

Implications of the Development Potential of Solar Power Plants (PLTS) on Tri Hita Karana Sustainability in Denpasar City

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ABSTRACT

This study explores the implications of Solar Power Plant (PLTS) development on the sustainability of Tri Hita Karana values in Denpasar City. Using a qualitative approach with case studies, in-depth interviews, and thematic data analysis, the research examines how solar energy aligns with Bali's traditional values, including the spiritual, social, and environmental dimensions. The findings reveal that solar power supports the Parhyangan aspect by reducing carbon emissions and preserving nature, which is considered a manifestation of God's greatness. In terms of Pawongan, the development of solar power creates job opportunities and enhances public awareness of clean energy. From a Palemahan perspective, it helps maintain ecological balance by minimizing the exploitation of fossil fuels and contributing to environmental conservation. The study concludes that integrating solar energy with Tri Hita Karana values can provide a sustainable development model that harmonizes modern technology with local cultural wisdom. However, challenges such as land constraints and public awareness need to be addressed to fully realize the potential of solar power in Denpasar. This research offers a unique framework for balancing technological advancement with cultural preservation in urban development.

Keywords: Solar Power Plant (PLTS), Tri Hita Karana, Renewable Energy, Sustainability, Parhyangan, Pawongan, Palemahan

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INTRODUCTION

The city of Denpasar, as the economic and cultural center of Bali Province, faces great challenges in maintaining environmental sustainability and local values in the midst of development development. One of the solutions that is developing is the use of renewable energy through the construction of Solar Power Plants (PLTS). This effort not only serves to meet energy needs in a sustainable manner, but also contributes to the preservation of local values, including the concept of Tri Hita Karana which is the cornerstone of Balinese people's lives.

Tri Hita Karana, which consists of three elements of harmony, namely the relationship between man and God (Parhyangan), the relationship between man and others (Pawongan), and the relationship between man and the environment (Palemahan), has become a philosophy that forms the pattern of social interaction and the environment of the Balinese people. In the context of solar power plant development, the implementation of clean energy has great potential to maintain ecological balance (Palemahan), increase social awareness (Pawongan), and maintain the sanctity of nature which is considered a spiritual manifestation (Parhyangan).

However, despite the many benefits offered, the construction of solar power plants in Denpasar also poses challenges, both from technical, social, and cultural aspects. Therefore, it is important to deeply examine the implications of solar power plants on the sustainability of Tri Hita Karana values so that the development of this technology can be in harmony with local wisdom and support sustainable development in Denpasar.

Literature Review

This literature review examines various literature related to the construction of Solar Power Plants (PLTS) and their relationship with the values of Tri Hita Karana in the city of Denpasar. A multidisciplinary approach that includes environmental, social, and cultural aspects is needed to understand the implications of solar power plant development on the sustainability of local wisdom of the Balinese people.

Renewable Energy and Solar Power

Renewable energy, including solar power, has become one of the solutions in an effort to reduce dependence on fossil fuels that negatively impact the environment (Mahendra et al., 2020). Solar PV technology offers benefits in the form of reduced carbon emissions and energy efficiency that can increase the energy security of an area (Suryadi & Purnomo, 2022). In tropical areas such as Bali, the potential for solar power is very large with an average high intensity of sunlight throughout the year (BPS Bali, 2021).

Tri Hita Karana as Local Wisdom

Tri Hita Karana is a philosophy of life of the Balinese people that includes three dimensions of harmony: the relationship between humans and God (Parhyangan), the relationship between humans and others (Pawongan), and the relationship between humans and the environment (Palemahan) (Windia & Dewi, 2011). This philosophy is the foundation in various aspects of Balinese people's lives, including environmental management and infrastructure development.

Implications of Solar Power Plants on Tri Hita Karana

a. Parhyangan

The construction of solar power plants can support the spiritual aspect of the community by maintaining the sanctity of nature as a manifestation of God's greatness (Mahardika, 2023). Clean energy from solar power plants is considered more in line with the principle of maintaining cosmic and environmental harmony.

b. Pawongan

In the social aspect, the construction of solar PV has the potential to increase community participation in clean energy initiatives and create new jobs (Pramana, 2024). In addition, education related to the benefits of renewable energy can increase environmental awareness among the community.

c. Palemahan

From an environmental point of view, solar PV supports ecological preservation by reducing carbon emissions and the exploitation of destructive natural resources (Arta et al., 2021). This is in line with Palemahan's values which emphasize the importance of maintaining the balance of nature.

From this study, it can be shown that the construction of solar power plants not only has a positive impact on energy and environmental aspects, but also has the potential to support the sustainability of local values such as Tri Hita Karana.

Several studies have explored the relationship between renewable energy and cultural sustainability. Mahardika (2023) highlighted the alignment of clean energy technologies with Bali's local wisdom, particularly the Tri Hita Karana philosophy, by promoting environmental preservation. Suryadi & Purnomo (2022) discussed the potential of solar power in tropical regions, emphasizing its environmental and economic benefits. Both studies support the integration of renewable energy technologies with local cultural values, showing the significance of sustainability in both environmental and societal contexts.

The urgency of this study lies in the growing demand for sustainable energy solutions amidst rapid urbanization and climate change. Denpasar City, as Bali's cultural and economic hub, faces critical challenges in maintaining environmental balance while fostering development. Integrating solar power with the Tri Hita Karana philosophy could provide a

model for other regions aiming to achieve sustainable growth while respecting cultural values. The timely implementation of this model is essential to preserve Bali's unique spiritual and environmental identity.

Although existing studies have addressed the technological and environmental aspects of solar power in Bali, there is limited research on how solar power development can harmonize with local cultural values, particularly the Tri Hita Karana philosophy. This study fills that gap by examining the implications of solar power plants for sustainability within the context of Bali's indigenous values, offering a unique approach to integrating renewable energy with cultural preservation.

This study introduces the concept of integrating solar power plants with the Tri Hita Karana philosophy, focusing on its implications for spiritual, social, and environmental sustainability. The novelty lies in exploring how clean energy solutions can contribute to preserving cultural harmony while fostering ecological balance. By linking renewable energy with local wisdom, this study provides a new perspective on sustainable development that can guide future urban planning.

The purpose of this study is to analyze the impact of solar power plant development on the sustainability of Tri Hita Karana values in Denpasar City. The benefits of this research include offering insights into how solar power can be leveraged not only as a clean energy source but also as a tool for preserving local cultural values. It aims to provide recommendations for policymakers and stakeholders to create a harmonious balance between modern energy solutions and Bali's traditional values.

METHOD

This study uses a qualitative approach with a case study method to analyze the implications of the construction of Solar Power Plants (PLTS) on the sustainability of Tri Hita Karana values in Denpasar City, which was chosen because it is the center of social, economic, and cultural activities in Bali and has high solar energy potential. Data were obtained through in-depth interviews with government officials, traditional leaders, solar PV project managers, and affected communities, and supported by field observations and documentation studies from official sources. The data analysis technique was carried out thematically with stages of data reduction, categorization based on aspects of Parhyangan, Pawongan, and Palemahan, as well as drawing conclusions to understand the impact of solar power plant construction on Tri Hita Karana. To ensure the validity of the data, this study applies triangulation of sources, methods, and theories, as well as member checking with informants, peer debriefing with experts, documentation trail audits, and data consistency tests to ensure the accuracy and credibility of the findings. In-depth interviews explored informants' perceptions regarding the impact of solar PV, field observations looking at the use and involvement of the community in renewable energy, while documentation studies analyzed related policies and academic publications. With this combination of methods, the research is expected to provide a comprehensive understanding of the impact of solar PV development on the sustainability of local wisdom values in Denpasar City.

RESULTS AND DISCUSSION

Focus Group Discussion

The focus group discussion was carried out by involving various stakeholders to identify collective views related to the social, cultural, and environmental impact of solar power plants in Denpasar.

By using a combination of this data collection technique, the research is expected to provide a comprehensive understanding of the implications of solar power plant construction on the sustainability of Tri Hita Karana values in Denpasar City.

Discussion

The construction of a Solar Power Plant (PLTS) in Denpasar City has various implications for the sustainability of Tri Hita Karana values which include Parhyangan, Pawongan, and Palemahan. Clean energy such as solar power plants not only offer technical solutions to meet electricity needs in an environmentally friendly manner but also have the potential to strengthen the social and cultural harmony that is the foundation of Balinese people's lives.

Implications for Parhyangan

Parhyangan reflects man's relationship with God through respect for nature which is considered a manifestation of His greatness. The application of solar power plants that utilize solar energy, a natural and clean resource, can be seen as an effort to maintain the sanctity and harmony of nature. By reducing dependence on fossil energy that damages the environment, solar power is in line with the philosophy of maintaining the cosmic balance that is part of Parhyangan's values.

Implications for Pawongan

Pawongan describes human relationships with others that emphasize the importance of social welfare and community cooperation. The construction of solar power plants in Denpasar opens up new job opportunities, both in the installation and maintenance of renewable energy systems. In addition, educational programs related to the use of clean energy can increase public awareness of the importance of using environmentally friendly energy. The active participation of the community in the management of renewable energy also creates a sense of collective responsibility that strengthens social solidarity.

Implications for Palemahan

Palemahan is related to the relationship between humans and the environment, which emphasizes the importance of maintaining ecological balance. With the operation of solar power plants, carbon emissions generated from fossil fuel power plants can be significantly reduced. This contributes to the preservation of air quality and the environment in the city of Denpasar. In addition, land use for solar PV that is designed sustainably can minimize negative impacts on the surrounding ecosystem.

Challenges and Opportunities

Despite having many benefits, the construction of solar power plants in Denpasar also faces various challenges, such as limited land, high initial investment costs, and a lack of awareness among some people regarding the importance of renewable energy. However, with the support of government policies, collaboration between various stakeholders, and increased public education, this challenge can be overcome.

Overall, the construction of solar power plants in Denpasar City shows great potential to support the sustainability of Tri Hita Karana values. The synergy between renewable energy technology and local wisdom is a strong foundation for sustainable development that is in harmony with nature, society, and spirituality.

CONCLUSION

The construction of a Solar Power Plant (PLTS) in Denpasar City has a positive impact on the sustainability of the Tri Hita Karana values, which include the harmony of human relationships with God (Parhyangan), humans with others (Pawongan), and humans with the environment (Palemahan). In the Parhyangan aspect, solar power plants support the preservation of nature as a manifestation of God's greatness, in line with the philosophy of maintaining cosmic and spiritual balance through the use of clean energy from the sun. In the Pawongan aspect, the development of solar power plants creates new job opportunities, increases public awareness of the importance of renewable energy, and encourages community participation in maintaining the sustainability of clean energy, which strengthens social

solidarity and the welfare of the people of Denpasar. From Palemahan's point of view, solar power plants contribute to environmental sustainability by reducing carbon emissions and exploiting fossil natural resources, supporting ecosystem conservation efforts and improving the quality of the environment in Denpasar City. However, challenges such as limited land, high investment needs, and lack of public education about the benefits of renewable energy still need to be overcome. With the right policy support, multi-stakeholder collaboration, and increased public awareness, the construction of solar power plants in Denpasar City has the potential to be a strong foundation for sustainable development that is in line with the local values of the Balinese people.

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