

Qualitative Comparative Analysis of the SDGs Program to Alleviate Climate Change: Case Study on PT. Pupuk Indonesia

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ABSTRACT

Climate change drives the importance of implementing the SDGs in Indonesia. This research analyzes the implementation of the SDGs in six subsidiaries of PT Pupuk Indonesia and its implications for sustainability strategies. A qualitative approach using Qualitative Comparative Analysis (QCA) was employed to analyze secondary data from sustainability reports and annual reports. The results show that all subsidiaries have adopted environmental initiatives such as carbon emission reduction and energy efficiency, but variations are observed in governance aspects. Pupuk Kaltim stands out with a holistic ESG commitment, including reforestation, water management, community empowerment, and international-standard governance. The implementation of ESG enhances competitiveness, corporate image, and contribution to the SDGs. Subsidiaries of PT Pupuk Indonesia can serve as role models for other companies. The research recommends enhancing governance capacity, synergy among subsidiaries, and resource allocation for sustainable innovation. These findings underscore the critical role of the SDGs in climate change mitigation and achieving sustainable development in Indonesia's strategic sectors.

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I. INTRODUCTION

Indonesia, as an archipelagic country in Southeast Asia, is experiencing significant climate change. This change is marked by an increase in the intensity of various extreme weather phenomena, such as floods, droughts, and storms, which have a widespread impact on people's lives. This makes Indonesia vulnerable to the negative impacts of climate change. According to Law Number 32 of 2009, the negative impacts of climate change in Indonesia can be measured through several parameters, including temperature increase, rising sea levels, more frequent storm occurrences, and longer drought periods. Indonesia's agricultural sector's dependence on water availability and consistent weather patterns makes it highly vulnerable to the impacts of climate change. Climate change can disrupt planting and harvesting cycles, negatively impacting agricultural production and food availability (Arham & Adiwibowo, 2022).

One of the main indicators is the air temperature anomaly, which is the difference between the current temperature and the average temperature over the period 1991-2024. Based on observations by the Meteorology, Climatology, and Geophysics Agency (BMKG) from 117 BMKG observation stations, the average temperature in Indonesia during the period 1991-2020 was 26.7°C. In 2024, the average temperature reached 27.5°C, resulting in an anomaly of 0.8°C. This makes 2024 the hottest year in Indonesia since 1981. This drastic temperature increase has the potential to disrupt the climate balance and threaten agricultural productivity (Adityo Wicaksono, 2025).

Climate change is primarily caused by human activities that increase greenhouse gas emissions into the atmosphere. The use of fossil fuels such as coal, oil, and natural gas in industry, transportation, and power generation produces carbon dioxide (CO₂) emissions and other gases that trap heat in the atmosphere, thereby causing global warming. In addition, deforestation or logging reduces the Earth's ability to absorb CO₂, thereby increasing the concentration of that gas in the atmosphere. Agricultural and industrial activities also contribute by releasing methane (CH₄) and nitrous oxide (N₂O), which have a higher warming potential than CO₂. Although natural factors such as variations in solar activity and volcanic eruptions can affect the climate, scientists agree that the current climate change is largely caused by human activity (Ade S, 2024). This is where the concept of Sustainability Development Goals (SDGs) becomes relevant. SDGs, which are rooted in the corporate social responsibility (CSR) movement at the end of the 20th century, have evolved into a systematic framework for assessing the impact of companies on the environment, society, and governance. Since the "Who Cares Wins" report by UNEP FI in 2004, the SDGs have become a global standard in promoting sustainable business practices (UNEP FI, 2004).

The SDG program is very important in addressing climate change because it encourages companies to operate in an environmentally friendly, socially responsible, and sustainable manner. The SDG program is very important in addressing climate change because it encourages companies to operate in an environmentally friendly, socially responsible, and sustainable manner (Zazkia & Putri, 2024). SDGs help reduce greenhouse gas emissions by encouraging the use of renewable energy and energy efficiency. Additionally, the SDGs support the sustainable management of natural resources, reduce deforestation, and preserve forests that are crucial for carbon absorption. In the agricultural sector, the SDGs encourage more environmentally friendly practices to reduce pollution and enhance food security. Additionally, good governance ensures that sustainability policies are implemented transparently (Sholikha et al., 2023). Thus, the SDGs help companies reduce their negative impact on climate change and support long-term solutions.

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In Indonesia, PT Pupuk Indonesia, as the largest fertilizer producer in the country, plays a strategic role in adopting and implementing the SDGs across all its subsidiaries. The implementation of SDGs in each subsidiary of Pupuk Indonesia can vary, depending on business characteristics, geographical location, and specific challenges faced. There are six subsidiaries of Pupuk Indonesia that have shown a strong commitment to the implementation of the SDGs. They realize that the

sustainability of their business does not only depend on economic performance but also on responsible environmental and social management.

From the above issues, questions arise regarding the comparison of ESG program implementation among PT Pupuk Indonesia's subsidiaries in their efforts to mitigate climate change, and what the implications are for PT Pupuk Kaltim's sustainability strategy? This article aims to analyze the comparison of the implementation of Environmental, Social, and Governance (ESG) programs across various subsidiaries of PT Pupuk Indonesia, with a primary focus on PT Pupuk Kaltim. In addition, this research also aims to identify the factors that influence the variation in ESG implementation in each subsidiary. Using comparative analysis methods, this article will describe the effectiveness of the implemented ESG programs in reducing environmental impact and supporting the company's sustainability. Furthermore, this article will also explain the implications of ESG implementation on the sustainability strategy of PT Pupuk Kaltim and provide policy and strategy recommendations to enhance the effectiveness of ESG in supporting sustainable development.

II. LITERATURE REVIEW

Stakeholders Theory

Stakeholder is a concept in management and business ethics that states that companies are not only responsible to shareholders but also to all stakeholders affected by the company's activities. According to stakeholder theory, companies must consider and meet the interests of various parties involved and affected by the company's activities, not just shareholders. Stakeholders are defined as individuals or groups who can influence or be influenced by the achievement of the organization's goals. Stakeholder theory emphasizes that companies must manage relationships with various stakeholders, not just focus on shareholders. This is considered important for the sustainability and long-term success of the company (Freeman, 2010).

Sustainable Development Goals (SDGs)

At the United Nations Conference on Environment and Development (UNCED) di June 1992, lebih dari 178 negara telah menyetujui Agenda 21, "a plan of action to establish a global partnership for sustainable development to improve human lives and protect the environment." In September 2000, setiap satu dari 191 klausul yang dibuat oleh UN telah menyetujui Millennium Development Goals (MDGs)(Hanssonetal.,2021).

The main goal of the MDGs, which included eight distinct targets, was to eradicate extreme poverty and hunger by the year 2015. All of these were prerequisites for the UN's 2015 adoption of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals. Together, the 17 indisputable Sustainable Development Goals serve as a common blueprint for a feasible future, and the goals are represented by 17 well-known images. These 17 objectives include 169 subgoals (also known as "targets" or "SDG targets" from now on) that can be further divided into 231 intriguing points (Chopra et al., 2022).

In 2015, all UN member states adopted the goals, establishing a 15-year plan to achieve them. Although there has been some progress today, overall, the pace and scale of the activities to achieve the goals have not yet increased. The UN's Agenda 2030 has in some ways revived the concept of sustainable development in the digital age. The current conceptualisation of maintainable improvement has expanded its extraordinary focus on the possibility of monetary advancement just to even more thoroughly wrap the three components of financial development, social development, and biological confirmation. This is sometimes implied as "progression that resolves the issues of the current age without compromising the limit of individuals in the future to resolve their issues" as described in an accomplishment report distributed in 1987. The three pillars of maintainability environment, society, and economy are expanded upon and consolidated by the 17 Sustainable Development Goals, which also extend a wide range of perspectives associated with maintainability, such as the regular and social effects of industry, poverty alleviation, sexual orientation uniformity, guaranteeing that everyone is admitted for clinical consideration, biodiversity assurance, etc (Mensah, 2019).

The SDGs use reasoning and association to help individuals make the best choices now to improve the economic well-being of future generations. They provide clear guidelines and resources that any nation can use in accordance with its particular needs and the typical struggles faced by the global community. The SDGs are a comprehensive plan. They address the underlying cause of poverty and work with us to improve things for both of us and the environment.

III. METHODS

This research uses a qualitative approach with the type of research known as qualitative comparative analysis (QCA). QCA is a research method that combines elements of quantitative and qualitative research. It is based on grounded theory and Boolean logic. This method allows researchers to discover complex causal relationships by examining the conditions that lead to specific outcomes. QCA is very useful for analyzing cases thoroughly by considering each case as a unique combination of conditions and outcomes (Schneider, C.Q., Wagemann, 2012).

The author examines the implementation of the Sustainable Development Goals (SDGs) program across all subsidiaries of PT Pupuk Indonesia. The determination of subjects used purposive sampling with the criteria being the subsidiaries of PT Pupuk Indonesia that produce and sell fertilizers, resulting in 6 entities as research subjects. Meanwhile, the research object focuses on the implementation of 14 SDG indicators across all subsidiaries of PT Pupuk Indonesia as an effort to mitigate climate change and the company's sustainability strategy.

The data in this study were obtained from secondary sources, including sustainability reports, company annual reports, and SDG policies published by PT Pupuk Indonesia. The collected data was then analyzed using the QCA method by compiling a table that displays the implementation of the SDGs across all subsidiaries of PT Pupuk Indonesia that produce and sell fertilizers. This analysis includes various 14 SDG indicators, such as environmental policies, social programs, and corporate governance, in order to identify implementation patterns, program effectiveness, and challenges faced by PT Pupuk Indonesia's subsidiaries. The results of this analysis are expected to provide a comprehensive overview of the implementation of the SDGs in the subsidiaries of PT Pupuk Indonesia and to identify best practices that can be applied to enhance the effectiveness of the SDGs in supporting sustainable development.

IV. RESULT AND DISCUSSION

As part of their commitment to sustainability, PT Pupuk Indonesia and its subsidiaries have implemented Environmental, Social, and Governance (ESG) principles in their operations. In the environmental field, each company focuses on reducing environmental impact through green energy transformation, the development of environmentally friendly technology, and waste management. For example, PT Petrokimia Gresik implements the use of electric vehicles (Jagat, 2024) and undergoes green energy transformation (Friska Yolanda, 2024), while PT Pupuk Kujang innovates with the development of green ammonia and hydrogen ecosystems (Fernan Rahardi, 2023). PT Pupuk Kaltim actively participates in environmental conservation with reforestation and water management programs (Pupuk Kaltim, n.d.-a), while PT Pupuk Iskandar Muda (PIM) implements effective environmental management to minimize operational impacts (Environmental Management, n.d.)

In the social field, these companies actively implement Corporate Social and Environmental Responsibility (TJSL) programs, such as community empowerment and skills development programs. PT Petrokimia Gresik won the Gold Winner ISDA 2024 award thanks to its TAMENG program (Komunikasi Korporat PG, 2024), while PT Pupuk Kujang organized community training and development with MSI Institute (MSI Institute, 2024). PT Pupuk Kaltim focuses on empowering the surrounding community through access to education and health (Pupuk Kaltim, n.d.-c). PT Pupuk Iskandar Muda runs a CSR program focused on sustainable development and received the Top CSR Awards 2024 (Samosir, n.d.).

In the field of governance, each company demonstrates transparency and accountability through annual sustainability reports and policies that support the principles of good corporate governance. PT Petrokimia Gresik achieved Platinum Rank in the Asia Sustainability Reporting Rating (ASRRAT) 2023 (PG, 2023), while PT Pupuk Kaltim demonstrates commitment to Good Corporate Governance (GCG) with clear policies and procedures (Pupuk Kaltim, n.d.-b). PT Pupuk Iskandar Muda maintains

No	SDGs	PT PG			PT Pupuk Kujang			PT PKT			PT PIM			PT PUSRI			PT Pupuk Indonesia Pangan		
		21	22	23	21	22	23	21	22	23	21	22	23	21	22	23	21	22	23
1	No Poverty	√	√	√	√	√	×	×	√	√	√	√	√	√	√	×	×	×	
2	Zero Hunger	√	√	√	√	√	×	√	√	√	√	√	√	√	√	×	×	×	
3	Good Health and Well-Being	√	√	√	√	√	×	√	√	√	×	×	×	√	√	√	×	×	×
4	Quality Education	√	√	√	√	√	×	√	√	√	√	√	√	√	√	×	×	×	
5	Gender Equality	√	√	√	√	√	×	√	√	√	×	×	×	√	√	√	×	×	×
6	Clean Water and Sanitation	√	√	√	√	√	×	×	√	√	√	√	√	√	√	×	×	×	
7	Affordable and Clean Energy	√	√	√	√	√	×	×	√	√	×	×	×	√	√	√	×	×	×
8	Decent Work and Economic Growth	√	√	√	√	√	×	√	√	√	√	√	√	√	√	×	×	×	
9	Industry, Innovation, and Infrastructure	√	√	√	√	√	×	√	√	√	×	×	×	√	√	√	×	×	×
10	Reduce Inequalities	√	√	√	√	√	×	×	√	√	×	×	×	√	√	√	×	×	×
11	Sustainable Cities and Communities	√	√	√	√	√	×	√	√	√	×	×	×	√	√	√	×	×	×
12	Responsible Consumption and Production	√	√	√	√	√	×	×	√	√	×	×	×	√	√	√	×	×	×
13	Climate Action	√	√	√	√	√	×	√	√	√	√	√	√	√	√	×	×	×	
14	Life Below Water	√	√	√	√	√	×	√	√	√				√	√	√	×	×	×
15	Life on Land	√	√	√	√	√	×	√	√	√	√	√	√	√	√	×	×	×	
16	Peace, Justice, and Strong Institution	√	√	√	√	√	×	√	√	√	√	√	√	√	√	×	×	×	
17	Partnership for the Goals	√	√	√	√	√	×	√	√	√	×	×	×	√	√	√	×	×	×

governance with sustainability reports and recognition of its CSR. The implementation of ESG is measured through various Sustainable Development Goals (SDGs) indicators that reflect the company's contributions in environmental, social, and governance aspects. The following table compares the extent to which each subsidiary has integrated ESG through the achievement of SDGs, thus providing an overview of their efforts in supporting sustainable development and climate change mitigation.

Keterangan:

PKT : PT Pupuk Kaltim PKP : PT Petrokimia Gresik PIM : PT Pupuk Iskandar Muda
 PSP : PT Pupuk Sriwijaja Palembang PIP : PT Pupuk Pangan Indonesia PKC : PT Pupuk Kujang
 √ : Implemented × : Not Implemented

The table above provides a comparison of environmental, social, and governance (ESG) principles across various subsidiaries of PT-Pupuk-Indonesia through the Sustainable Development Goals (SDG).

All companies have different levels of participation in implementing ESG. This reflects our commitment to sustainability in the fertilizer industry. The implementation of ESG can be analyzed in three main aspects: Environmental, Social, and Governance. Each is represented by various SDG indicators. From an environmental perspective, most subsidiaries have contributed to the achievement of related SDGs, such as Climate Action (SDG 13), Life on Land (SDG 15), and Life Below Water (SDG 14). This demonstrates a commitment to climate change mitigation, biodiversity conservation, and sustainable natural resource management. PT Petrokimia Gresik, PT Pupuk Kujang, and PT Pupuk Kalimantan Timur, for example, have shown significant efforts in reducing carbon emissions and energy efficiency through green energy innovations and environmental conservation. Meanwhile, PT Pupuk Iskandar Muda and PT Pupuk Sriwidjaja Palembang are also active in waste management and water use efficiency to support sustainability principles. However, PT Pupuk Indonesia Pangan has more limited involvement in environmental aspects, which indicates an opportunity to enhance the implementation of green strategies in its operations.

In the social aspect, these companies play a role in community empowerment through involvement in SDGs such as No Poverty (SDG 1), Zero Hunger (SDG 2), Good Health and Well-being (SDG 3), Quality Education (SDG 4), and Gender Equality (SDG 5). The implementation of ESG in this social aspect reflects the company's responsibility in improving the welfare of the surrounding community, particularly farmers and workers. The majority of PT Pupuk Indonesia's subsidiaries have contributed to food security through sustainable agriculture programs, one of which is the "MAKMUR" program that provides support to farmers in increasing productivity. In addition, the company is also active in providing access to education, health, and creating an inclusive work environment with gender equality. The existence of sustainable CSR programs is a key factor in strengthening the social aspects of each company.

Meanwhile, in the aspect of corporate governance, the implementation of ESG can be seen from the participation of companies in Peace, Justice, and Strong Institutions (SDG 16) and Partnership for the Goals (SDG 17). Companies such as PT Petrokimia Gresik, PT Pupuk Kalimantan Timur, and PT Pupuk Iskandar Muda have demonstrated good corporate governance by applying the principles of transparency, accountability, and integrity. This is reflected in the awards they have received in sustainability reports as well as the implementation of governance systems based on technology and strict regulations. In addition, partnerships with various stakeholders, including the government, academics, and local communities, have become key factors in the successful implementation of ESG in these companies.

Overall, the implementation of ESG through SDG indicators in the subsidiaries of PT Pupuk Indonesia shows that most companies have made efforts in the environmental, social, and governance aspects. However, there is variation in the level of implementation in each company, with some still having room for improvement, especially in the aspects of environmental and corporate governance. Improving synergy in the implementation of ESG across all subsidiaries will further strengthen PT Pupuk Indonesia's role in supporting sustainable development and climate change mitigation in Indonesia.

To enhance the effectiveness of the SDGs in sustainable development, companies need to integrate Environmental, Social, and Governance (ESG) into their business strategies through sustainability policies, energy efficiency, and environmental management. Green technology innovations, such as renewable energy and the circular economy, can reduce emissions and improve resource efficiency. In addition, community empowerment programs in the fields of education, health, and food security play a role in improving social welfare. Transparent corporate governance and synergy among subsidiaries are also important for strengthening sustainability policies. Collaboration with the government, communities, and academics can accelerate innovation and the implementation of sustainable solutions. With this practice, companies can be more effective in supporting the SDGs, climate change mitigation, and sustainable development.

V. CONCLUSION

The conclusion of this article shows that PT Pupuk Indonesia and its subsidiaries, including PT Petrokimia Gresik, PT Pupuk Kujang, PT Pupuk Kalimantan Timur, PT Pupuk Iskandar Muda, PT Pupuk Sriwidjaja Palembang, and PT Pupuk Indonesia Pangan, demonstrate a strong commitment to sustainability through the implementation of ESG measured by the SDGs. Although the levels of achievement vary, the majority of subsidiaries have made efforts in the fields of environment, social, and governance. Companies such as PT Petrokimia Gresik, PT Pupuk Kujang, and PT Pupuk Kalimantan

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Timur have been actively reducing environmental impact and improving energy efficiency, whereas PT Pupuk Indonesia Pangan needs to enhance its environmental efforts. PT Pupuk Indonesia and its subsidiaries demonstrate seriousness in conducting sustainable business by applying ESG principles. In the environmental aspect, they strive to reduce negative impacts through green energy innovations, waste management, and various conservation programs. In the social field, they actively assist the community with training, access to education, health, and empowerment programs that have a tangible impact. From a governance perspective, transparency and accountability are continuously maintained through sustainability reports and clear policies. Various awards received reflect success in implementing responsible business practices. Overall, these measures strengthen PT Pupuk Indonesia's role in supporting sustainable development and maintaining a balance of environmental, social, and good governance. PT Pupuk Kaltim has become a prime example with a holistic ESG approach that includes reforestation, water management, community empowerment, and international governance, which enhances competitiveness and contributions to the SDGs. To maximize the SDGs, it is necessary to enhance governance capacity, synergy, and investment in sustainable innovation, including green technology and the circular economy. Success in the fertilizer industry can serve as a model for other companies in facing climate change and achieving sustainable development, demonstrating that responsible business practices are the key to a better future.

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