Descriptive Relationship Analysis Between the Program for Pollution Control Evaluation and Rating (PROPER) and ISO 14001

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Abstract. In the last decade, the program for pollution control evaluation and rating (PROPER) in environmental management and ISO 14001 has been used by companies to reduce industrial pollution in Indonesia. Both programs are important for companies to handle environmental problems. ISO 14001 certified company will get pressure to develop their environmental performance systems in measuring and evaluating the effectiveness of programs related to environmental management. PROPER may be effective for ISO 14001 certified companies to reduce industrial pollution and be used to measure the company's environmental performance. This study aims to investigate the relationship between PROPER and ISO 14001 in controlling, managing and monitoring the environment. Descriptive analysis method is used in this study. The results of this study indicate that there is a relationship between ISO 14001 and PROPER, where the implementation of ISO 14001 helps or effectively for companies to get a better PROPER award and PROPER can be used as an environmental performance to measure the effectiveness of ISO 14001.

1. Introduction
In Indonesia, industrial growth has created pollution problems [1]. Based on monitoring of hazardous and toxic materials waste management in 2016, 295 companies in the mining sector, energy-oil and gas sector, manufacturing sector, agro-industry sector, infrastructure and services sector produced 73,545,067.63 tons of waste [2]. Therefore, companies will get pressure to reduce their environmental problems.

In the last decade, public disclosure of pollution has emerged as a new instrument to reduce industrial pollution [3]. Public disclosure is one mechanism to control environmental performance [4]. Developing an environmental performance system is needed by the company to measure and evaluate the effectiveness of programs related to their environmental management [1]. PROPER was launched as the first major scheme in Indonesia that was used as disclosure of information to the public and measurement of environmental performance [1][5]. PROPER assesses the company's environmental management performance with color ratings (gold, green, blue, red, and black). In PROPER, the results of environmental performance achievement can be known, but the process of achievement is not taken into consideration in the implementation of the evaluation.

ISO 14001 certified companies will get pressure to develop an environmental performance system to measure and evaluate the effectiveness of programs related to their environmental management [1][6][7]. PROPER may be effective for ISO 14001 certified companies to be able to reduce industrial
pollution and be used to measure the company's environmental performance [1]. Therefore, the analysis of the relationship between ISO 14001 and PROPER in controlling, managing and monitoring the environment is the main focus of the research.

2. Literature Review

2.1. Program for pollution control evaluation and rating

Since 1995, the Indonesian Ministry of Environment has developed a program for pollution control evaluation and rating (PROPER) in environmental management to encourage companies to improve their environmental management [8]. PROPER is the first major scheme in Indonesia that was used as information disclosure to the public measurement of environmental performance, and pollution control in Indonesia [3]. The basic principle of PROPER is participants are selective, which is intended for industries that have a major impact on the environment and those who care about their corporate image [8]. PROPER utilizes communities and markets to put pressure on the industry to improve environmental management performance. The environmental performance rating given by PROPER is divided into five colors, including [8]:

| Color | Description |
|-------|-------------|
| Gold  | Provided to companies that have consistently demonstrated environmental excellence in the production and service processes, and carry out ethical and responsible businesses. |
| Green | Provided to companies that have carried out environmental management more than required by regulations (beyond compliance) through the implementation of environmental management systems, utilizing resources efficiently, and implementing social responsibility well. |
| Blue  | Provided to companies that have made environmental management efforts, which are required in accordance with applicable laws and regulations. |
| Red   | Provided to companies that have made environmental management efforts, but have not been in accordance with the requirements as stipulated in the legislation. |
| Black | Provided to companies that have intentionally committed acts or committed negligence resulting in pollution or environmental damage, and violate applicable laws and regulations. |

Based on the Regulation of the Minister of Environment Number 03 in 2014, the PROPER assessment criteria consisted of two categories, including [9]:

A. Obedience assessment criteria

This criterion answers simple questions about company compliance with environmental management. The assessment aspect of this criterion are regulations related to the requirements of environmental documents and their reporting, water pollution control, air pollution control, hazardous and toxic waste management, potential damage to land (specifically for mining activities).

B. The assessment criteria are more than those required by regulations (beyond compliance)

Assessment aspects in beyond compliance criteria include assessment of summary environmental management performance document, the application of environmental management assessment systems, evaluation of achievements in the field of energy efficiency, assessment of reduction and utilization of hazardous and toxic waste materials, evaluation of the application of principles of reduction reuse and recycling of non-hazardous and toxic waste, assessment of reducing air pollutants and greenhouse gas emissions, evaluating achievements in the areas of water efficiency and decreasing water pollution loads, assessment of biodiversity protection; assessment of community empowerment.
2.2. ISO 14001 environmental management system

The environmental management system is one of the main tools that is used to deal with their environmental aspects [10]. Environmental management systems help organizations to identify, manage, monitor and control their environmental problems. ISO 14001 is an international standard that establishes requirements for environmental management systems. The concept of the Plan-Do-Check-Action (PDCA) model is the basic model of the ISO 14001 approach.

Research that focuses on the benefits of ISO 14001 has been widely carried out [12]. ISO 14001 helps companies to control environmental effects due to the organization's operational activities, including reducing pollution, increasing awareness about environmental problems [13]. Besides environmental effects, ISO 14001 can also improve the company's image, reduce the risk of environmental accidents [7], increase company profits, increase customer trust, and improve relations between employees [14].

3. Method

The questionnaire is used as a research instrument. In this study, there are two types of questionnaires. The first questionnaire is utilized to find out the relationship between ISO 14001 and PROPER, and the second questionnaire is figured out to determine the level of approval for the relationship between ISO 14001 requirements and the PROPER obedience assessment category. There are two questions in the first questionnaire, there are PROPER can be used as an environmental performance to measure the effectiveness of ISO 14001 (P1), and the implementation of ISO 14001 is helpful or effective for companies to get a better PROPER award (P2). Each question in the second questionnaire is related to the requirements of ISO 14001: 2015 and each category of aspects of PROPER compliance assessment. Likert scale 1 to 5 is used for the assessment in the questionnaire:

1 = Strongly unrelated / strongly no influential / strongly disagree
2 = Not related / no effect / disagree
3 = Slightly related / slightly influential/ neither agree
4 = Relate / influence / agree
5 = Strongly related / strongly influential / strongly agree

Reliability and validity tests are conducted by researchers. In statistical tests, data can be declared reliable if the reliability coefficient value > 0.60, and the data is valid if the value of corrected item-total correlation> r table [11]. Descriptive analysis is used in processing data to find mean, mode, standard deviation and variance. Descriptive analysis is used to describe the level of respondents' agreement on the relationship between ISO 14001 clauses and aspects of proper obedience assessment. Descriptive analysis of data processing using IBM SPSS 20 software.

Limitation of research problems are the PROPER aspect studied is only the aspect of obedience assessment which consists of 4 aspects, there are document requirements and the environment, water pollution control, air pollution control, hazardous and toxic waste management, and the PROPER obedience value criteria are used as aspects of the rating for blue, red, and black.

4. Results and Discussion

4.1. Relationship between PROPER and ISO 14001

Respondents in this study are employees who work in companies registered as PROPER participants in 2017-2018 period and understood ISO 14001 and PROPER. Demographics of respondents are shown in Table 2.

The reliability test results carried out on P1 and P2 obtained cronbach’s alpha value (0.777) > 0.60, therefore the questionnaire data can be stated reliably as a measure of research. Based on the results of the validity test of 2 items on the questionnaire, it shows that all statements in the questionnaire can be declared valid because of the value of the corrected item-total correlation > 0.328. Figure 1 shows that 24 respondents agreed that PROPER can be used as an environmental performance to measure the effectiveness of ISO 14001 (P1), and the implementation of ISO 14001 is helpful or effective for companies to get a better PROPER award (P2).
Table 2. Demographics respondents

| Number of respondents | Number of companies | Company characteristics | Position and work experience |
|-----------------------|---------------------|-------------------------|------------------------------|
| 39 respondents        | 26 companies        | Industry electronics, pharmaceutical, chemical, metal coating, glass, plastic film, pesticide industry, automotive component, automotive, energy, service contractor and mining, waste management, machinery. | Minimum staff position and work experience of at least 1 year. |

4.2. *The relationship between ISO 14001 requirements and aspects of PROPER obedience assessment*

Each question in this questionnaire is related to the requirements of ISO 14001: 2015 and each category of aspects of PROPER compliance assessment. The purpose of this questionnaire is to find out which clauses of ISO 14001 relate to aspects of PROPER obedience assessment. Obedience assessment PROPER criteria are used as aspects of the rating for blue, red, and black. This criterion focuses on the company's obedience to environmental management regulations. The assessment aspect of this criterion are the regulations related to the requirements of environmental documents and their reporting, water pollution control, air pollution control, hazardous and toxic waste management.

The reliability test results related to the level of agreement on the relationship between the requirements of the ISO 14001: 2015 and aspects of obedience assessment PROPER are presented in Table 3. It shows that the reliability test results carried out on 4 aspects of obedience assessment PROPER obtained cronbach's alpha value > 0.60 therefore the questionnaire data can be stated reliably as a measure of research. Based on the results of the validity test of 43 items on the questionnaire, it can be seen that all statements in the questionnaire can be declared valid because of the value of the corrected item-total correlation > 0.374. Respondents in this study consisted of 30 respondents who understand ISO 14001 and or PROPER from 25 companies. Respondents in companies with a minimum staff position and work experience of at least 1 year. In addition for working in companies, there are also respondents who work as lecturers in environmental engineering and environmental consultants.
Table 3. Reliability test results in relation to ISO 14001 requirements with obedience assessment aspect PROPER

| PROPER category | PROPER assessment aspects | Cronbach’s alpha | Description |
|-----------------|---------------------------|------------------|-------------|
| Obedience assessment | Regulations relating to the requirements of environmental documents and their reporting | 0.769 | Reliable |
| | Water pollution control | 0.787 | Reliable |
| | Air pollution control | 0.786 | Reliable |
| | Hazardous and toxic waste management | 0.785 | Reliable |

4.2.1. Regulations relating to the requirements of environmental documents and reporting.
The aspect of assessing the requirements of environmental documents and reporting is an assessment of the compliance of the company in reporting on environmental management required in the environmental impact assessment (AMDAL)/document for management and monitoring of environmental quality (UKL/UPL). The results of ISO 14001:2015 relationship descriptive analysis requirements and this assessment aspect are shown in table 4. All respondents indicate that clause 5.1, 5.2, 5.3, 6.1.2, 6.1.3, 7.4.3, 8.1.8.2, 9.1.2, 9.2.2, 9.3, 10.2, and 10.3 have a relationship or influence on aspects of assessing the requirements of environmental documents and report. The meaning of relationship is by applying the ISO 14001 requirements, it helps companies to get better assessment of the requirements of environmental documents and reporting according to PROPER.

Table 4. The results of the descriptive analysis of the relationship of ISO 14001 requirements with aspects of assessment of environmental document requirements and report

| Clause ISO 14001 : 2015 | Regulations relating to the requirements of environmental documents and report |
|--------------------------|--------------------------------------------------------------------------|
|                          | Mean | Modus | Std | Variance |
| 5.1. Leadership and commitment | 4.30 | 5 | 1.119 | 1.252 |
| 5.2. Environmental policy | 4.37 | 5 | 0.928 | 0.861 |
| 5.3. Organizational roles, responsibilities and authorities | 4.33 | 5 | 1.028 | 1.057 |
| 6.1.2. Environmental aspects | 4.43 | 5 | 1.040 | 1.082 |
| 6.1.3. Compliance obligations | 4.60 | 5 | 0.675 | 0.455 |
| 7.4.3. External communication | 4.43 | 5 | 0.679 | 0.461 |
| 8.1. Operational planning and control | 4.27 | 5 | 0.907 | 0.823 |
| 8.2. Emergency preparedness and response | 4.13 | 5 | 1.167 | 1.361 |
| 9.1.2. Evaluation of compliance | 4.33 | 4 | 0.802 | 0.644 |
| 9.2.2. Internal audit programme | 4.33 | 4 | 0.802 | 0.644 |
| 9.3. Management review | 4.33 | 4 | 0.802 | 0.644 |
| 10.2. Nonconformity and corrective action | 4.27 | 4 | 0.907 | 0.823 |
| 10.3. Continual improvement | 4.37 | 5 | 1.033 | 1.068 |

4.2.2. Water pollution control.
The aspect of water pollution control assessment is an assessment of the company's compliance with the provisions for the disposal of wastewater into the environment. Assessment aspects of these criteria include adherence to permits, arrangement points, wastewater quality standard parameters, fulfilment of quality standards, and technical provisions. To ensure that the company's wastewater for not exceeding the quality standard, the company is required to carry out monitoring with the frequency and parameters
according to the permit. The results of the descriptive analysis of the relationship of ISO 14001: 2015 requirements with this aspect of assessment are shown in Table 5. All respondents indicate that the clauses 4.1, 4.2, 4.3, 5.2, 5.3, 6.1.2, 6.1.3, 8.1, 9.1.2, 9.2.2, 9.3, 10.2 and 10.3 have a relationship on aspects of water pollution control assessment.

| Clause ISO 14001 : 2015 | Aspects of water pollution control |
|--------------------------|----------------------------------|
| 4.1. Understanding the organization and its context | Mean | Modus | Std | Variance |
| 4.2. Understanding the needs and expectations of interested parties | 4.50 | 5 | 0.938 | 0.879 |
| 4.3. Determining the scope of the environmental management system | 4.50 | 5 | 0.820 | 0.672 |
| 5.2. Environmental policy | 4.47 | 5 | 0.937 | 0.878 |
| 5.3. Organizational roles, responsibilities and authorities | 4.37 | 5 | 1.129 | 1.275 |
| 6.1.2. Environmental aspects | 4.23 | 4 | 1.006 | 1.013 |
| 6.1.3. Compliance obligations | 4.00 | 4 | 1.232 | 1.517 |
| 8.1. Operational planning and control | 4.07 | 4 | 1.143 | 1.306 |
| 9.1.2. Evaluation of compliance | 4.27 | 5 | 1.048 | 1.099 |
| 9.2.2. Internal audit programme | 4.33 | 5 | 0.938 | 0.879 |
| 9.3. Management review | 4.50 | 5 | 0.922 | 0.851 |
| 10.2 Nonconformity and corrective action | 4.47 | 5 | 0.820 | 0.672 |
| 10.3. Continual improvement | 4.37 | 5 | 0.937 | 0.878 |

4.2.3. Air pollution control.
The aspect of air pollution control is an aspect of corporate compliance assessment where all sources of emissions must be identified and monitored. This is used to ensure that emissions disposed to the environment do not exceed the prescribed quality standards. Assessment aspects of this criterion include adherence to sources of emissions, parameters, amount of data for each parameter reported, quality standards for technical requirements. The results of the descriptive analysis of the relationship of ISO 14001: 2015 requirements with this aspect of assessment are shown in Table 6. All respondents indicated that the clauses 4.1, 4.2, 4.3, 5.2, 6.1.2, 6.1.3, 8.1, 8.2, 9.1.2, 9.2.2, 9.3, 10.2, and 10.3 have a relationship or influence on aspects of air pollution assessment.

4.2.4. Hazardous and toxic waste management.
The aspect of assessing the hazardous and toxic waste management is an aspect of evaluating the compliance of the company with the provisions of the waste management permit, where the company is required to collect data on the type and volume of hazardous and toxic waste, further management. The results of the descriptive analysis of the relationship of ISO 14001: 2015 requirements with this aspect of assessment are shown in Table 7. All respondents indicate that the clauses 4.1, 4.2, 4.3, 5.2, 6.1.2, 6.1.3, 7.4.3, 8.1, 8.2, 9.1.2, 9.2.2, 9.3, 10.2, and 10.3 have relationship on aspects of air pollution assessment.
Table 6. The results of the descriptive analysis of the relationship of ISO 14001 requirements with aspects of air pollution control

| Clause ISO 14001 : 2015 | Aspects of air pollution control | Mean | Modus | Std | Variance |
|--------------------------|----------------------------------|------|-------|-----|----------|
| 4.1. Understanding the organization and its context | | 4.33 | 5 | 1.03 | 1.06 |
| 4.2 Understanding the needs and expectations of interested parties | | 4.37 | 5 | 0.93 | 0.86 |
| 4.3 Determining the scope of the environmental management system | | 4.43 | 5 | 0.82 | 0.67 |
| 5.2. Environmental policy | | 4.47 | 5 | 0.94 | 0.88 |
| 6.1.2. Environmental aspects | | 4.03 | 5 | 1.25 | 1.55 |
| 6.1.3. Compliance obligations | | 4.47 | 5 | 0.94 | 0.88 |
| 8.1. Operational planning and control | | 4.17 | 5 | 1.18 | 1.39 |
| 8.2. Emergency preparedness and response | | 4.13 | 5 | 1.25 | 1.57 |
| 9.1.2. Evaluation of compliance | | 4.17 | 5 | 1.18 | 1.39 |
| 9.2.2. Internal audit programme | | 4.17 | 5 | 1.26 | 1.59 |
| 9.3. Management review | | 4.33 | 5 | 1.03 | 1.06 |
| 10.2 Nonconformity and corrective action | | 4.37 | 5 | 0.93 | 0.86 |
| 10.3. Continual improvement | | 4.43 | 5 | 0.82 | 0.67 |

Table 7. The results of the descriptive analysis of the relationship of ISO 14001 requirements with aspects of hazardous and toxic waste management

| Clause ISO 14001 : 2015 | Hazardous and toxic waste management | Mean | Modus | Std | Variance |
|--------------------------|--------------------------------------|------|-------|-----|----------|
| 4.1. Understanding the organization and its context | | 4.47 | 5 | 0.94 | 0.88 |
| 4.2 Understanding the needs and expectations of interested parties | | 4.40 | 5 | 0.93 | 0.87 |
| 4.3 Determining the scope of the environmental management system | | 4.60 | 5 | 0.81 | 0.66 |
| 5.2. Environmental policy | | 4.33 | 5 | 0.92 | 0.85 |
| 6.1.2. Environmental aspects | | 4.37 | 5 | 1.03 | 1.07 |
| 6.1.3. Compliance obligations | | 4.23 | 5 | 1.19 | 1.43 |
| 7.4.3. External communication | | 4.47 | 5 | 1.04 | 1.09 |
| 8.1. Operational planning and control | | 4.33 | 5 | 1.12 | 1.26 |
| 8.2. Emergency preparedness and response | | 4.20 | 5 | 1.19 | 1.41 |
| 9.1.2. Evaluation of compliance | | 4.37 | 5 | 1.13 | 1.27 |
| 9.2.2. Internal audit programme | | 4.37 | 5 | 1.13 | 1.27 |
| 9.3. Management review | | 4.47 | 5 | 0.94 | 0.88 |
| 10.2 Nonconformity and corrective action | | 4.40 | 5 | 0.93 | 0.87 |
| 10.3. Continual improvement | | 4.60 | 5 | 0.81 | 0.66 |

5. Conclusion
Integration of PROPER and ISO 14001 can be used by companies to reduce industrial pollution in Indonesia. This is based on the results of research show that some ISO 14001 clauses affect all aspects
of PROPER compliance assessment. Both programs are important for companies to handle environmental problems caused by company activities and operations. PROPER can be used to measure the company's environmental performance in managing environmental management systems, and implementation of ISO 14001 helpful or effective for companies to get a better PROPER award. ISO 14001 is a system related to the whole aspect of Plan Do Check Action system, for PROPER it is only limited to Do Check processes. This is the basis that a combination of ISO 14001 and PROPER is needed to improve environmental performance in the company.

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