadership, environmental culture and environmental capability, while the external origin comprises of the environmental regulations and the environmentalism of investors and clients. Both can generate reactive green innovation, but only the internal origins can facilitate the proactive green innovation. Albort-Morant *et al.* (2016) conducted a study on the antecedents of green innovation performance in the Spanish automotive components' manufacturing sector and found that learning capabilities mediate dynamic capabilities–green innovation performance relationship. Chang and Chen (2013)

also proved that both environmental commitment and environmental organizational legitimacy mediate organizational identity-green innovation performance relationship in Taiwan. A further study by Song and Yu (2017) in several industries in China provided empirical evidence that green organizational identity and green creativity mediate green innovation strategy-green innovation relationship.

This study continues the works of Chang and Chen (2013) as well as Song and Yu (2017). However, this study has the following differences and uniqueness. First, this study employs both green environmental identity and environmental organizational legitimacy as variables that play an important role in the mechanism of how green innovation strategy stipulates green innovation. Second, following Song and Yu (2017), this study is conducted in the manufacturing companies instead of several industries. Finally, following Chang and Chen (2013) as well as Song and Yu (2017), the future study should be conducted in other countries. Therefore, this study is conducted in Indonesia, a developing country that is very different from Taiwan or China in terms of cultures, regulations, business practices and so on. This study has similarities to those previous studies in terms of exploring and investigating the antecedents of green innovation using the organizational theory and the legitimacy theory.

Previous studies on how green innovation strategy affects green innovation performance were rarely conducted by scholars, and this also becomes the motivation for this study. Therefore, the objective is to empirically test the theory of organizational identity and the theory of organizational legitimacy in the context of environmental issues in a developing country. Specifically, this study focuses on analyzing and testing the mediating roles of green organizational identity and environmental organizational legitimacy on green innovation strategy-green innovation relationship in the setting of the Indonesian manufacturing companies.

Developing a green innovation strategy is the first stage that should be done by a firm that has to pursue the green innovation performance. Following Johnson and Scholes (1993), a strategy refers to the long-term direction and scope to meet the market needs and to fulfill stakeholder expectations. Porter (1996) stated that a strategy rests on unique activities, and therefore, firms must consciously select a set of activities to provide a distinctive combination of value. When firms develop a strategy with the aim to contribute to saving the environment, they develop green innovation strategies. A green innovation strategy builds a firm's environmental responsiveness of pollution prevention, product stewardship and unpolluted technology (Hart, 1997). Green innovation strategy becomes a means of gaining competitive advantages by developing various environmentally friendly programs (Zhu *et al.*, 2008; Chang, 2011; Chen, 2011; DeBoer *et al.*, 2017).

When firms develop a green innovation strategy, the managers and internal stakeholders readily integrate the organizational resources to mitigate the risks of manufacturing processes and output impacts on the environment, and thus, this kind of behavior can strengthen an organizational identity (Song and Yu, 2017). Organizational identity is an overview of how a firm assesses their management and how they want to be seen by stakeholders, internally or externally, consumers and investors. Identity and image are critical organizational perceptions that influence interpretation and action during strategic change (Albert and Whetten, 1985; Gioia and Thomas, 1996; Gioia, 1998). Chen (2011) developed a new construct called green organizational identity as an interpretive structure regarding environmental management and protection constructed by members in order to give meaning to their behaviors. Firms that have green organizational identity will surely perform environmentally friendly innovations in carrying out their operating activities.

Firms that reflect green organizational identity will easily obtain the legitimacy from the green society. Legitimacy involves shared values in the involvement of action in

the society (Parsons, 1960, p. 175). Dowling and Pfeffer (1975) stated that legitimacy is the circumstances in which a firm's value is congruent with the larger social value system. Legitimacy theory explains the relationship between firms and society, and therefore, it is an important framework for analyzing the relationships between companies and their environment. Besides describing relationships between a company and the community, the legitimacy theory is used to explain companies' motivations, strategies, disclosures and responses to particular events or crisis in social and environmental issues (Mousa and Hassan, 2015). Therefore, if a firm's value is in accordance with society's expectations related to environmental issues, then the firm has acquired environmental organizational legitimacy. Furthermore, the legitimacy or the trust from society may drive and contribute to keep innovating in eco-friendly products or programs. To date, green innovation pioneers have the benefits of first-mover advantages and enjoy the better performance by demanding higher prices of their eco-products, enhancing their corporate image and expanding into new markets (Peattie, 2001; Chen *et al.*, 2006; Lin *et al.*, 2014).

This study contributes to a better understanding of the mechanism of how green innovation strategy affects green innovation using green organizational identity and environmental organizational legitimacy. In addition to using the organizational identity theory, this study also applies the organizational legitimacy theory. The reasons why firms are motivated and why they respond to environmental issues are also assessed in this study. It implies that managers need to understand that they can enjoy a better green innovation performance by effectively formulating and executing green innovation strategy, creating green organizational identity and obtaining legitimacy from society.

The rest of the paper is organized as follows. The next section will explain the literature review and hypotheses development which then will be followed by the research methodology and measurements. Analysis, results, and discussion will be presented in the further section. Finally, the last section describes the conclusions, limitations and suggestions for future research.

Literature review and hypotheses development

Like other developing countries, Indonesia still faces massive environmental challenges. For example, forest degradation in Indonesia, the third largest area of tropical forest after Brazil and Congo, has contributed to global as well as local environmental issues for years. Longstanding debates have also been held between protection for environmental sustainability and the production of valuable commodities (McCarthy and Kathryn, 2016). For decades, Indonesia has surpassed Brazil as a tropical country with the highest levels of deforestation (Margono *et al.*, 2014). Environmental damage can be a threat to living organisms and ecosystems when there is no concern toward the environment and natural resources (Fransson and Garling, 1999). The impact of drastic climate change has created an awareness in governments, firms and civil societies around the world regarding the importance of preserving the environment (Chan, 2005; Foley and Olabi, 2017; Campiglio *et al.*, 2018).

Environmental concerns will automatically change the society's viewpoints toward activities that could damage the ecosystems in the long run. Therefore, firms need to develop strategies in order to execute innovations so they can minimize the negative effects of their operating activities on the environment. Green innovations refer to various innovations that allow the reduction of adverse impacts on the environment so as to provide a great opportunity for firms to achieve the environmental performance targets and benefits (Wong *et al.*, 2013; Lin *et al.*, 2014).

A strategy refers to the direction and scope of an organization over the long term to meet the needs of markets and to fulfill stakeholder expectations (Johnson and Scholes, 1993). Meanwhile, green innovation refers to an innovation that puts emphasis on the reduction

of waste, pollution prevention and environmental management system implementation (Eiadat *et al.*, 2008). Thus, a green innovation strategy is a type of strategy that a firm has carried out in order to implement green innovation so that they achieve competitive advantage, meet the needs of markets and fulfill stakeholders' expectations. Song and Yu (2017) stated that firms should develop green innovation strategy to stimulate green innovation. Based on the previous justification, the following first hypothesis is proposed:

H1. Green innovation strategy positively affects green innovation.

Green innovation is an important means of a firm in winning the competition in an era of environmental concern. Many factors have been identified by scholars as the drivers of green innovations. Most recent studies revealing the drivers of green innovations include societal expectations (Lee *et al.*, 2016), resources and capabilities (Leonidou *et al.*, 2017), export intensity, women leaders, absorptive capacity (Galbreath, 2017), and executive compensation (Francoeur *et al.*, 2017).

Firms need strategies to deal with environmental issues, to win the markets with environmentally friendly products and to continue in business for the foreseeable future, and therefore, the green innovation strategy is considered as the most crucial strategy in the era of environmental awareness. Some scholars have also focused their studies on how firms develop and execute environmental strategies, innovate and produce green products in order to gain a better performance and improved competitive advantage (Sharma *et al.*, 1999; Chen *et al.*, 2012; Song and Yu, 2017). As stated by Porter (1996), the essence of strategy is choosing to perform activities differently than rivals do and the core of the strategy is cross-functional or cross-activity integration. When a firm develops a strategy with the aim to save the environment, it needs to formulate and implement a green innovation strategy. Green innovation strategy forms a firm's environmental awareness of pollution prevention, product stewardship and clean technology (Hart, 1997). A green innovation strategy will drive firms' top, middle, lower management and internal stakeholders to integrate the organizational resources and direct employees' behavior to mitigate the risks of the bad impacts of manufacturing processes and outputs on the environment. Thus, this kind of behavior will strengthen the organizational identity (Song and Yu, 2017).

If a firm has a strong environmental commitment, the management will not ignore the negative impact of the firm's operating activities on the environment. This type of environmental concern is a part of the organizational identity (Sharma *et al.*, 1999), which recently has been named as the green organizational identity (Chen, 2011). Therefore, the following second hypothesis is proposed:

H2. Green innovation strategy positively affects green organizational identity.

Organizational identity refers to a set of statements that organization members perceive to be central, distinctive and enduring to their organization (Albert and Whetten, 1985). In other words, organizational identity is an overview of how a firm assesses their management and how they want to be seen by stakeholders, internally or externally, consumers and investors. Chen developed a new concept called the green organizational identity referring to an interpretive scheme about environmental management and protection that members collectively construct in order to provide meaning to their behaviors (Chen, 2011).

Firms around the world have been forced to innovate and develop green products in dealing with the increasing environmental concerns and issues from stakeholders (Green *et al.*, 2012; Tseng *et al.*, 2013; Lin *et al.*, 2014). Firms that have green organizational identity will surely create environmentally friendly innovations in carrying out their operating activities, such as implementing an environmental management system and using

energy-saving hardware or software that can reduce pollution and waste generated from firms' operating activities.

Moreover, firms with environmental concern acknowledge the importance of protecting the environment; thus, they reflect their concern through actions. When environmental issues become the main purpose of organizational identity, it will trigger the members of the organization to make further contributions toward the environment (Sharma, 2000). Therefore, the following third hypothesis is proposed:

H3. Green organizational identity positively affects green innovation.

Following Chen (2011), green organizational identity refers to an interpretive scheme about environmental management and protection that members collectively construct in order to provide meaning to their behaviors. Firms that reflect green organizational identity will easily obtain legitimacy. Legitimacy was defined by Dowling and Pfeffer (1975) as the circumstances in which a firm's value is congruent with the larger social value system. Therefore, if a firm's value is in accordance with the society expectations related to environmental issues, then it can be said that the firm has acquired environmental organizational legitimacy.

Massey (2001) stated that an interdependence relationship between the organization and stakeholders is important, not only for firm survival, but also for firm legitimacy. Therefore, firms that reflect green organizational identity and implement environmental management and protection in every aspect of their activity can easily obtain environmental organizational legitimacy. According to Thomas (2007), organizational legitimacy is indirectly related to firms' reputations. Thus, firms that obtain environmental organizational legitimacy will gain a positive reputation as socially responsible firms. From the previous justification, the following fourth hypothesis is proposed:

H4. Green organizational identity positively affects environmental organizational legitimacy.

Generally, a firm's objective from a financial perspective is to maximize stockholders' equity. However, to maximize profit is not always the main objective because a firm has also to deal with various external pressures to gain legitimacy (Sharma *et al.*, 1999). Legitimacy theory described the relationship between firms and society. As stated by Dowling and Pfeffer (1975), organizational legitimacy refers to the degree of the congruence between activities of an organization and the associated norms, beliefs, values and stakeholders' expectations.

People nowadays hold big concerns and awareness toward the environment; thus, consumers have become very sensitive to eco-friendly products. Therefore, firms are expected to implement green innovation so that firms can adjust to stakeholders' expectations. Green innovation refers to all aspects of innovation related to green products and processes, including energy saving, pollution management, waste recycling, product design and environmental management (Chen *et al.*, 2006). Organizational legitimacy can help firms to achieve the congruence between firm activities and society expectations (Kostova and Zaheer, 1999). A study by Figueroa *et al.* (2018) on three Mexican and five Spanish companies revealed that CSR and social legitimacy are positively associated with business results. The higher the legitimacy a firm has from stakeholders, the greater the firm can enjoy access to resources and support from those internal and external stakeholders so that the firm can make better green innovations (Chang and Chen, 2013). Therefore, the following fourth hypothesis is proposed:

H5. Environmental organizational legitimacy positively affects green innovation.

When a firm develops the green innovation strategy, the managers and other internal stakeholders are ready to integrate the organizational resources to mitigate the risks of manufacturing processes and output impacts on the environment; thus, this kind of behavior can strengthen organizational identity (Song and Yu, 2017). Because organizational identity is

collectively formed by members who give meaning to their behaviors, when the environment becomes a critical issue in the organizational identity, the environmental protection and management cannot be ignored anymore (Chen, 2011). Green organizational identity contributes to this process by combining a firm's different skill sets and the areas of expertise to further facilitate innovation that puts emphasis on the reduction of waste, pollution prevention and environmental management system implementation (Benet-Martínez *et al.*, 2002; Eiadat *et al.*, 2008; Chang and Chen, 2013). Green organizational identity combines the different skills and the areas of expertise to further facilitate innovation that puts emphasis on waste reduction, pollution prevention and green management system implementation (Benet-Martínez *et al.*, 2002; Eiadat *et al.*, 2008; Chang and Chen, 2013). Green organizational identity encourages managers of the firms to implement new technologies needed by the market. Based on the previous reasoning, the following sixth hypothesis is proposed:

H6. Green organizational identity mediates the relationship between green innovation strategy and green innovation.

As previously discussed, a green innovation strategy refers to a strategy that puts emphasis on the reduction of waste, pollution prevention and environmental management system (Eiadat *et al.*, 2008). Firms need to develop a green innovation strategy to stimulate green innovation (Song and Yu, 2017). In order to implement green innovation strategy, management at all levels needs to integrate the entire organizational resources and coordinating employees' behavior to focus on environmental issues. This kind of behavior will strengthen the green organizational identity (Song and Yu, 2017). When a firm has a strong green organizational identity, the firm easily gets the trust and legitimacy from the society (Chang and Chen, 2013). Therefore, a legitimate firm will be able to obtain more resources and support from both internal and external stakeholders. Finally, with those resources and strong support from the society, a firm will more easily develop and achieve green innovations. Based on the previous justification, the following seventh hypothesis is proposed:

H7. Green organizational identity and environmental organizational legitimacy mediate the relationship between green innovation strategy and green innovation.

Research framework

Figure 1 presents the research framework of this study. This framework describes the links between variables studied consisting of green innovation strategy, green organizational identity, environmental organizational legitimacy and green innovation.

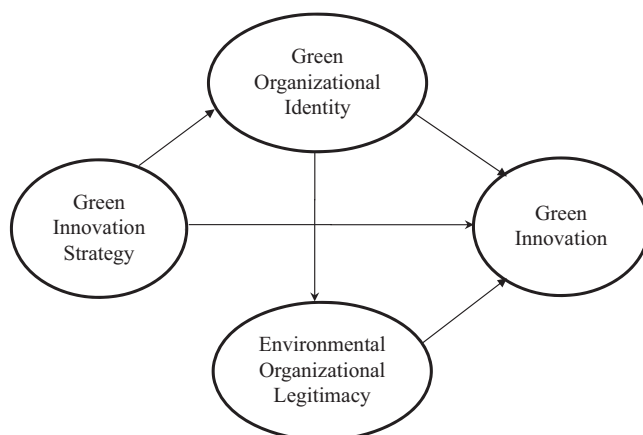


Figure 1.
Research framework

Methodology and measurement*Research design*

The design of this study is a quantitative approach. To test the hypotheses, this study employed a variance-based or partial least square-structural equation modeling (PLS-SEM). Following Chin (1998a, b) as well as Chin and Newsted (1999), the PLS-SEM is considered suitable for the following reasons. First, the PLS-SEM does not require a normal distributional assumption. Second, it is capable to handle multiple dependent and independent variables simultaneously. Third, PLS-SEM is capable of handling relatively small sample sizes and multicollinearity problems among independent variables.

Data collection

Questionnaires were used to collect data. Sampled managers were selected from the manufacturing firms in the Surabaya Industrial Estate Rungkut, Indonesia. A single respondent was applied for each participating firm. Questionnaires were sent along with the brief description of the study and the confidentiality assurance to 156 companies that listed in the Investor Guidance Book of the Surabaya Industrial Estate Rungkut. Respondents were asked to return a completed questionnaire within a week. Table I presents the description of the positions of sampled managers of this study.

Out of 156 questionnaires sent, as many as 101 managers participated and returned questionnaires. Only 1 questionnaire was not completely filled. Thus, the valid questionnaires were 100, and the effective valid response rate was 64.10 percent.

Measurements of the constructs

To permit comparability of this study with previous studies, all variables were measured by instruments that had been previously developed and used. Prior to the distribution, all instruments were translated into the Indonesian language and translated back into English to guarantee the same meaning. Those instruments were also pilot-tested on a group of MBA students in a university to ensure that the translation did not affect the validity and reliability of the measures. A five-point Likert scale was employed rating from strongly agree (1) to strongly disagree (5) to measure the questionnaire items. The measures of the constructs in the questionnaire survey are described as follows.

Green innovation strategy. Green innovation strategy in this study is defined as a type of strategy that a firm has carried out in order to implement green innovation so that they achieve competitive advantage, meet the needs of markets and fulfill stakeholders' expectations. To evaluate green innovation strategy developed by firms, the seven-item instrument based on Chan (2005) and Song and Yu's (2017) revised scale was adopted. The measurements showed that the firm carried out a green innovation strategy including: adjustment of business practices to reduce their impact on animal species and nature; voluntary actions to restore the environment; adjustment of business practices to reduce waste and emissions; procurement reduction of non-recyclable materials, chemicals and other components; use reduction of fossil fuels and replacing them with environmentally friendly fuels; adjustment of business practices to reduce energy

Table I.
Characteristics of
respondents

Position	Total	Respondents	
			Percentage
Human resources manager	22		21.78
Research and development manager	13		12.87
Manufacturing manager	59		58.41
Marketing manager	7		6.93

consumption; and adjustment of business practices to decrease the environmental impacts of its products.

Green organizational identity. Green organizational identity in this study is defined as an interpretive scheme about environmental management and protection that members collectively construct in order to provide meaning to their behaviors (Chen, 2011). To measure green organizational identity, a six-item instrument developed by Chen (2011) was adopted. The measurements showed that the management of the firm: is proud of the firm's history about environmental management and protection; has a sense of pride about firm's environmental objectives and missions; feels that the firm is in compliance with respect to environmental management and protection; has developed well-defined environmental missions; has enough knowledge about the firm's environmental tradition and culture; and verifies that the firm pay attention to environmental management and protection.

Environmental organizational legitimacy. Environmental organizational legitimacy in this study is defined as the degree of the congruence between activities of an organization and the associated norms, beliefs, values and stakeholders' expectations regarding environmental issues. To measure environmental organizational legitimacy, the six-item instrument of Chang and Chen (2013) who refer to Suchman (1995) and Massey (2001) was adopted. The measurements showed the opinion of management that with respect to environmental management and protection, their firm: is a safe organization; is a legitimate organization; is a credible organization; is a good organization; is allowed to provide products or services to their customers; and is allowed to continue operating activities.

Green innovation. Green innovation in this study is defined as an innovation that puts emphasis on the reduction of waste, pollution prevention and environmental management system implementation (Eiadat *et al.*, 2008). To measure green innovation, the eight-item instrument referring to Chen *et al.* (2006) was adopted. The measurements showed the environmental-related innovations were carried out by the firm, such as: choosing environmentally friendly materials in product development; choosing materials that consume less energy in product development; using the least amount of materials to produce products in product development; evaluating that products are easy to reuse, recycle and decompose in product development; effectively reducing the emission of dangerous substances or wastes in the production process; effectively recycling wastes and emission in production process; effectively reducing water consumption, electricity or oil in production process; and effectively reducing the use of raw materials in production process.

Empirical results

Results of descriptive statistics

Table II presents the results of descriptive statistics. The results showed the following suggestions: first, the mean value of 1.584 indicated that managers strongly agreed on the questionnaire items of the green innovation strategy. This suggested that the company needs

Constructs	Mean (α)	Category
Green innovation strategy	1.584	Strongly agree
Green organizational identity	1.463	Strongly agree
Environmental organizational legitimacy	1.379	Strongly agree
Green innovation	1.411	Strongly agree

Notes: Interval = highest score – lowest score/number of scores interval = $(5 - 1)/5 = 0.8$; criteria of the average respondents' answers: $1.00 < \alpha < 1.79$: strongly agree; $1.80 < \alpha < 2.59$: agree; $2.60 < \alpha < 3.39$: neutral; $3.40 < \alpha < 4.19$: Disagree; $4.20 < \alpha < 5.00$: strongly disagree

Table II.
Results of
descriptive statistics

to develop and implement a strategy that focuses on environmental concern. Second, the mean value of 1.463 suggested that managers strongly agreed on the statements regarding the green organizational identity. This showed that the company needs a strong organizational identity of environmental awareness. Third, the mean value of 1.379 revealed that managers strongly agreed on the statements regarding the environmental organizational legitimacy. This means that the company needs strong support and trust from internal and external stakeholders to survive. Fourth, the mean value of 1.411 indicated that managers strongly agreed on the statements regarding green innovation. This suggested that the company needs to continuously innovate on green products and programs.

Measurement model analysis

The measurement model analysis was used in this study to evaluate the relationship between measures and constructs so that the reliability and validity of measures relating to specific constructs can be assessed. This study used the WARPPPLS 5.0 for the reason that it enables us to take nonlinearity into consideration when estimating coefficients of association among linked variables (Kock, 2016). In the first iteration, there were indicators that were not valid in green innovation strategy (GIS₂) suggesting that the majority of firms were not able to perform voluntary actions related to environmental recoveries, such as reforestation. Other invalid indicators were from green organizational identity (GOI₁ and GOI₂), indicating that the majority of firms' employees did not have a sense of pride to their firms' history, mission and objectives related to environmental management and protection. This statement was confirmed with invalid indicators from environmental organizational identity (EOL₁, EOL₃ and EOL₄) proving that the majority of respondents perceived that their companies have not yet implemented the environmental management and protection as a whole. Those invalid indicators were dropped for further analysis.

As shown in Table III and after the second iteration, all measures were significant and above the 0.60 loading level. Following Chin (1998a, b), this means that the measure is accounting for at least 60 percent of the variance of the underlying latent variable. The composite reliability (CR) coefficients for the constructs were all above the accepted level of 0.70. Referring to Nunnally (1967) and Hair *et al.* (2013, p. 104), this means that the measures are reliable. The construct validity was assessed by convergent validity and discriminant validity. The average variance extracted (AVE) was employed to assess convergent validity. Hulland (1999) stated that a construct must have an AVE measure of 0.50 or more to be considered as having adequate convergent validity. As shown in Table III, the AVEs for all constructs were above 0.50, and this provides the evidence of convergent validity.

The assessment of discriminant validity is needed to ensure that the constructs used for measuring the causal relationships are not measuring the same thing that would arise the issue of multicollinearity. To evaluate discriminant validity in this study, the square roots of AVEs was compared with the correlation between constructs to describe whether a construct shares more variance with its measures than with other constructs. It is valid when the square root of AVE of a construct is greater than the correlation between the construct with another construct (Fornell and Larcker, 1981). Table IV shows the correlation among constructs in the off-diagonal and the square root of AVE in the diagonal. It indicates adequate discriminant validity because the diagonal elements are all greater than their respective off-diagonal elements. Thus, it proved that the measurement model is reliable and valid.

Table IV also reveals that green innovation strategy has positive and significant correlations with green innovation ($r = 0.837$; $p < 0.001$), green organizational identity ($r = 0.710$; $p < 0.001$), and environmental organizational legitimacy ($r = 0.441$; $p < 0.001$). This suggests that green innovation strategy is an important variable in improving green innovation, green organizational identity and environmental organizational legitimacy. In addition, green innovation is also positively correlated with green organizational identity

Latent variable	Loading	p-values
<i>Green innovation strategy (composite reliability = 0.833^(r); AVE = 0.546^(cv))</i>		
GIS 1	0.565	< 0.001
GIS 3	0.720	< 0.001
GIS 4	0.671	< 0.001
GIS 5	0.696	< 0.001
GIS 6	0.727	< 0.001
GIS 7	0.659	< 0.001
<i>Green organizational identity (composite reliability = 0.893^(r); AVE = 0.678^(cv))</i>		
GOI 3	0.889	< 0.001
GOI 4	0.929	< 0.001
GOI 5	0.714	< 0.001
GOI 6	0.714	< 0.001
<i>Environmental organizational legitimacy (composite reliability = 0.785^(r); AVE = 0.552^(cv))</i>		
EOL 2	0.638	< 0.001
EOL 5	0.806	< 0.001
EOL 6	0.773	< 0.001
<i>Green innovation (composite reliability = 0.931^(r); AVE = 0.664^(cv))</i>		
GI 1	0.647	< 0.001
GI 2	0.702	< 0.001
GI 4	0.678	< 0.001
GI 5	0.908	< 0.001
GI 6	0.852	< 0.001
GI 7	0.931	< 0.001
GI 8	0.928	< 0.001

Table III. Results of reliability and convergent validity

Notes: ^(r)CR of 0.70 or more: sufficient reliability; ^(cv)AVE of 0.50 or more: convergent validity

	Green innovation strategy	Green organizational identity	Environmental organizational legitimacy	Green innovation
Green innovation strategy	0.709 ^(dv)			
Green organizational identity	0.710***	0.824 ^(dv)		
Environmental organizational legitimacy	0.441***	0.433***	0.743 ^(dv)	
Green innovation	0.837***	0.788***	0.610***	0.815 ^(dv)

Table IV. Discriminant validity

Notes: ^(dv)discriminant validity: diagonal elements > respective off-diagonal elements. ***Significant at $p < 0.01$

($r = 0.788$; $p < 0.001$) and environmental organizational legitimacy ($r = 0.610$; $p < 0.001$), indicating that green innovation may be improved by increasing green organizational identity and environmental organizational legitimacy. Finally, the table shows that environmental organizational legitimacy is also positively correlated with green organizational identity ($r = 0.433$; $p < 0.001$), revealing that green organizational identity may be enhanced by improving green organizational identity.

Structural model analysis

To test the hypotheses, the PLS-SEM was employed. Specifically, this study focuses to test whether the effect of green innovation strategy on green innovation is direct or mediated by green organizational identity and environmental organizational legitimacy. Tables V–VI and Figure 2 show the results of the structural model.

To test the indirect effects in this study, the Variance Accounted For (VAF) method was employed. The VAF method is considered as the more appropriate method than the other methods because it does not require any assumptions about the distribution of variables (Sholihin and Ratmono, 2014, p. 81) and it has higher statistical power (Hair *et al.*, 2013, p. 223). According to Hair *et al.* (2010, p. 746), the following requirements of mediating effects should be met: the path coefficient from independent variable to dependent variable should be significant, the path coefficient from independent variable to intervening variable should be significant and the path coefficient from intervening variable to dependent variable should be also significant. Following Hair *et al.* (2010, p. 746), the VAF > 80 percent indicates a full mediation, the VAF 20–80 percent means a partial mediation and the VAF < 20 percent suggests no mediation.

The results shown in Tables V–VI and Figure 2 support the hypotheses of this study. As shown in Table V, *H1* stating that green innovation strategy positively affects green

Table V.
Result of hypotheses testing (direct effects)

Hypotheses	Path coefficient	Decision
1. Green innovation strategy → green innovation	0.411***	Supported
2. Green innovation strategy → green organizational identity	0.712***	Supported
3. Green organizational identity → environmental organizational legitimacy	0.464***	Supported
4. Environmental organizational legitimacy → green innovation	0.268***	Supported
5. Green organizational identity → green innovation	0.418***	Supported

Note: ***Significant at $p < 0.01$

Table VI.
Result of hypotheses testing (indirect effects)

Hypotheses	VAF	<i>p</i> -values	Category	Decision
Green innovation strategy → green organizational identity → green innovation	41.94%	< 0.001***	Partial mediation ^a	Supported
Green innovation strategy → green organizational identity → environmental organizational legitimacy → green innovation	39.55%	0.061*	Partial mediation ^a	Supported

Notes: ^aVAF value is between 20–80 percent (VAF > 80 percent: a full mediation; VAF 20–80 percent: a partial mediation; VAF < 20 percent: no mediation). * $p < 0.1$; *** $p < 0.01$

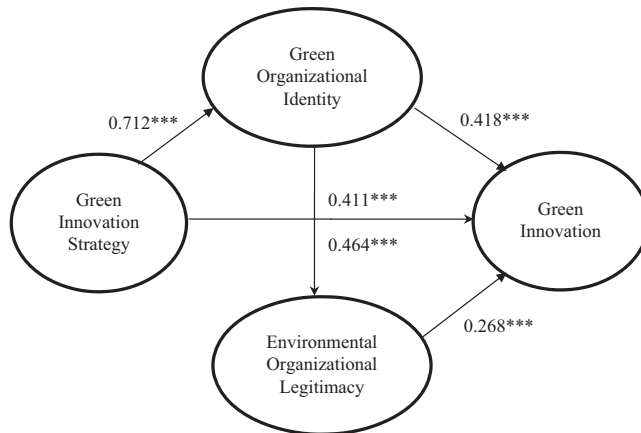


Figure 2.
Result of the structural model

Note: ***Significant at $p < 0.01$

innovation ($\beta = 0.411, p < 0.01$) is supported. *H2* stating that green innovation strategy positively affects green organizational identity ($\beta = 0.712, p < 0.01$) is supported. *H3* stating that green organizational identity positively affects environmental organizational legitimacy ($\beta = 0.464, p < 0.01$) is supported. The fourth hypothesis stating that environmental organizational legitimacy positively affects green innovation ($\beta = 0.268, p < 0.01$) is supported. Finally, the fifth hypothesis stating that green organizational identity positively affects green innovation ($\beta = 0.418, p < 0.01$) is also supported.

Table VI shows the results of hypotheses testing (indirect effects) and provides evidence that the sixth hypothesis stating that green organizational identity mediates the relationship between green innovation strategy and green innovation is supported (VAF = 41.94 percent, $p < 0.01$). The seventh hypothesis stating that both green organizational identity and environmental organizational legitimacy mediate the relationship between green innovation strategy and green innovation is also supported (VAF = 39.55 percent, $p < 0.1$). Both green organizational identity and environmental organizational legitimacy are partial mediation.

Conclusions and implications

This study explores the research framework whether green innovation strategy has a positive effect on green innovation and if so whether the effect is mediated by two variables, namely, green organizational identity and environmental organizational legitimacy. The understanding of this association or mechanism is crucial for the theoretical development as well as the practical implications. Using a sample of 100 managers in the Surabaya Industrial Estate Rungkut, Indonesia, this study finds that green innovation strategy has a positive effect on green innovation. Further analysis reveals that green organizational identity and environmental organizational legitimacy partially mediate green innovation strategy–green innovation relationship.

This study continues the works of Chang and Chen (2013) as well as Song and Yu (2017) in different research settings. Chang and Chen (2013) explored whether environmental commitment and environmental organizational legitimacy mediate the relationship between green organizational identity and green innovation performance. Song and Yu (2017) investigated the mediating role of both green organizational identity and green creativity on green innovation strategy–green innovation relationship. In this study, both green environmental identity and environmental organizational legitimacy are employed to explain the mechanism of how green innovation strategy affects green innovation. Following Song and Yu (2017), this study is conducted on the manufacturing companies in Indonesia instead of several industries. As suggested by Chang and Chen (2013) as well as Song and Yu (2017), this study is conducted in a different country from Taiwan or China, and therefore, it is conducted in Indonesia which is very different from Taiwan or China in terms of cultures, regulations and business practices. The results of this study provide additional support for the studies of Chang and Chen (2013) as well as Song and Yu (2017).

A study by Azam and Khan (2017) revealed that economic growth, corruption, health and poverty affect environmental degradation in Indonesia, Malaysia and Thailand. Environmental problems faced by Indonesia consist of river pollution due to industrial and household waste disposal, forest destruction due to wood and plantation industries, urban air pollution due to transportation and industrial smoke pollution as well as haze from forest fires. Indonesia must be aware that the issue of environmental pollution has reached an alarming stage. Manufacturing firms are among the largest contributors to this environmental degradation. An ecosystem approach to manufacturing management must be adopted by the government and manufacturing firms for long-term environmental sustainability. Indonesia still needs a more appropriate legal and institutional approach to better protect and manage environmental sustainability (Muawanah *et al.*, 2018).

In Indonesia, the green innovation strategy is often discussed in newspapers or at seminars, but there is a lack of its implementation in the manufacturing sector. Therefore, although Indonesia is experiencing relatively high economic growth, the issue of environmental degradation is still emerging. Scholars who conduct empirical research on how green innovation strategy affects green innovation are still rare. This condition certainly does not provide a maximum contribution to the green economy, especially the issue of environmental management and protection by manufacturing firms in Indonesia.

Our study which combines the works of Chang and Chen (2013), as well as Song and Yu (2017), provides a more comprehensive understanding by offering a mediation research model. This model suggests that the green innovation strategy should be adopted as the initial step to improve green innovation performance that is also crucial for competitive advantage. The lack of implementations of good green strategy might be one of the reasons why the exports of Indonesian products to the environmental conscious countries, such as the European countries or the USA tend to decrease lately.

This study also provides a clear understanding that having a green innovation strategy is not enough. Managers of manufacturing firms need to build a strong green identity so that the issue of environmental protection and management becomes the responsibility of all members. By having a strong green identity, managers can drive the behavior of members and resources to use processes and produce products that favor environmental sustainability. In the era of environmentally conscious society, a firm should accommodate the interests of green stakeholders because the performance of the firm is determined by the quality of the relationship. The result of this study also confirms that a firm needs legitimacy from the society where it operates so that the firm has a sustainable competitive advantage. Strong legitimacy allows a firm to gain access to greater resources and profitability. Thus, the managers of manufacturing firms in Indonesia should understand that green innovation performance will be better with stronger legitimacy and will gain support from the society.

Contribution to theory

From a theoretical perspective, all hypotheses of this study are supported. This provides empirical evidence in supporting the identity theory as well as the legitimacy theory, especially in the context of environmental management in Indonesia as a developing country. Green innovation strategy has a positive effect on green organizational innovation. Green innovation strategy has a positive effect on green organizational identity. Green organizational identity has a positive effect on environmental organizational legitimacy. Environmental organizational legitimacy has a positive effect on green innovation. Furthermore, this study demonstrates that both green organizational identity and environmental organizational legitimacy mediate the green innovation strategy–green innovation relationship. These results confirm the organizational identity theory and the legitimacy theory in explaining green innovation performance. This study provides additional supports to several previous studies of Sharma *et al.* (1999), Chen *et al.* (2012), Chang and Chen (2013), Song and Yu (2017), Green *et al.* (2012), Tseng *et al.* (2013), Lin *et al.* (2014), Chen (2011), Kostova and Zaheer (1999) and Figueroa *et al.* (2018).

Contribution to practice

From the practical perspective, this research model provides a more comprehensive understanding for managers of the firms who want to enhance green innovation performance. The results of this study suggest that managers need to verify the roles of green organizational identity and environmental organizational legitimacy in their companies. In the era of environmentally conscious society, managers need to start with developing a green innovation strategy. However, managers also need to understand that having a strategy is not sufficient enough to directly enhance green innovation performance. Managers need to seek

approaches on how to cultivate a strong green organizational identity and use the identity to get environmental organizational legitimacy from the stakeholders. Thus, this study implies that manufacturing firms in Indonesia should develop green innovation strategy and it must be reflected as green organizational identity to obtain and maintain environmental organizational legitimacy and then the firms can enhance green innovation performance as well as to contribute to a better environment that has become the issue of the world.

Contribution to society

As the environmental issues have become a serious problem of the world, the results of this research contribute to providing an approach on how to conduct a better environmental management, which brings more benefits to a better life of the society and the world as a whole. Manufacturing firms are the major contributors to environmental damage. The environmentally conscious society requires firms to reduce greenhouse gases as outputs of the manufacturing process and start conducting resource efficiency. This research model and results provide empirical evidence of the importance of green innovation and its antecedents, namely, a green innovation strategy, green organizational identity, and environmental organizational legitimacy. When manufacturing companies in Indonesia implement this model of managing environmental issues, the society will get more benefits in terms of the reduction of environmental degradation, the availability of more green products and programs, the improvements in resource efficiencies and economic development and the enhancement of quality of life.

Limitations and future research

This study has the following limitations. First, a structural equation modeling is used as an approach to test the hypotheses of this study. This may raise the issue of causality, and therefore, future studies should address this issue by using experimental or case study approaches to validate the results. Second, although examining the antecedents of green innovation, this study did not investigate its consequences. Hence, future studies should investigate the consequences of green innovation performance in terms of financial and nonfinancial consequences. Third, the sample size used in this study is relatively small and limited to companies in the Surabaya Industrial Estate Rungkut, Indonesia, and therefore, future studies should use larger samples from other areas to validate the results of the same model. Finally, this study employs a cross-sectional survey and the data obtained are based on the Likert scales. This may raise the issue of perception bias of the sampled managers. Future studies should try to develop proxies of variables using secondary data. Notwithstanding the limitations, this study still provides additional theoretical and practical support to a deeper understanding of how green organizational identity and environmental organizational legitimacy play important roles in green innovation strategy–green innovation relationship.

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