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External Environment Factors Affecting Green Innovation of SMEs in the Manufacturing Sector in Vietnam

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Abstract:
Recently, enterprise activities in the manufacturing sector have been blamed for contributing significantly to environmental degradation, causing a severe health hazard on human beings and future generations. This study's objective was to find external environmental factors affecting the green innovation of small and medium-sized enterprises (SMEs) in the manufacturing sector in Vietnam. The empirical research was conducted by quantitative approach with a sample of 400 SMEs in the manufacturing sector at industrial zones in Vietnam. The results showed that *governmental pressure*, *market changes*, *government support*, and *customer pressure* all had positive effects on the green innovation of SMEs in the manufacturing sector in Vietnam. This study also offers some policies for SMEs in Vietnam to innovate the growing model, greening production, and sustainable development.

Keywords: customer pressure, governmental pressure, government support, green innovation, market changes.

影响越南制造业中小企业绿色创新的外部环境因素

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摘要：
最近，制造业中的企业活动被指责对环境恶化做出了重大贡献，对人类和后代造成了严重的健康危害。 本研究的目的是找出影响越南制造业中小型企业（中小企业）绿色创新的外部环境因素。 实证研究采用定量方法，以越南工业区制造业的 400 家中小企业为样本。 结果表明，政府压力、市场变化、政府支持和客户压力都对越南制造业中小企业的绿色创新产生了积极影响。 本研究还为越南中小企业提供了一些政策，以创新增长模式、绿色生产和可持续发展。

关键词：客户压力、政府压力、政府支持、绿色创新、市场变化。

1. Introduction

In recent decades, environmental problems such as pollution and global warming have become vital issues for humankind, directly affecting each country, region, and locality. However, the lack of cognizance in the business activities of enterprises is one of the main reasons affecting the environment negatively. Enterprises in the manufacturing sector are usually considered the main reasons for environmental problems that the whole world has to deal with. The exhaust fumes creating the greenhouse effect have been caused by enterprises, especially enterprises in the manufacturing sector (Chandra et al., 2021). Besides exhaust fumes, these enterprises are the main source consuming the limited natural resources and causing the production of hazardous substances which are dangerous to community health and society (Sivathaasan et al., 2013). In addition, the wastewater in the manufacturing process, which was not treated, has polluted all drainage canals, lakes, and rivers running across cities and residential areas. It affects not only locals' lives and health but also the enterprises' performance (Nishant et al., 2012).

According to the statistics of Leonidou et al. (2016), although the effect of each small and medium-sized enterprise (SME) in the manufacturing sector on the environment is not significant, many SMEs in the whole have a significant effect, estimated to be two-thirds of the total pollution in the industrial sector. Therefore, Dangelico and Pujari (2010) stated that enterprises operating their business responsibly to the environment are key factors affecting the growth and sustainable development of enterprises, the environment, and the life quality.

After growing the economy quickly, Vietnam has to deal with the significant challenges of balancing economic development and environmental sustainability. Although the Vietnamese government has made a great effort to promulgate environmental regulations, the environmental compliance was not successful, which was found at a low level in essential industries such as food, leather, paper. Due to financial ability and lack of enforcement strictly from Vietnamese specialized organizations, SMEs usually build their temporary factory to deal with the environmental issues when the government officers come to check or investigate their business activities (Nham et al., 2012).

Approximately 700,000 small and medium-sized enterprises (SMEs) correspond to 97.5% of total enterprises in Vietnam. Yearly, SMEs contribute 40% of GDP, 30% of their profit goes to the state budget. They represent 33% of industrial output value and create nearly 60% of job occupations (Tuan, 2019). However, SMEs' activities also lead to environmental and community health degradation. Facing challenges to develop sustainably and create profits in the context of fierce market competition becomes the first priority concern of firms in Vietnam, especially SMEs in the manufacturing sector. Fostering the manufacturing process innovation and investing in manufacturing activities that are friendly with the environment are considered critical factors to limit waste and improve SMEs' performance. Green innovation could prevent environmental pollution, allow enterprises to save their operating costs, reuse material through recycling, lower the environmental costs, process the waste, receive a positive reputation, get a high price for products, and increase turnover (Ho, 2015).

The main reason is that Vietnamese SMEs' technology and manufacturing processes have been outdated, slow to change, and have low economic performance. Following the global tendency towards a green economy and solving climate changes, Vietnam has been fostering the economic growth model towards green innovation, in which SMEs in manufacturing are considered the core in this transformation. Although there have been some governmental efforts, the environmental regulations in Vietnam were not successful, considering the low compliance found in important industrial sectors of Vietnam, especially SMEs in the manufacturing sector (Ho, 2015). In reality, Vietnamese firms seldom volunteer to build their processing waste system without external pressure, especially for SMEs with low capital and limited capacity; therefore, it is challenging to follow green innovation in the manufacturing process to protect the environment and obey governmental regulations (Nham et al., 2012). In addition, Kousar et al. (2017) stated that market changes negatively influenced the green innovation of enterprises, and the customer pressure factor was also found not to influence enterprises' green innovation.

Deriving from these difficulties and research gaps above, this study aimed to find out whether external factors affect the green innovation of SMEs in the manufacturing sector or not, especially in the context of developing the green economy of the Vietnamese government recently.

2. Literature Review and Research Model

2.1. Green Innovation

Facing pressure from government, customers, and other institutions as well as local governments, many SMEs have difficulties in solving environmental challenges. Therefore, green innovation is regarded as a new way to solve current challenges for many business practices (Hernandez-Vivanco et al., 2018). Green innovation has recently become an important subject studied by many researchers. To comply with environmental regulations to get firm performance in the manufacturing sector and sustainably develop firms and the environment, it is important to identify factors affecting green innovation and its effect on enterprise performance (Alkali et al., 2016).

Implementing green innovation relates to implementing new processes, new technology, and systems or preparation to reduce damaging effects on the environment. Because innovation means using new technical knowledge and administration, applying green practices is considered an innovative process. Walker and Wan (2012) stated that financial sources, management style, human resources, manufacturing activities, methods of approaching technology, innovative ability, and external cooperation are the related factors that affect a green application for SMEs.

Atalay et al. (2013) concluded that four types of innovation—product, manufacturing process, organization, and new marketing policies—showed a positive influence on financial performance and also created a sustainable competitive advantage for firms. In a recent study, Khan et al. (2019) suggested that comprehensive green innovation could accelerate resource-saving, create a more sustainable process and competitive advantage, and generate higher revenue for enterprises' performance.

External environmental factors are regarded as outside factors in which a firm performs its business activities. Some environmental factors, such as the pressure of relative parties, unstable market changes, government support, and network relationships, have been discussed in many innovation studies (Jeyaraj et al., 2006). The relative parties were the individuals or groups affecting a firm's activities and were in turn affected by the firm's activities. At the same time, organizations performed activities to meet the main relative parties, in which customers and governmental organizations were considered the most important ones (Etzion, 2007). Therefore, external environment factors in this study are *market changes, customer pressure, government pressure,* and *government support*.

2.2. Market Changes and Green Innovation

Changes in the market are regarded as environmental features that greatly affect enterprises' decisions. These are related to the frequency of, and unexpected changes in, customers' favor, developed technology, and competitive behavior. In order to develop a market, Dao (2016) introduced factors affecting market development for enterprises, such as internal factors and external factors. Most enterprises have to face market changes with external forces, such as suppliers, marketing agencies, rivals, the public, and customers.

According to Abdullahi et al. (2018), external pressure provided the impetus for SMEs to achieve advantages such as customer attraction, reputation, market share, and financial performance. In addition, Federica et al. (2016) provided new insights into the relationship between the orientation of the export market and export performance among SMEs. The results of his study showed that firms seemed to become more inclined to respond to market changes than to generate and share market information, as the value of export intelligence responsiveness was considered to be higher than export intelligence dissemination and export intelligence generation. Moreover, Benzidia and Naouel (2020) explored the effect of supply chain flexibility and agility toward the market, regarded as responsiveness to customers' needs and the speed of new product launches to improve SME performance. From the above analysis of market change, the proposed hypothesis is as follows:

Hypothesis 1 (H_1): There is a positive relationship between market change and green innovation of SMEs in the manufacturing sector.

2.3. Governmental Pressure and Green Innovation

There are also many enterprises usually paying attention to the influence level of their firms' activities on the environment to increase their firms' image in consumers' attention and create good relationships with authority. Furthermore, enterprises with ineffective environmental activities are often evaluated by the local community and customers participating in enterprises' actions, which are closely attached to external negative factors. Incompliancy toward environmental regulations increases the forcing pressure by fining firms from

managerial departments that the government imposes (Lombardo, 2009). In developing countries, many governments set up plans and designed policy initiatives in terms of cost-effectiveness, adoption, and compliance incentives as well as the ability to deal with uncertainty and provide a clear and credible signal to enterprises (The Organisation for Economic Co-operation and Development, 2011).

An empirical survey by Weng et al. (2015) of 202 Taiwanese service and manufacturing firms showed that pressure from competitors and the government had significant and positive effects on green practices. Nowadays, many companies worldwide feel constant pressure to develop responsible and friendly activities in the environment accompanied by governmental regulations. As a result, there are many studies conducted to investigate the relationships between governmental regulations and environmental practices, leading to the conclusion that governmental pressure has become one of the most significant external stakeholders (Freeman, 2011). Recent regulatory changes and government enforcement of those changes have affected firms' activities relating to environmental management and sustained their business growth (Huang et al., 2009).

Moreover, to compete with other rivals globally and locally, enterprises in general and SMEs in particular must follow both global and local regulations to protect the environment. To what degree the government supports or enforces regulations may also significantly impact firms' policies toward environmental practices (Zeng et al., 2011). In addition, the results of Li et al. (2019) showed that not only the single factor of external legitimacy pressure and internal profitability, but also these interactions, are said to affect firms' green innovation practices. Based on the above analysis, the second hypothesis is given as follows:

Hypothesis 2 (H_2): There is a positive relationship between government pressure and green innovation of SMEs in the manufacturing sector.

2.4. Customer Pressure and Green Innovation

In recent decades, customers have become more concerned about environmental matters and tend to demand more green products. Therefore, firms' decision to adopt green practices is derived from customers' desire to earn more revenue by improving customers' satisfaction. As a result, it becomes clear that customer pressure affects firms' responses in improving green innovation (Huang et al., 2016). Moreover, it is said that firms usually have to deal with their customers' substantial pressure towards environmental sustainability issues but lack resources and capabilities to offer innovative green products to customers. Chen and Liu (2020) suggested that customers' participation enhanced green product innovation by facilitating the recognition and exploitation of opportunities on the part of SMEs.

Nowadays, many researchers have been studying the key factors of green innovation, which include customer awareness and corporate responsibility towards the environment, stakeholders' pressure, ethical issues, top management initiatives, availabilities of technology, and collaboration. Among these factors, the main external driving forces for managing SMEs' business sustainability are customers and legal drivers, both of which are related to environmental regulations. Therefore, customer pressure and environmental regulations are identified as external drivers of green innovation (Yalabik & Fairchild, 2011).

It is clearly seen that customers affect firms' activities, but notably, firms' activities also affect customers. Thus, firms perform actions to treat customers and governmental organizations as equally important. Lestari et al. (2021) came to the conclusion that the more pressure a customer put on a firm, the more a firm worked to increase its green innovation to better meet customers' needs and social requirements. Based on the above studies and analysis, the next hypothesis is as following:

Hypothesis 3 (H_3): There is a positive relationship between customer pressure and green innovation of SMEs in the manufacturing sector.

2.5. Government Support and Green Innovation

It can be said that government support is an external environmental factor that affects green innovation. Indeed, the government implemented green innovation and growth through its incentive policies, such as financial support, technological sources, focused projects, and training programs.

Hypothesis 4 (H_4): There is a positive relationship between government support and green innovation of SMEs in the manufacturing sector.

2.6. Research Model

The theory of relative parties was applied to observe the influence of each relative party on firms' green innovation. Additionally, the research model of this study was also based on the study of Wang et al. (2019) to identify the influence of some external factors on green innovation practices. The research model is proposed as follows:

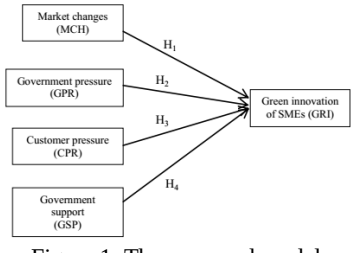

Figure 1. The proposed model

3. Research Methodology

3.1. Research Method

The quantitative approach was used to verify the research model and hypotheses of the study. The survey comprised specific and narrow questions to participants. Then, the authors analyzed the numeric data, using statistics and conducting the inquiry in an unbiased manner. The tool used to perform analysis was SPSS 22.0 in this study.

3.2. Research Samples and Process of the Study

The respondents in this survey are production managers and owners of SMEs in the manufacturing sector at the main industrial zones in Vietnam. The investigation of samples was conducted using different groups of managers/owners who differ in age, education level, seniority, and experience in consuming green products to ensure the samples were representative of the whole population. Tabachnick et al. (2001) rates sample sizes as follows: 50 cases are very poor, 100 cases are poor, 200 cases are fair, 300 cases are good, 500 cases are very good, and 1000 cases or more are excellent. This study had a sample size of 400 respondents which was deemed a good size to avoid computational difficulties.

There were four stages in this study. In the first stage, the survey used a qualitative approach to discuss the recent use of green products and the green innovation trend with experts as well as some managers and owners of SMEs.

In the second stage, the survey also used a quantitative approach to survey managers or directors of SMEs in the manufacturing sector, to understand the scale of the effect that external environment factors have on green innovation.

In the third stage, the survey collected the data by non-probability sampling methods.

In the last stage, following data collection, the survey chose suitable samples and filtered the collected data. The survey removed the incomplete copies or the copies that were completed cursorily. The survey then analyzed the Cronbach's alpha and EFA, verifying the research model and hypotheses to provide suitable solutions for green innovation of SMEs in the manufacturing sector in Vietnam.

4. Findings

4.1. Descriptive Statistics

4.1.1. Describing Samples

The survey of samples was performed with a group of participants differing in gender, educational background, managerial seniority, and experience in using green products in different provinces and cities in Vietnam. The characteristics of the collected samples are described in the following table.

Table 1. Characteristics of the samples

Characteristics	**Frequency**	**Percentage (%)**
Gender		
Male	368	92.0%
Female	32	8.0%
Total	400	100%
Educational background	**Frequency**	**Percentage (%)**
Undergraduate	9	2.25%
Bachelor's degree	333	83.25%
Master / Ph.D.	58	14.5%
Total	400	100%
Managerial seniority		
From 1 year to 3 years	49	12.3%
From 4 years to 6 years	179	44.8%
From 7 years to 9 years	115	28.7%
Over 10 years	57	14.2%
Total	400	100%
Frequency of using green products		
Never	180	45.0%
From once to thrice	170	42.5%
From 4 to 6 times	44	11.0%
More than six times	6	1.5%
Total	400	100%

4.1.2. Describing Observed Variables

4.1.2.1. The Market Changes (MCH) Factor

The factor *market changes* included eight variables that were coded MCH1 to MCH8. The first computation for the factor resulted in Cronbach's alpha = 0.817, which was a good result. However, the author disqualified item MCH6 because its corrected item-total correlation was 0.139 (<0.3); therefore, MCH6 was removed from the questionnaire. The author conducted a second run, and the result showed that corrected item-total correlation of all variables was > 0.3 and Cronbach's alpha of variables was > 0.7. This demonstrates that MCH1, MCH2, MCH3, MCH4, MCH5, MCH7, and MCH8 met the requirements and were used for representation of scale *market changes*.

4.1.2.2. The Government Pressure (GPR) Factor

The factor *government pressure* included 11 variables coded GPR1 to GPR11. The first computation for the factor with Cronbach's alpha = 0.788 was a good result. However, the author disqualified items GPR4, GPR5, GPR10, and GPR11 because their corrected item-total correlation was less than 0.3 and the author ran the second computation for this factor. The second run showed that the corrected item-total correlation of all variables was greater than 0.3 and value of Cronbach's alpha with the items deleted was greater than 0.7. Therefore, GPR1, GPR2, GPR3, GPR6, GPR7, GPR8, and GPR9 were grouped together and became the representation for the scale of *government pressure*.

4.1.2.3. Customer Pressure (CPR) Factor

Factor *customer pressure* had 11 variables coded from CPR1 to CPR11. The first computation resulted in Cronbach's alpha = 0.830, and its value was good, meeting the requirement of the scale. However, when testing the item-total statistics, the author disqualified items of CPR8, CPR10, and CPR11 as their corrected item-total correlations were smaller than 0.3 and run for the second computation. The second run resulted in the value of Cronbach's alpha = 0.894, which was higher than the first run (0.064). The left variables with corrected item-total correlation were all larger than 0.3, and their Cronbach's alpha was larger than 0.7. Therefore, CPR1, CPR2, CPR3, CPR4, CPR5, CPR6, CPR7, and CPR9 were grouped together and used for representing the factor *customer pressure* in this study.

4.1.2.4. Government Support (GSP) Factor

Factor *government support* had 10 variables coded from GSP1 to GSP10. The first computation resulted in Cronbach's alpha = 0.790, and its value was good, passing the requirement of the scale. However, when testing the item-total statistics, the author disqualified items of GSP2, GSP5, and GSP9 as their corrected item-total correlations were smaller than 0.3 and ran for the second computation. The second run resulted in the value of Cronbach's alpha = 0.884, which was 0.096 higher than the first run and had a good value. The left variables with corrected item-total correlation were all larger than 0.3, and their Cronbach's alpha was larger than 0.7. Therefore, GSP1, GSP3, GSP4, GSP6, GSP7, GSP8, and GSP10 were grouped into one factor, representing the scale of *government support*.

4.1.2.5. Green Innovation (GRI) Factor

The *green innovation* factor included seven variables coded from GRI1 to GRI7. The first computation for the factor resulted in Cronbach's alpha = 0.829, which was the good one. In addition, all variables with corrected item-total correlation were all larger than 0.3, and their Cronbach's alpha was larger than 0.7. Therefore, all these variables passed the requirement and were grouped into one factor, representing the scale of *green innovation*, and the author prepared the next steps for analysis.

4.2. Evaluating the Reliability of the Scales

The author checked the reliability of the scales by SPSS version 22.0 through testing Cronbach's alpha index. The purpose was to find out the observed variables needed to keep and remove the unnecessary variables within the whole variables. The regulation to remove variables is that the variables with the corrected item-total correlation smaller than 0.3 will be removed. The standard to choose scale is when it has the reliability of Cronbach's alpha ≥ 0.7 (Nunnally & Bernstein, 1994). In theory perspective, the higher Cronbach's alpha is, the better the scale's reliability is. Cronbach's alpha of all variables will be presented in the below tables:

Table 2. The synthetic analysis towards Cronbach's alpha of factors

Name of variables	Cronbach's Alpha
Market changes (MCH)	0.878
Government pressure (GPR)	0.871
Customer pressure (CPR)	0.894
Government support (GSP)	0.884
Green innovation (GRI)	0.829

From Table 2, it can be seen that all Cronbach's alphas exceeded 0.7, and there were no variables with corrected item-total correlation smaller than 0.3 so that all scales had the reliability. The author continued to analyze EFA for the next step.

4.3. Analyzing EFA (Exploratory Factor Analysis)

The result of Barlett's test of sphericity showed that KMO = 0.907 (> 0.5), so the analysis of the factors was suitable. In addition, Sig. of Barlett's test = 0.000 < 0.05 proved that the observed variables had mutual correlations; therefore, EFA was suitable with the collected data of the study.

4.4. Regression Analysis

From the result of Cronbach's alpha and EFA, the research model included four factors affecting the green innovation of SMEs in the manufacturing sector. Simultaneously, the study used the Multivariate multiple regression with the method of one-way input, which was established as followings:

$Y = \beta o + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \beta_4 * X_4 + \sigma$;

where Y - green innovation of SMEs (GRI); X_1 - market changes (MCH); X_2 - government pressure (GPR); X_3 - customer pressure (CPR); X_4 - government support (GSP); σ - error term; βo - the intercept; β_1, β_2, β_3, and β_4 are the regression coefficients for the four dimensions of the independent variable measures.

Table 3. Evaluating the suitability of the regression model

Model Summary[b]					
Model	**R**	**R-Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.724[a]	.530	.502	.33941	1.480

a. Predictors: (Constant), MCH, GPS, CPR, GSP
b. Dependent Variable: GRI

From Table 3, it could be seen that the Adjusted R^2 was 0.502 > 0.5; therefore, the model was quite suitable to test the relationship between the dependent variable and independent variables. Additionally, the value of the adjusted R-squared was 0.502 so that the built regression model suited the data (50.2%). In other words, 50.2% of the changes towards green innovation in SMEs were due to factors such as market changes, government pressure, customer pressure, and government support while the remaining 49.8% were attributed to other factors.

4.5. Testing Hypothesis and Relationship of Factors

After testing the data, it was seen that all the scales satisfied the requirements and the coefficients of variance inflation factor (VIF) were < 2 indicating no multiple collinearity in this study as shown in Table 4.

Table 4. The result of the regression coefficients

Coefficients[a]							
	Unstandardized Coefficients		**Standardized Coefficients**			**Collinearity Statistics**	
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**	**Tolerance**	**VIF**
1 (Constant	.746	.177		4.084	.000		
MCH	.219	.044	.217	3.700	.000	.603	1.657
GPR	.151	.041	.185	3.380	.003	.679	1.472
CPR	.154	.052	.178	2.963	.001	.623	1.606
GSP	.236	.053	.286	4.719	.000	.576	1.736

a. Dependent Variable: GRI

Based on Table 4 and from the regression model analysis, the linear regression model of the factors affecting *green innovation* of SMEs in Vietnamese manufacturing with standardized coefficients is as follows:

$$Y_{(GRI)} = \beta o + 0.217*MCH + 0.185*GPR + 0.178*CPR + 0.286*GSP + \sigma$$

Table 5. Testing hypotheses

Hypothesis	**Sig.**	**Statement**
H_1	.000	Supported
H_2	.003	Supported
H_3	.001	Supported
H_4	.000	Supported

The result of testing the hypothesis in Table 5 revealed that all sig. were smaller than 0.05 so that all H1, H2, H3, and H4 were accepted, in which the factor affecting the *green innovation* of SMEs the most was *government support* (β = 0.286); the next was *market changes* (β = 0.217); the third one was *government pressure* (β = 0.185); the final factor was *customer pressure* (β = 0.178). It proved that all four factors had a positive influence on the green innovation of SMEs in the Vietnamese manufacturing sector.

5. Discussion

With β = 0.217 and Sig. = 0.000 < 0.05, it could be seen that H_1 was accepted. It meant that *Market changes* positively influenced the *green innovation* of SMEs in the manufacturing sector. Previous studies had also concluded that the influence of market changes greatly affected enterprises' decisions, as the market was considered the most influential environment (Li et al., 2019; Molina-Azorín et al., 2009). In addition, the second hypothesis (H_2) was also accepted with β = 0.185 and Sig. = 0.003 < 0.05. It showed that *government pressure* also affected green innovation positively, and this result coincided with that of studies of Christmann (2017), Shen and Yao (2006), Lee (2008), Weng et al. (2015) because legal pressure from the government had correlations with firms' decision to perform green activities. With β = 0.178 and Sig. = 0.001 < 0.05, the third hypothesis (H_3) was accepted at the low meanings due to the low influence index. The result of this study had the same idea with studies of Weng et al. (2015) and Qi et al. (2010), where they stated that customer pressure did not affect green innovation, which showed that customer pressure was not the first attention of administrators when fostering green innovation of firms. With β = 0.286 and Sig. = 0.000 < 0.05, it could be concluded that H_4 was accepted. It meant that *government support* had the most influence on *green innovation* with the highest affecting index. The result

also had consensus with studies of Scupola (2003), Tornatzky et al. (1990), Guo et al. (2018), where government support has been a relative environment factor affecting green innovation.

This study has found four external environment factors that positively affected *green innovation*. From the study result, manufacturing sector enterprises in Vietnam can apply the green innovation scale and its process for their business and production to have significant benefits, such as higher prices of finished products, improve their image and reputation in customers' view. In addition, enterprises can have more opportunities in new markets and competitive advantages in the age of Industrial Revolution 4.0.

6. Conclusion

This empirical study was conducted to identify factors affecting green innovation of SMEs in manufacturing sectors. The result of analyzing the regression model and coefficients of factors showed that three factors of *market changes*, *government pressure*, *government support*, and *customer pressure* had positive effects on the green innovation of SMEs in the manufacturing sector of Vietnam. From the result of the study, the author suggested some policies for administrators of enterprises to improve their performance when implementing green innovation:

1) Being active in investing and studying to innovate the high technology to enhance the productivity and save the natural materials;

2) Using and manufacturing organic products that are friendly with the environment to preserve the natural resources, reduce the effects of climate changes and environmental pollution;

3) Investing in high-qualification employees to operate and apply new skills in green production;

4) Requiring the government to adjust policies to support enterprises when changing the manufacturing process to green manufacturing and reduce the environmental tax to stimulate enterprises to participate in green economy development in Vietnam.

Last but not least, when investing in external factors affecting green innovation, this survey becomes necessary to foster Vietnamese SMEs to perform policies changing to green innovation to develop their business and production sustainably, contributing to the green economy development in Vietnam. In addition, this paper also proved that market changes and customer pressure correlated significantly with green innovation, which was similar to studies of Thogersen and Zhou (2012), Huang et al. (2009), which showed that customers and governmental organizations were the most important external environment factors affecting green innovation.

7. Limitation and Further Study

Like other studies, this survey also had some limitations. The study focused on identifying only external environment factors affecting green innovation of SMEs in Vietnam's manufacturing sector, while there are other factors: organizational, environmental, and technological ones. Therefore, future studies need to discuss and test the relationship between *green innovation* of enterprises and firm performance through the mediating role of the environmental performance of SMEs in the manufacturing sector. In addition, this study only used the convenience sampling method, which is regarded as a type of non-probability sampling method to collect the data.

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Authors' Contributions

Prof., Ph.D. Nguyen Minh Ha provided consultation and gave professional knowledge for this paper to be accomplished and revised relative theories regarding external factors affecting green innovation. Pham Anh Nguyen collected and analyzed the data, composing the draft and final manuscript.

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