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Environmental Performance in Indonesia Automotive Industry

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Abstract. A large number of firms still view the environmental protection as barrier to profitability or as a regulation to comply with rather than fundamental business strategy leading to a sustainable competitive advantage. Another research is argue integrating environmental issues into business strategy can become a strategic opportunity for companies. The capacity to formulate strategy leads to competitive advantage when aligned with the environment. This research aims to examine impact of environmental performance on firm performance. The survey is conducted on automotive companies in Indonesia. Literature study are conducted to obtain criteria of environmental management system, environmental performance and firm performance that will be used as variables in this research. The data is collected using questionnaire and analysed by experts in automotive industry. Pilot test of questionnaire is conducted in this research. The result of this research shows that the questionnaire has good validity and high reliability.

1. Introduction

Automotive industry in Indonesia is pioneer in the growth of manufacturing industry in Indonesia. The growth of automotive industry could have an impact on increasing the national economy [1]. According to the data from BPS (Central Bureau of Statistics) in 2018, the contribution of the transportation equipment industry subsectors (including the automotive industry) to the GDP of the non-oil and gas industry sector reached 10.16 percent or the third largest after the food and beverage industry subsectors (34.33 percent) and metal, computer, electronic, optical and electrical equipment subsectors (10.40 percent) [2]. Based on the data, automotive industry has a considerable influence on the Indonesian economy. According to the data of Domestic Automotive Production and Sales Performance (Figure 1) for the period 2005-2017 issued by the Ministry of Industry in 2018, the automotive industry in Indonesia has fluctuating production and sales in the period 2005-2009. In the period 2010-2013, the automotive industry in Indonesia has an increase in production and sales. In the following period, the automotive industry in Indonesia again has fluctuating production and sales [3].



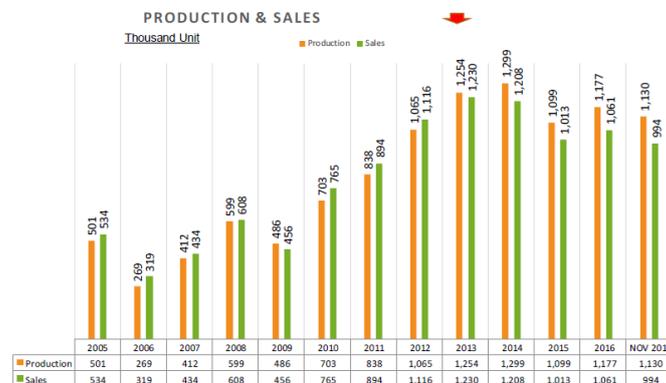


Figure 1. Domestic automotive production and sales performance

Although the automotive industry in Indonesia is currently has fluctuating production and sales, the automotive industry is one of the 5 focus sectors for the "Making Indonesia 4.0" program. The program has a quantitative target for the automotive industry in 2020-2035 with the details that in 2020 the target of producing automobile will reach 1,500,000 units and motorcycle will reach 8,000,000 units. In 2025 the production target of automobile reaches 2,000,000 units and motorcycle reach 10,000,000 units. In 2030 the production target of automobile reaches 3,000,000 units and motorcycle reach 12,500,000 units. And finally, in 2035 the production target of automobile reaches 4,000,000 units and motorcycle reach 15,000,000 units [3]. Although the program has a positive impact on the Indonesian economy. The program also has a negative impact such as environmental issues resulting from increased automotive production in Indonesia, because the automotive industry is included in the "Pollution" industry category [4]. According to data from the Environmental Performance Index released by Yale University in 2018, Indonesia is ranked 133 out of 180 countries in the World [5]. This shows that the environmental performance in Indonesia is still low, as well as environmental issues need to be given more attention by the government and industry practitioner in Indonesia, especially the automotive industry in Indonesia.

A large number of firms have implemented environmental practices that go far beyond environmental regulation in order to reduce energy consumption, to propose green products or technologies to their consumers, and to minimize their ecological footprint [6]. Porter and Reinhardt [7] argue integrating environmental issues into business strategy can become a strategic opportunity for companies. This is the background to the conduct of this research and the automotive industry to be a case study in this study, because the automotive industry is one of the industrial sectors included in the "Pollution" industry category.

2. Methodology

The first step of this research is literature review. In this step, the author collects and studies the literature to be used as a reference for research related to environmental management systems, environmental performance and firm performance to obtain research gap. After the literature review, the next step is to develop a conceptual model and hypothesis based on previous research. Research hypothesis that have been built will be answered in this research. Environmental management system is used as independent variable in this research. Then, environmental performance and firm performance are used as dependent variable in this research. Questionnaire is designed based on the hypothesis and variables. Automotive industry is chosen to be the case study in this research. Qualitative test is conduct by experts or practitioners in automotive industry to obtain justification for the validity of the question items. The last stage in this study is a pilot test questionnaire using Pearson correlation test and Cronbach alpha to obtain the result of validity and reliability of questionnaire.

3. Literature Study and Hypothesis

Russo [8] conducted a study with hypothesis that environmental management system had positive impact on environmental performance. Wagner and Schaltegger [9] conducted a study with hypothesis that environmental performance had positive impact on firm performance. Environmental management systems can be measured through several variables including environmental strategy [10], environmental commitment [11] and environmental sustainability **Error! Reference source not found..** Then, environmental performance can be measured through several variables including operational waste [13], gas emissions [14] and the use of hazardous materials [15]. Furthermore, firm performance can be measured through several variables including customer satisfaction [16], market share [17], and financial performance [18]. Based on the description above, the hypothesis in this study is as follows:

H1 : Environmental Management System has positive impact on Environmental Performance

H2 : Environmental Performance has positive impact on Firm Performance

The next step is to construct a research questionnaire as a method for collecting data. The questionnaire consists of several questions arranged based on the conceptual framework and refers to the hypotheses that have been built. Each question on the questionnaire used a 6-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = agree and 6 = strongly agree). The questionnaire structure is divided into two parts, first part contains the respondent data and second part regarding the environmental management system which consists of 4 questions and an assessment of environmental performance and firm performance which consists of 7 questions. Assessment of environmental performance and firm performance uses a 6-point Likert scale (1 = far smaller than the target and 6 = far greater than the target).

4. Data Collection and Analysis

Environmental management system is used as the independent variable in this study. Environmental management system variables are environmental strategy, environmental commitment and environmental sustainability. Environmental strategy variable is measured by assessing the integration of environmental issues into the company's strategic planning. Environmental commitment variable is measured by identifying environmentally friendly factors in the selection of raw materials. And finally, Environmental sustainability variable are measured by identifying pollution controls and minimizing waste in the company's operational activities.

The dependent variables in this study are environmental performance and firm performance. The variable of environmental performance is measured by assessing the level of operational waste and gas emissions produced by the company, as well as the use of hazardous materials compared to the company's target. While the firm performance variable is measured by assessing the customer satisfaction, market share and financial performance compared to the company's target. Both environmental performance and firm Performance are assessed over the past 5 years.

From the above literature review and hypotheses development, this research develop conceptual model linking environmental management system, environmental performance and firm performance are shown in Figure 2 below.

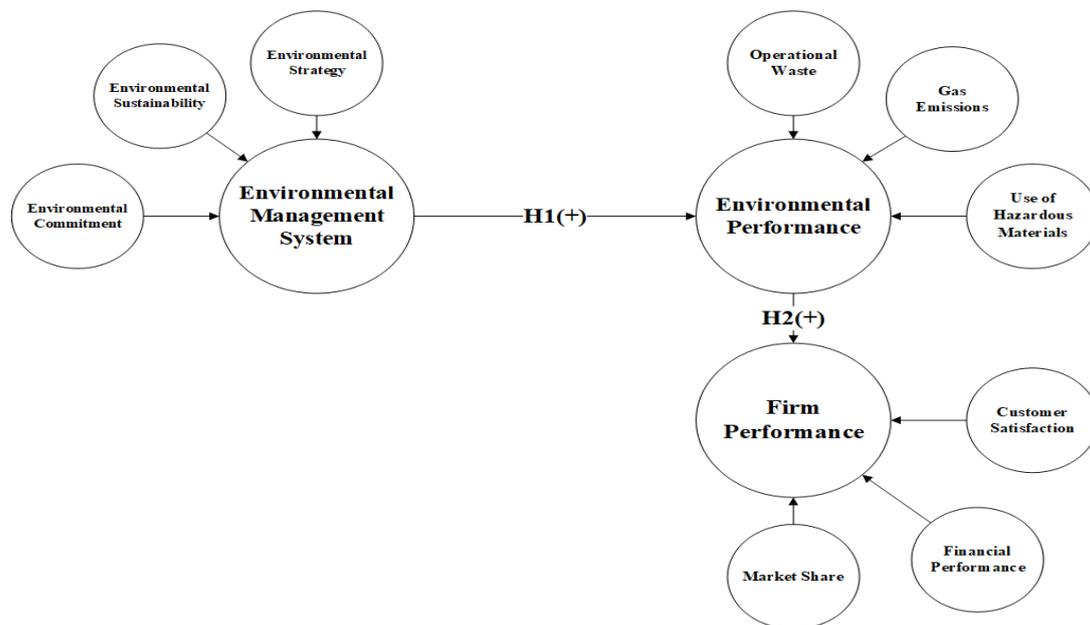


Figure 2. Research conceptual model

Furthermore, the designed questionnaire is carried out qualitative testing by experts, in this case is practitioners in the automotive industry. Qualitative tests are given to 5 experts consist of 5 managers from different department, such as quality control manager, production manager, marketing manager, technical service manager and environmental health and safety manager with working experience are more than 15 years. The qualitative test results of the research questionnaire can be seen in Table 1 below.

Table 1. Qualitative test of questionnaire

No	Questionnaire Design	Feedback from Expert	Action
1.	Questions related to environmental strategy: "Our company make every effort to link environmental objectives with other company goals"	Questions are changed to "Our company make every effort to link environmental objectives with our other company goals". Because the previous question can be meaningful that the company make every effort to link environmental objectives with the environmental objectives of the other companies.	Change questions according to feedback from expert.

After qualitative test, the improved questionnaire is distributed to 30 respondents as a pilot sample. Respondent are automotive companies (first tier until third tier) located Indonesia. The pilot test questionnaire consisted of validation tests using the Pearson Correlation Test method and reliability test using the Cronbach's Alpha method. Validity is the degree to which a scale or set of measure accurately represents the concept of interest [19]. Reliability is an assesment of the degree of consistency between multiple measurements of variable. Reliability test with Cronbach's alpha being the most widely used measure. Both of this test is using software SPSS 25 to process the data. The results of the validation test and reliability test can be seen in Table 2and Table 3 below.

Table 2. Result of pearson correlation test

Q1	Pearson Correlation	0.563	Valid	Q7	Pearson Correlation	0.691	Valid
	Sig. (2-tailed)	0.001			Sig. (2-tailed)	0	
	N	30			N	30	
Q2	Pearson Correlation	0.510	Valid	Q8	Pearson Correlation	0.766	Valid
	Sig. (2-tailed)	0.004			Sig. (2-tailed)	0	
	N	30			N	30	
Q3	Pearson Correlation	0.473	Valid	Q9	Pearson Correlation	0.654	Valid
	Sig. (2-tailed)	0.008			Sig. (2-tailed)	0	
	N	30			N	30	
Q4	Pearson Correlation	0.472	Valid	Q10	Pearson Correlation	0.518	Valid
	Sig. (2-tailed)	0.009			Sig. (2-tailed)	0.003	
	N	30			N	30	
Q5	Pearson Correlation	0.443	Valid	Q11	Pearson Correlation	0.561	Valid
	Sig. (2-tailed)	0.014			Sig. (2-tailed)	0.001	
	N	30			N	30	
Q6	Pearson Correlation	0.677	Valid				
	Sig. (2-tailed)	0					
	N	30					

Table 3. Result of cronbach alpha

	Cronbach Alpha
Environmental Management System	0.877
Environmental Performance	0.878
Firm Performance	0.813
Total	0.801

In Table 2 the results of the validity test of the questionnaire above can be seen that all questions are valid. Because the Pearson correlation value is greater than the value of the r table = 0.361 ($n = 30$ and significance is 5%). For Table 3 the results of the reliability test of the questionnaire above can be seen that the overall value of the variable is 0.801. The generally agreed upon lower limit for Cronbach's alpha is 0.6 in exploratory study [19]. It means this questionnaire is very reliable and has high reliability. Reliable means the level of consistency, accuracy and predictive power of the questionnaire is good.

5. Conclusion

Automotive industry in Indonesia is pioneer in the growth of manufacturing industry in Indonesia. The growth of automotive industry could have an impact on increasing the national economy. A large number of firms have implemented environmental practices that go far beyond environmental regulation in order to reduce energy consumption, to propose green products or technologies to their consumers, and to minimize their ecological footprint. Integrating environmental issues into business strategy can become a strategic opportunity for companies. The capacity to formulate strategy leads to competitive advantage when aligned with the environment. Environmental management system is used as independent variable in this research. Then, environmental performance and firm performance are used as dependent variable in this research. The validity of the questionnaire is obtained from the results of qualitative tests to experts. Validity test conclude that all question in questionnaire is valid and reliability test shows that all variables are reliable.

6. Future Research

After conduct the validity and reliability test, it is necessary to carry out statistical test of the research hypotheses, so that the impact of environmental management system on environmental performance and environmental performance on firm performance can be explored. Result of the research on the impact of environmental performance on firm performance are expected able to help managers or company leaders to increase company performance and company competitive advantage through environmental performance.

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References

- [1] Nurcahyo R and Wibowo A D 2015 *Procedia CIRP* **26** 653–7.
- [2] Central Bureau of Statistic 2018 *Produk Domestik Bruto Indonesia Triwulanan 2014 – 2018* Online: <http://www.bps.go.id>
- [3] The Ministry of Industry 2018 *Kebijakan Sektor Industri Otomotif Dalam Rangka Implementasi Roadmap Industri 4.0* Online: <http://www.kemenperin.go.id>.
- [4] Othman R and Ameer R 2010 *Corp. Soc. Resp. Env. Ma.* **62** 52–62.
- [5] Yale University 2018 *Environmental Performance Index* available at: <http://epi.envirocenter.yale.edu>.
- [6] Cramer J 1998 *Business Strateg. Environ.* **7** 162-72.
- [7] Porter M and Reinhardt F L 2007 *Harvard Bus. Rev.* **85** 22–6.
- [8] Russo M V 2009 *Business Strateg. Environ.* **18** 307-19.
- [9] Wagner M and Schaltegger S 2004 *Eur. Manag. J.* **22** 557-72.
- [10] Chen Y, Tang G, Jin J, Li J and Paillé P 2015 *J. Bus. Ethics* **127** 479–500.
- [11] Azorin J F M, Cortes E C, Moliner J P and Taro J J 2009 *J. Clean. Prod.* **17** 516–24.
- [12] Bamgbade J A, Kamaruddeen A M and Nawi M N M 2017 *Sustainable Cities and Society* **32** 486–95.
- [13] Zhu Q, Sarkis J and Lai K H 2008 *Int. J. Prod. Econ.* **111** 261-73.
- [14] King A and Lenox M 2002 *Manage. Sci.* **48** 89–99.
- [15] Russo M and Fouts P 1997 *Acad. Manage. J.* **40** 34-59.
- [16] Agan Y, Acar M F and Borodin A 2013 *J. Clean. Prod.* **51** 23-33.
- [17] Albertini E 2013 *Organ. Environ.* **26** 431.
- [18] Escriba-Esteve A, Sanchez-Peinado L and Sanchez-Peinado E 2008 *Int. Small Bus. J.* **26** 463-89.
- [19] Hair J F, Black W C, Babin B J and Anderson S E 2010 *Multivariate Data Analysis 7th Ed* (New Jersey: Pearson Prentice Hall).