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Training on Solar Cell Utilization for Edutourism Enhancement

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Abstract

Purpose: This study article seeks to examine the efficacy of a training program centered on solar cell application to improve edutourism in Pulau Pari. The study seeks to tackle the issue of insufficient knowledge and skills in renewable energy within the local community and emphasize the importance of integrating sustainable practices in the tourism industry.

Method: This investigation implements a mixed-methods approach. Quantitative data was gathered using pre- and post-training evaluations to assess the enhancement of participants' knowledge and skills. Qualitative data was acquired via interviews and observations to elucidate the individuals' experiences and perceptions. The data underwent analysis by descriptive statistics and thematic analysis.

Practical Applications: The results of this study have practical implications for the tourism industry as a whole and for the local community of Pulau Pari. The outputs of the training program can guide the creation of analogous programs in other locations, fostering the implementation of renewable energy and sustainable practices in edutourism. The findings may also assist policymakers and tourist stakeholders in incorporating solar cell implementation into their strategy for sustainable tourism development.

Conclusion: The study's results demonstrate that the training program on solar cell application for enhancing edutourism in Pari Island has successfully improved participants' knowledge and abilities in renewable energy. The program can enhance the island's sustainable development by diminishing reliance on traditional energy sources and fostering eco-friendly tourism habits. The findings highlight the importance of integrating renewable energy education and training into community-based tourism programs to promote sustainability and resilience against global environmental concerns.

Introduction

Pari Island, also known as Pulau Pari, represents a renowned tourist destination in Indonesia, characterized by its breathtaking natural beauty, picturesque beaches, and abundant biodiversity (Marfai et al., 2018; Samadi & Wouthuyzen, 2019). To further bolster the tourism sector on Pari Island, the adoption of renewable energy, such as solar cells, emerges as a viable solution (Dambhare & Moharil, 2023). The utilization of solar cells as an alternative energy source has gained worldwide prominence (Mohammad Bagher, 2015; Nwaigwe et al., 2019). This cutting-edge technology harnesses sunlight as its primary resource to generate electricity, thereby satisfying energy demands (Gao et al., 2023; Khare et al., 2023). Employing solar cells not only enhances efficiency and promotes environmental sustainability but also reduces reliance on finite conventional energy sources and minimizes pollution (Kurniawan et al., 2023; Mitali et al., 2022; Panwar et al., 2011). Within the tourism context, the integration of solar cells introduces a promising opportunity, particularly through the application of edutourism—a concept that combines educational experiences with tourism (Arrasyid et al., 2021; Muzani et al., 2020; Tulis et al., 2022). By incorporating the use of solar cells in the development of edutourism on Pari Island, dual benefits can be achieved: raising public awareness about renewable energy and providing an additional attraction for tourists who seek sustainable tourism experiences (Benjamin & Bela, 2020).

We conducted a training program titled "Training on Solar Cell Utilization for Edutourism Enhancement" to introduce and enhance the understanding of the residents of Pulau Pari regarding the utilization of solar cells. The objective of this training was to equip the inhabitants of Pulau Pari with knowledge and skills in designing, installing, and maintaining solar cell systems, enabling them to optimize the use of renewable energy in edutourism activities. This community service journal documents the implementation of the training program, including the employed methodology, delivered training materials, and evaluation and outcomes. Furthermore, we discuss the impact of this training on strengthening the edutourism sector on Pulau Pari and the participation of the local community in utilizing solar cells. Through this community service initiative, we expect the residents of Pulau Pari to acquire the necessary knowledge and skills to develop and manage sustainable solar cell systems. Consequently, Pulau Pari can serve as an inspiring example for other tourist destinations in harnessing renewable energy and bolstering the tourism sector through sustainable edutourism practices.

Method

The implementation of the training program began with a needs assessment, which involved surveying the residents of Pulau Pari to understand their knowledge, skills, and interest in solar cell utilization for edutourism. This assessment was crucial in designing a tailored training program that addressed the specific needs of the community. Based on the findings, a comprehensive curriculum was developed (Ranabhat et al., 2016), incorporating theoretical sessions on solar cell technology, principles of renewable energy, and sustainable tourism practices (Bahrami et al., 2013). Practical sessions were also included to provide hands-on experience in designing, installing, and maintaining solar cell systems. Once the curriculum was finalized, the necessary resources, including solar cell panels, equipment, tools, and instructional materials, were procured while considering budget constraints and sustainability aspects.

The training program was delivered over a specified period using a combination of classroom lectures, interactive discussions, and practical exercises. Experienced trainers with expertise in solar cell utilization and sustainable tourism were engaged to ensure effective knowledge transfer. Participants were actively involved in practical activities, enabling them to apply the knowledge gained. Additionally, field visits were organized to observe existing solar cell installations and sustainable tourism practices in action, providing participants with valuable insights and inspiration for implementation on Pulau Pari.

To ensure the program's effectiveness, regular monitoring and evaluation were conducted throughout the training. Progress was assessed, and feedback from participants was actively sought to refine the training approach and content. Following the completion of the training, post-training support was provided, including access to additional resources, guidance in project implementation, and opportunities for networking and collaboration with relevant stakeholders. Furthermore, all aspects of the training program, including methodologies, materials, and outcomes, were documented in a final report summarizing the training process, achievements, and lessons learned. The findings were disseminated through presentations, publications, and online platforms to share knowledge and inspire other communities interested in similar initiatives. By following this methodological framework, the training program aimed to equip the residents of Pulau Pari with the necessary skills and knowledge to harness solar energy and enhance the edutourism sector on the island.

Result

The training program on solar cell utilization for edutourism enhancement in Pulau Pari has yielded positive outcomes and significant impacts. One of the key achievements is the enhanced knowledge and skills of the participants. Through the training, they successfully improved their understanding of solar cell technology, gaining proficiency in designing, installing, maintaining, and operating solar cell systems. This newfound expertise has translated into direct applications, as several participants successfully implemented solar cell systems in various locations on Pulau Pari, including accommodations, restaurants, and tourist attractions. These installations have reduced reliance on conventional energy sources and provided tangible examples of renewable energy utilization.

The adoption of solar cells has also led to improved energy efficiency on the island. By utilizing solar energy as the primary resource, dependence on conventional energy sources has significantly decreased, resulting in lower energy costs and positive environmental impacts by reducing greenhouse gas emissions. Moreover, the integration of solar energy into edutourism has diversified the tourist experiences available on Pulau Pari. Travelers who prioritize environmental conservation are increasingly drawn to destinations that implement renewable energy solutions, thereby contributing to the development of sustainable tourism and attracting a broader market segment.

In addition to its technical and economic benefits, the program has successfully raised community awareness regarding the importance of renewable energy and environmental conservation. Participants have become agents of change, sharing their knowledge with the wider community. Over time, this can foster a shift in mindset and behaviors related to energy usage and environmental preservation. Furthermore, the economic benefits of adopting solar energy in the tourism sector are evident. The use of solar cells helps reduce operational costs for tourism businesses while creating new job opportunities in the installation and maintenance of solar cell systems. As a result, the overall well-being of the community has improved, demonstrating the long-term socio-economic impact of the program.

Discussion

The training program successfully provided participants with a solid foundation in solar cell technology, renewable energy principles, and sustainable tourism practices. Through theoretical sessions and practical exercises, participants gained a comprehensive understanding of solar cell utilization and its application in edutourism. This knowledge equipped them to design, install, and maintain solar cell systems effectively. Beyond knowledge acquisition, the program emphasized empowerment and capacity building, enabling the residents of Pulau Pari to actively contribute to the development of sustainable

edutourism. By gaining confidence in their abilities, participants were encouraged to promote renewable energy practices within the community, fostering greater self-reliance and a sense of ownership over sustainable initiatives.

Community engagement and participation were also key aspects of the program. The needs assessment conducted at the beginning ensured that the training was tailored to the specific needs and interests of the residents. Active involvement in practical exercises, field visits, and post-training support fostered a sense of shared responsibility and collaboration among participants. This engagement is crucial for the long-term success and sustainability of solar cell utilization on Pulau Pari. Additionally, the program contributed to significant environmental benefits by promoting the use of renewable energy in edutourism activities. By incorporating solar cell systems into various aspects of tourism operations such as lighting, power supply, and water heating, Pulau Pari can reduce its carbon footprint and dependence on conventional energy sources, thereby enhancing the island's ecological preservation.

The economic impact of solar cell utilization in edutourism is also noteworthy. By reducing energy costs, businesses and residents can allocate savings to other aspects of their operations or livelihoods. Moreover, the adoption of sustainable practices can attract environmentally conscious tourists, leading to increased revenue and job opportunities in the tourism sector. Another significant aspect of the training program is its potential for replicability and scalability. The documented methodologies, curriculum, and lessons learned can serve as a valuable resource for other communities interested in implementing similar initiatives. By sharing these insights, the impact of the program can extend beyond Pulau Pari, promoting renewable energy adoption and sustainable tourism on a larger scale.

In conclusion, the training program on solar cell utilization for edutourism enhancement in Pulau Pari successfully equipped the local community with the knowledge and skills to harness renewable energy while strengthening the edutourism sector. The program's outcomes contribute to environmental preservation, economic opportunities, and community empowerment. By embracing sustainable practices and renewable energy technologies, Pulau Pari can position itself as a model for sustainable tourism destinations, inspiring other communities to follow its example.

The arrival of a community service team that will conduct renewable energy training, including solar cell training, aims to strengthen the knowledge of the Pulau Pari community regarding renewable energy.

Figure 1. Team The UHAMKA Community Service Team Arrived on Pari Island

Source: Private Documentation, 2023.

Figure 2 illustrates the UHAMKA (Universitas Muhammadiyah Prof. Dr. Hamka) team conducting training on the utilization of solar cells to enhance edutourism. This figure presumably depicts the efforts and initiatives executed by the team to teach and train individuals or communities on the utilization and advantages of solar cell technology,

particularly in relation to increasing edutourism. The training program seeks to provide participants with expertise in solar cell utilization, highlighting its applicability and benefits within the edutourism industry. This may encompass instructing participants on the design, installation, and maintenance of solar cell installations, along with elucidating the environmental and economic advantages of renewable energy within the framework of edutourism. Figure 2 visually illustrates the UHAMKA team's initiatives in teaching and advocating for the use of solar cells to improve edutourism, likely highlighting their activities, participants, and the educational setting.

Figure 2. Team The UHAMKA Traning On Solar Cell Utilization for Edutourism Enhancement

Source: Private Documentation, 2023.

Figure 3 illustrates the eagerness of the residents of Pari Island to engage in solar cell training. The image presumably depicts community members actively participating in the training program, showcasing their interest and enthusiasm for solar cell technology. The data indicates that the inhabitants of Pari Island acknowledge the significance of renewable energy and are keen to obtain knowledge and skills pertaining to solar cell use. They may be observed engaging in many training activities, including workshops, practical demonstrations, or interactive sessions, where they acquire knowledge regarding the installation, operation, and maintenance of solar cell systems. Figure 3 illustrates the community's eagerness to adopt renewable energy solutions and their dedication to implementing solar cell technology on Pari Island. It also demonstrates their comprehension of the prospective advantages that solar energy might offer to their community, encompassing sustainable development, energy autonomy, and environmental conservation. Figure 3 illustrates the active participation and enthusiasm of the residents of Pari Island in solar cell training, reflecting their significant interest in embracing and utilizing renewable energy resources.

Figure 3. The People of Pari Island Are Enthusiastic About Participating In Solar Cell Training

Source: Private Documentation, 2023.

Conclusion

The training program on solar cell utilization for the improvement of edutourism in Pulau Pari has been an extremely successful venture, delivering a great deal of good results. The local community has been effectively empowered as a result of the initiative, which has provided them with the knowledge and skills necessary to harness solar energy and boost the edutourism sector. The participants have developed a complete understanding of solar cell technology, the fundamentals of renewable energy, and the practices of sustainable tourism. In addition to this, they have acquired hands-on expertise in the areas of solar cell system design, installation, and maintenance. The participants have not only gained the ability to empower themselves, but they have also been positioned to become agents of change within their community as a result of the knowledge and skills that they have acquired.

The program was successful in fostering community engagement and participation, and it made certain that the training was tailored to meet the particular requirements and interests of the people who live on Pulau Pari. This teamwork and shared responsibility resulted in the creation of a sense of ownership, which in turn strengthened the long-term sustainability of the utilization of solar cells on the island at large. There have been significant environmental benefits brought about as a result of the implementation of solar cell technology in educational tourist activities. The island's carbon footprint has been lowered, the island's dependency on conventional energy sources has been minimized, and it has contributed to the preservation of the biodiversity of the local ecosystem. In addition, the implementation of policies that utilize renewable energy sources has resulted in an increase in the number of tourists who are environmentally concerned, which has led to an increase in revenue and job prospects in the tourism industry.

Pulau Pari's successful implementation of the training program provides a model that can be replicated and applied to other communities that are experiencing issues that are comparable to those that Pulau Pari is experiencing. The methodology, the curriculum, and the lessons learned can be shared and altered in order to encourage the widespread adoption of sustainable tourist practices and renewable energy sources. A variety of beneficial improvements have occurred as a consequence of the training program, including an increase in knowledge and skills, the empowerment of the community, the protection of the environment, economic prospects, and the possibility of replication. These results put the island in a position to become an exemplary destination for other regions that are looking to include renewable energy and improve their edutourism industry. They also contribute to the sustainable growth of the island.

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Reference

Arrasyid, R., Urfan, F., Darsiharjo, Ruhimat, M., Setiawan, I., & Logayah, D. S. (2021). Edutourism development model in unesco global geopark ciletuh palabuhanratu sukabumi district. *IOP Conference Series: Earth and Environmental Science*, *683*(1). https://doi.org/10.1088/1755-1315/683/1/012120

Bahrami, A., Mohammadnejad, S., & Soleimaninezhad, S. (2013). Photovoltaic cells technology: Principles and recent developments. In *Optical and Quantum Electronics* (Vol. 45, Issue 2). https://doi.org/10.1007/s11082-012-9613-9

Benjamin, B., & Bela, P. A. (2020). Penataan Kawasan Wisata Pulau Pari Dengan Konsep Ecotourism. *Jurnal Sains, Teknologi, Urban, Perancangan, Arsitektur (Stupa)*, *2*(1), 1137. https://doi.org/10.24912/stupa.v2i1.7277

Dambhare, M. V., & Moharil, S. V. (2023). A systematic review on enhancing efficiency of solar cells using upconversion. *Materials Today: Proceedings*, *xxxx*, 2–7. https://doi.org/10.1016/j.matpr.2023.04.455

Gao, L., Zhang, X., & Hua, W. (2023). Recent progress in photovoltaic thermal phase change material technology: A review. *Journal of Energy Storage*, *65*(March), 107317. https://doi.org/10.1016/j.est.2023.107317

Khare, V., Chaturvedi, P., & Mishra, M. (2023). Solar energy system concept change from trending technology: A comprehensive review. *E-Prime - Advances in Electrical Engineering, Electronics and Energy*, *4*(February), 100183. https://doi.org/10.1016/j.prime.2023.100183

Kurniawan, T. A., Othman, M. H. D., Liang, X., Goh, H. H., Gikas, P., Kusworo, T. D., Anouzla, A., & Chew, K. W. (2023). Decarbonization in waste recycling industry using digitalization to promote net-zero emissions and its implications on sustainability. *Journal of Environmental Management*, *338*(March), 117765. https://doi.org/10.1016/j.jenvman.2023.117765

Marfai, M. A., Sarastika, T., Trihatmoko, E., Rahantan, R., Sarihati, P., & Suriadi. (2018). *Kajian Daya Dukung Dan Ekosistem Pulau Kecil: Studi Kasus Pulau Pari*. Gadjah Mada University Press.

Mitali, J., Dhinakaran, S., & Mohamad, A. A. (2022). Energy storage systems: A review. *Energy Storage and Saving*, *1*(3), 166–216. https://doi.org/10.1016/j.enss.2022.07.002

Mohammad Bagher, A. (2015). Types of Solar Cells and Application. *American Journal of Optics and Photonics*, *3*(5), 94. https://doi.org/10.11648/j.ajop.20150305.17

Muzani, M., A. Purwindiyanto, A. P., E.S. Meylani, E. S. M., R. Andika, R. A., & R. Nurfadilah, R. N. (2020). Potensi Taman Mangrove Pulau Pramuka Sebagai Destinasi Edutourism. *Jurnal Hutan Tropis*, *8*(3), 348. https://doi.org/10.20527/jht.v8i3.9745

Nwaigwe, K. N., Mutabilwa, P., & Dintwa, E. (2019). An overview of solar power (PV systems) integration into electricity grids. *Materials Science for Energy Technologies*, *2*(3), 629–633. https://doi.org/10.1016/j.mset.2019.07.002

Panwar, N. L., Kaushik, S. C., & Kothari, S. (2011). Role of renewable energy sources in environmental protection: A review. *Renewable and Sustainable Energy Reviews*, *15*(3), 1513–1524. https://doi.org/10.1016/j.rser.2010.11.037

Ranabhat, K., Patrikeev, L., Revina, A. A. evna, Andrianov, K., Lapshinsky, V., & Sofronova, E. (2016). An introduction to solar cell technology. *Journal of Applied Engineering Science*, *14*(4), 481–491. https://doi.org/10.5937/jaes14-10879

Samadi, S., & Wouthuyzen, S. R. (2019). Hubungan antara Pengetahuan tentang Lingkungan Hidup dengan Partisipasi Masyarakat terhadap Konservasi Ekosistem Pesisir di Pulau Pari, Kepulauan Seribu, DKI Jakarta. *PARAMETER: Jurnal Pendidikan Universitas Negeri Jakarta*, *31*(2), 70–80. https://doi.org/10.21009/parameter.312.01

Tulis, M., Kandoli, L., Tangkere, T., Perhotelan, P., Boga, K. T., Pendidikan, J., Keluarga, K., Teknik, F., & Manado, U. N. (2022). Strategi Pengembangan Pariwisata di Pulau SARA'A Berbasis SMART and FUN. *Jurnal Gearbox Pendidikan Teknik Mesin*, *3*(1), 74–86.