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Stakeholders' Attitude in Implementing Cleaner Production: Case of The Pharmaceutical Industry in Jakarta

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Abstract: The medicines production process in the pharmaceutical industry, especially in herbal medicines, impacts natural resources and environmental pollution. Implementing cleaner production (CP) can be a profitable solution for companies. Stakeholders' attitudes toward implementing CP are needed to achieve a sustainable pharmaceutical industry. This research was conducted at the Company X, a pharmaceutical industry that produces herbal medicines located in DKI Jakarta Province. This research aims to identify and analyze stakeholder attitudes toward CP as assessed based on knowledge, responses, and practices through a questionnaire. The sample was conducted on 122 stakeholders participating in production and environmental management activities, including the Manager, Supervisor, and Staff. The results show that all stakeholders' knowledge, responses, and practices have a good average criteria. The most significant number of stakeholders who were respondents were production staff at 37.7%. From the results of this research, it is hoped that all respondents will know the herbal medicine production process and implement CP at Company X.

Keywords: Cleaner production; Herbal medicine; Jakarta; Pharmaceutical industry; Stakeholders' attitude

Introduction

The current large amount of development has impacted various environmental problems. The industrial is one of the developments that significantly impacts environmental conditions (Sejati et al., 2020). Environmental damage will affect the level of human welfare and the quality of the environment in the future (Méreiné-Berki et al., 2021). The industrial sector has now entered the fourth industrial revolution, providing various benefits, such as high product value and efficient production (Prasetyo & Sutopo, 2018). The pharmaceutical industry is the first industrial sector to experience significant growth in Indonesia (BPS, 2021). The pharmaceutical industry is an industry that produces medicines that have a direct impact on the quality of life of the population (Duarte et al., 2022). The growth of the pharmaceutical market in Indonesia has doubled since 2010 (Tannoury & Attieh, 2017). Large-scale production in the pharmaceutical industry can threaten the environment regarding material transportation, production, and distribution (Siegert et al., 2020). The pharmaceutical industry produces residues, emissions, and waste, most of which exist after production and use, causing environmental pollution (Huang et al., 2021). Therefore, preventing adverse impacts from pharmaceutical production activities is crucial (Martin et al., 2022).

CP can be a solution to reduce environmental impacts. In its implementation, CP prioritizes reducing the use of natural resources, reducing waste, improving cost efficiency (Widodo & Susanto, 2012), and using environmentally friendly technology (Ikram et al., 2021), which can benefit both the environment and humans. However, CP needs to be developed with a CP management system to remain efficient over time (Zhang et al., 2022). The advantage of implementing CP is that it can reduce production costs, waste generation, and energy consumption and increase productivity. In research by Paramitadevi et al. (2017), implementing CP

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was influential in saving raw water consumption of 4500 m^3 daily. However, there are several obstacles to implementing CP, including economic constraints (Djayanti, 2015), technology (Jaya et al., 2019), and human resources (Amrullah et al., 2018).

The term CP was first introduced by UNEP in May 1989 (Chung, Inhee (UNEP DTIE), 2006) and was introduced in Indonesia in 1995 with the launch of the National Commitment to CP (BAPEDAL, 1997). CP is an effort consistently to implement a comprehensive and preventive environmental management strategy for processes, products, and services to increase eco-efficiency and reduce risks to humans and the environment (Sulaeman, 2005). Environmental management strategies through CP are carried out to prevent or avoid the formation of waste in the source (Sumadi & Harmanuaadi, 2017). CP strategies are related to operations, environmental sustainability, maximizing waste reduction, recycling, and reuse, and are microeconomic (Khalili et al., 2015). The implementation of CP is carried out by using energy and efficient materials and substituting products that are harmful to the environment and health with safe products (Hens et al., 2018).

The implementation of CP by companies aims to provide added value by avoiding the consumption of large amounts of resources and minimizing risks to humans and the environment by minimizing waste from production output (Ozturk et al., 2020). Apart from that, implementing CP aims to gain profits for the company and reduce the burden of waste management (Hakimi & Budiman, 2012). CP plays a significant role in sustainable development through resource management and technology development, policy development, and organizing (Giannetti et al., 2020). Sustainable production is committing to activities that balance environmental, social, and economic aspects (Groth et al., 2023). According to the perspectives of Jia et al. (2020), implementing CP allows for the reuse of resources built on the concept of a circular economy. The main driver for companies to implement CP is obtaining economic benefits and reducing the environmental impact of their activities (Neto et al., 2017).

The CP principle is outlined in the 5R (Reduce, Reuse, Recycle, Recovery, and Rethink). The success of implementing CP in the industry must be connected to the role of stakeholders. Stakeholders are people or groups with responsibilities and interests in a company or organization. As a stakeholder, it is recommended to integrate three main pillars (triple bottom lines) in sustainable business: being environmentally, economically, and socially responsible (Sarfraz et al., 2018). The relationship between the triple bottom lines can be seen in Figure 1.

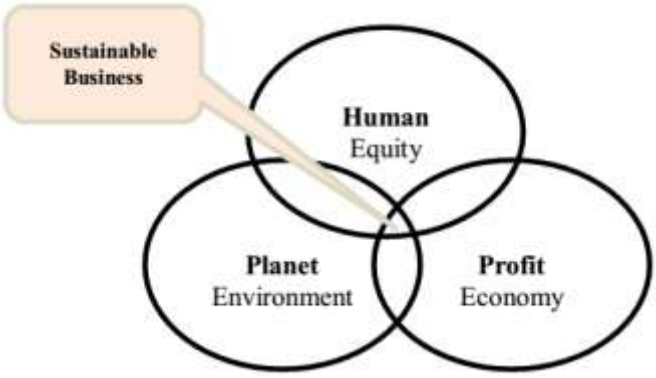

Figure 1. Triple bottom line

From the triple bottom line concept, stakeholders are the part of the company that is responsible for the company's image. Companies that pay attention to environmental issues and carry out ecological management appropriately and well can become sustainable businesses. Apart from paying attention to sound environmental management, a sustainable business always strives for the welfare of the community and its employees from an economic, social, and health perspective. Nowadays, companies must be sustainable so that the business can survive.

Company X has implemented CP, including reducing energy use, controlling wastewater processing, and the destruction process for hazardous and toxic waste (B3). However, Company X must comprehensively assess stakeholders' attitudes toward implementing CP. Evaluation of stakeholder attitudes is based on knowledge, responses, and practices.

Method

This research uses a quantitative approach by collecting questionnaires from 122 stakeholders and analyzing them with descriptive statistics. The stakeholders include employees at the manager, supervisor, and staff levels. The sample size selection for stakeholders in Company X was based on the Isaac and Michael Table, with the chosen error level being 10% from a total population of 220 people. This research aims to identify and analyze stakeholder knowledge, responses, and practices regarding the implementation of CP in Company X. Company X is a pharmaceutical industry that produces herbal medicines located in DKI Jakarta province, Indonesia.

Result and Discussion

This research analyzes stakeholders' attitudes toward implementing CP in the herbal medicine pharmaceutical industry. The data used in this analysis

is obtained from questionnaires given directly to stakeholders at Company X, which is involved in all herbal medicine production activities, including environmental management, with a sample size of 122 people. In the questionnaire given, data on length of service and position, knowledge, responses, and practices are displayed, as shown in Figure 2 and Table 1 below.

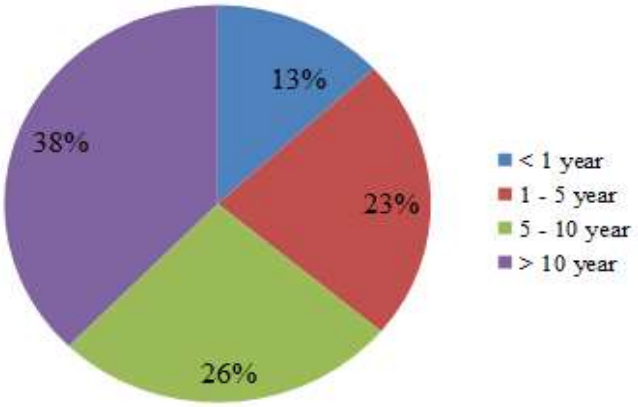

Figure 2. Respondent data based on work period

Based on Figure 2, the findings of the results show that 13.1% of respondents from this research had a working period of less than one year; 1 to 5 years as much as 23%; 5 to 10 years as much as 26.2% and more than ten years as much as 37.7%. From this data, it is hoped that respondents know and apply the entire clean production process in herbal medicine production activities well.

Based on Table 1, the findings show that the most significant number of respondents in this research were employees who worked as production staff at 37.7%, and it is hoped that all respondents will know the herbal medicine production process and implement clean production at the Company X.

Table 1. Respondent Data Based on Career Position

Career Position	Number of Responden (Person)	Average Percentage (%)
Site Supervisor	5	4.1
Operator Staff	15	12.3
Manager	3	2.5
Logistic	5	4.1
Maintenance	9	7.4
Planning Support	2	1.6
Supply Planning Staff	4	3.3
Material Planning Analyst	4	3.3
Site Staff	14	11.5
System Support	1	0.8
Warehouse Staff	10	8.2
Project Engineer	1	0.8
Production Staff	46	37.7
HSE	3	2.5
Total	122	100

Validity and Reliability Test

The validity test of the research instrument was carried out using the Pearson Correlation technique. The validity test results in Table 2 for three variables (knowledge, response, and practice) show that the validity coefficient value exceeds the r table value (0.176), which means the questionnaire is valid so that the researcher can continue distributing questionnaires.

Table 2. Validity Test Results of The Research Instrument

Knowledge		Response		Practice			
Item	Validity Coefficient	Item	Validity Coefficient	Item	Validity Coefficient	Criteria Result	
Definition of Cleaner Production	0.562	Training	0.888	Stakeholder Complicity	0.904	0.176	Valid
Implementation of Cleaner Production	0.547	Implement Support Programs	0.897	Comply with Work Procedures	0.892	0.176	Valid
Benefits of Implementing Cleaner Production	0.384	Routine Inspection of Production Units	0.841	Maintenance Of Facilities And Infrastructure	0.799	0.176	Valid
Obstacles to Implementing Cleaner Production	0.852	Saving Energy and Resource Use	0.855	Supporting The Successful Implementation Of Cleaner Production	0.907	0.176	Valid

Knowledge		Response		Practice			
Item	Validity Coefficient	Item	Validity Coefficient	Item	Validity Coefficient	Criteria	Result
Opportunities to Increase The Implementation of Cleaner Production	0.813	Minimizing Waste Generation	0.838	Participation in Environmental Inspections	0.650	0.176	Valid

After testing the validity of the three variables, the reliability test of the research instrument was carried out using Cronbach's Alpha technique. It is reliable if Cronbach's alpha value is ≥ 0.6. In Table 3 below, Cronbach's Alpha value is more significant than 0.6 so that the items in each variable are declared reliable, and the researcher can continue the research.

Table 3. Reliability Test Results of The Research Instrument

Variable	Cronbach's Alpha	N of Items
Knowledge	0.661	5
Response	0.968	5
Practice	0.876	5

Analysis of Stakeholders' Attitudes

Stakeholder attitudes are assessed based on knowledge, response, and practice. The stakeholders involved in this research include the manager, supervisor, and staff levels who work in the herbal medicine production area. The results of the questionnaire analysis on the knowledge variable are based on five questions, including:

1. Definition of cleaner production.
2. Implementation of cleaner production.
3. Benefits of implementing cleaner production.
4. Obstacles to implementing cleaner production.
5. Opportunities to increase the implementation of cleaner production.

On the response variable, the results of the questionnaire analysis are based on five questions, including:

1. Willingness to take part in training.
2. Willingness to implement programs to support the success of clean production.
3. Routine inspection of production process units.
4. Respondents' involvement in saving energy and resource use.
5. Involvement in minimizing waste generation.

Next, five questions on practice variables, including:

1. Involvement in the application of net production in the company.
2. Follow and comply with work procedures in the company.
3. Playing a role in maintaining the facilities and infrastructure of herbal medicine production.
4. Play a role in supporting the successful implementation of net production in the company.
5. Participation in environmental inspection from agencies related to environmental management.

Table 4. Analysis Results of Stakeholders' Attitudes

Variable	Average of Presentation Assessment Questions (%)	Average Criteria
Knowledge	84.9	Good
Response	90.5	Good
Practice	86.1	Good

Based on Table 4, the results of respondents' level of knowledge regarding the implementation of cleaner production produce good average criteria with a percentage of 84.9%. Followed by response and practice rates are 90.5% and 86.1%. From these results, most respondents work as production, operator, site, warehouse, and maintenance staff and indicate that overall, they have a good attitude toward implementing clean production in the Company. Cleaner production (CP) is closely linked to a commitment to a CP management system, which can impact the Company's performance and image. This aligns with research by Zhang et al. (2022), which states that a commitment to implementing a CP management system for three years increases performance by 25%. CP management systems are essential for a sustainable industry. A sound CP management system needs to be balanced with a good knowledge of each stakeholder. Success in implementing CP at both government and industrial levels requires adequate knowledge (Herat, 2000). Even in America, we have prepared the workforce with new knowledge, skills, and attitudes toward sustainability through clean production since they were students to implement and develop CP strategies in their respective places (McPherson et al., 2016).

During observations, Company X has improved in implementing natural resource management, energy efficiency, company financial conditions, and waste minimization by government regulations and policies to move towards a sustainable industry. The activities carried out by Company X are by CP indicators. CP indicators can be effective if they form a system

consisting of a series of related, complementary, and independent indicators to evaluate the level of CP implementation (Cui et al., 2022). Implementating of CP plays a significant role in sustainable development in resource management and environmentally friendly technologies, policy development, and organizing (Giannetti et al., 2020). Social responsibility and eco-innovation are also inseparable from sustainability goals, where many people are aware of the environment, and sustainable consumption includes principles and values related to environmental issues that contribute to a sustainable future (Severo et al., 2018).

Apart from that, Company X has committed to integrating the ISO 14000 series in implementing its environmental management system. The implementation of ISO 14000 has a significant impact on companies that implement CP because it can foster an environmentally friendly culture within the company and contribute to the systematic allocation of resources for decision-making processes (Oliveira et al., 2016) as well as bringing competitive advantages in the international market (Chen, 2005). The main principles of CP are reducing the use of resources and energy, avoiding dangerous and toxic raw materials, using environmentally friendly technology, carrying out established management and procedures, and understanding the life cycle of a product (Indrasti & Fauzi, 2009). The implementation of CP in industry carried out inclusively can positively impact companies, including an increase in corporate environmental responsibility and competition in product and financial markets (Hu et al., 2022).

Conclusion

This research analyzes the magnitude and influence of stakeholders' attitudes toward implementing CP. Stakeholders have an essential role in the successful development of the implementation of CP in the pharmaceutical industry. The stakeholders referred to in this research are employees with managers, supervisors, and staff-level positions who work in the herbal medicine production area. The questionnaires were distributed to 122 respondents. The results showed that 84.9% had good knowledge of implementing clean production, 90.5% had an excellent response to implementing clean production, and 86.1% had good practices regarding implementing CP in the herbal medicine pharmaceutical industry. In analyzing stakeholders' attitudes, it is known that with knowledge, responses, and good practices from relevant stakeholders, an excellent, cleaner production management system can be formed and impact the performance level of stakeholders. A CP management system is essential for a sustainable pharmaceutical industry. Apart from that, the results of this research can be used as suggestions aimed at the management of Company X, the entire pharmaceutical industry, and the government to collaborate by developing the implementation of CP to improve the performance of CP in the future.

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Author Contributions
Conceptualization, analysis & writing, proofreading – original draft preparation, Alin Erlita Nurfatiha; supervision, validation, writing – review & editing, Ahyahudin Sodri; methodology, validation, writing – review & editing, Dwi Nowo Martono.

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Conflicts of Interest
The authors declare no conflict of interest.

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