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Power Negotiation and Identity: Socio-Economic Transformation of Ethnic Minorities Through Biogas Empowerment in Central Lampung

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ABSTRACT

This study examines the impact of a biogas and silage empowerment program on the socio-economic transformation and power negotiation of the ethnic minority community in Rukti Endah Village, Central Lampung, Indonesia. Through a qualitative approach combining critical ethnography and conventional data collection methods, this research analyzes changes in energy consumption patterns, increases in farmers' productivity and welfare, social impacts on quality of life and women's empowerment, and the program's influence on power dynamics and minority identity. The findings reveal that the adoption of sustainable technology not only improves material well-being but also strengthens the community's bargaining position and cultural identity within the broader society. The empowerment program enables the minority community to become active agents of change, contributing to a more inclusive and equitable social structure. This research highlights the transformative potential of environmentally friendly technology when applied with a socio-culturally sensitive approach, offering valuable insights for policymakers and development practitioners working on community empowerment in diverse contexts. However, the study also underscores the complexities and challenges involved in the empowerment process, emphasizing the need for continuous efforts to ensure fair distribution of benefits and the integration of local wisdom in sustainable development initiatives.

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1. INTRODUCTION

Rukti Endah Village in Seputih Raman, Central Lampung, is a community predominantly inhabited by ethnic minority groups who have long been marginalized in social and economic aspects. The history of this community's formation is inseparable from the internal migration that occurred during the colonial era, where these minority groups were directed to certain areas considered less strategically important economically and politically by the colonial government (Dick et al., 2002; Lindblad & Lindblad, 1998). This condition has created a dependency on the agricultural and livestock sectors as the primary source of livelihood, despite limited access to modern technology and infrastructure.

The socio-cultural fabric of the Rukti Endah Village community is heavily influenced by traditional norms that govern daily life, including land ownership, resource distribution, and family structure. However, reliance on conventional farming and animal husbandry methods has limited the community's ability to adapt to broader economic changes, necessitating external interventions focused on technology-based empowerment.

Rukti Endah Village in Seputih Raman, Central Lampung Regency, exemplifies a minority community that has undergone significant transformation through an empowerment program initiated by the National Zakat Agency (BAZNAS). This community faces various challenges, such as limited access to affordable and environmentally friendly energy sources, as well as a lack of quality animal feed sources. These factors have resulted in low productivity in agriculture and animal husbandry, which are primary sources of livelihood for the community (Badan Amil Zakat Nasional, 2021).

The power relations between minority groups in Rukti Endah Village and the majority groups in surrounding areas reflect the dynamics of unequal access to resources, information, and decision-making processes. The majority group, often holding a more dominant position in the social and economic structure, tends to dictate local policies that benefit their interests (Weber, 1978). In this context, the biogas and silage empowerment program initiated by BAZNAS serves as a tool to balance power by providing minority communities with access to technology that can enhance their independence.

However, the challenges faced are not limited to resistance from the majority group but also emerge from within the community itself, such as internal hierarchies and gender inequalities that can affect participation in the empowerment program (Collins, 2019; Khader, 2014; O'Neil et al., 2014). Therefore, the success of this program is measured not only in terms of increased economic productivity but also by the ability of minority communities to articulate their interests in a broader arena of power.

Empowerment theory often focuses on how marginalized groups can gain access to and control over resources that have been dominated by more powerful groups (Butler & Adamowski, 2015; Khader, 2014; McGee, 2016; Melkote & Steeves, 2015).

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Empowerment is not just about providing tools or resources but also about strengthening the capacity of minority groups to make decisions and direct their own destinies. In a pluralistic society like Indonesia, empowerment of minority groups is also closely related to social inclusion, where social integration and acceptance of differences are key to achieving a balance of power. In the context of Rukti Endah Village, this empowerment theory is relevant when applied to programs that focus on environmentally friendly technologies. For instance, the use of biogas and silage technology not only provides economic benefits but also serves as a medium to strengthen the identity of minority communities as actors capable of contributing to environmental sustainability and broader social welfare. Understanding social dynamics in pluralistic societies also requires attention to how power relations are formed and maintained, and how empowerment can be a means to disrupt existing power domination. In this regard, the empowerment program initiated by BAZNAS demonstrates that through appropriate interventions, minority communities can become active actors in the socio-economic transformation process, rather than passive recipients of changes imposed by external forces.

Previous studies on minority community empowerment in Indonesia have largely focused on economic and educational aspects. However, research that thoroughly examines the role of environmentally friendly technology in the socio-economic transformation and power negotiation of ethnic minority groups remains limited. Works such as Eger et al. (2018), Pettit (2012), Popay et al. (2021), Syed (2010), Wilson (1996) have highlighted the importance of understanding the internal dynamics of communities, including hierarchies and gender inequalities, in empowerment efforts. Meanwhile, the empowerment theory proposed by Cyril et al. (2015), Eade (1997), Eriksen et al. (2021), Gaventa and Cornwall (2015), Goodman (2011), Peluso (2023) Williams (2000) emphasizes the importance of strengthening the capacity of marginalized groups to access and control resources that have been dominated by more powerful groups.

Nevertheless, there is a gap in our understanding of how technology-based empowerment programs can serve as catalysts for socio-economic transformation while also being tools for power negotiation for ethnic minority communities. Previous studies have not fully explored the intersection between the adoption of environmentally friendly technology, changes in power dynamics, and the strengthening of minority community identities in the context of Indonesia's pluralistic society. This gap becomes increasingly important to address given the growing urgency of sustainable development and social inclusion in the modern era.

The novelty of this research lies in its holistic approach to analyzing the biogas and silage empowerment program as a dual instrument: not only as a technical solution to energy and feed problems but also as a tool for power negotiation and identity strengthening for ethnic minority communities. By using a theoretical lens that combines Freire's (Freire, 2018, 2020; Freire & Macedo, 2005; Freire & Tasker, 1976) concept of empowerment with Weber's (Weber, 1978) analysis of power relations, this research offers a new perspective on how environmentally friendly technology can become a medium for overhauling existing power structures and strengthening the bargaining position of minority groups in the broader society.

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The main contribution of this research is to provide a deeper understanding of the complex dynamics that occur when technology empowerment programs are applied in the context of ethnic minority communities. The results of this research are expected to enrich academic discourse on community empowerment, sustainable technology, and power dynamics in pluralistic societies. Practically, the findings of this research can serve as a valuable reference for policymakers and development practitioners in designing and implementing empowerment programs that are more effective and sensitive to the socio-cultural dynamics of minority communities.

The primary objective of this research is to examine the impact of biogas and silage technology implementation on economic and social transformation in the ethnic minority community of Rukti Endah Village, Central Lampung. Specifically, this research aims to: (1) analyze changes in community energy consumption patterns after the use of biogas; (2) evaluate the increase in productivity and welfare of farmers through the use of silage; (3) explore the social impacts arising from this empowerment program, including improvements in quality of life and women's empowerment; and (4) analyze how this program influences power dynamics and the identity of ethnic minority communities in the context of the broader society. Through the achievement of these objectives, this research is expected to make a significant contribution to our understanding of the role of technology in the empowerment and socio-economic transformation of ethnic minority communities in Indonesia.

2. METHODS

This research adopts a qualitative approach to gain an in-depth understanding of the social phenomena occurring in Rukti Endah Village, Central Lampung, related to the implementation of biogas and silage technology. The qualitative approach is chosen due to its capacity to explore complexity, meaning, and individual perspectives within specific social contexts (Creswell, 2016). This method enables researchers to delve into the experiences, perceptions, and social dynamics that emerge in the context of empowering ethnic minority communities through environmentally friendly technology.

To enrich the understanding of the socio-cultural context and power dynamics in Rukti Endah Village, this research combines a critical ethnographic approach with conventional data collection methods. The critical ethnographic approach allows researchers to uncover layers of cultural meaning and power relations that might be overlooked by conventional research methods (Manias & Street, 2001). The data collection process is conducted through fieldwork over four months, during which the researcher resides within the community and participates in their daily activities.

The data collection techniques employed include:

1. Participant observation: The researcher is directly involved in various community activities, including biogas and silage production processes, farmer group meetings, and social rituals.
2. In-depth interviews: These are conducted with key informants, including minority community members, traditional leaders, representatives of majority groups, and

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BAZNAS staff. The interviews are semi-structured to allow flexibility in exploring themes.

3. Document analysis: Relevant documents such as BAZNAS reports, community meeting minutes, and local archives are examined to provide historical and institutional context.

For data analysis, this research utilizes a constructivist grounded theory approach (Mills et al., 2006; Mitchell, 2014), which allows new theories to emerge from empirical data. The analysis process involves open coding, axial coding, and selective coding. Additionally, thematic analysis (Mohajan & Mohajan, 2022; Naeem et al., 2023; M. Williams & Moser, 2019) is used to identify the main themes emerging from the data.

To address potential biases in studying minority groups, several strategies are implemented:

1. Data triangulation: Information is collected from various sources such as interviews, observations, and secondary data from BAZNAS reports and local statistics. This helps reduce bias that may arise from a single data source.
2. Active community participation: Minority community members are involved as active participants in the research process to gain their perspectives directly and minimize the possibility of data distortion.
3. Researcher reflexivity: Researchers actively note and reflect on how their background, perspectives, and personal experiences influence the research process and data interpretation. This involves acknowledging potential biases that may arise from the researcher's social position and striving to understand and mitigate these influences.
4. Peer debriefing: Regular discussions with research colleagues not directly involved in the project to obtain objective feedback and ensure the analysis is conducted in a balanced and fair manner.

Through this comprehensive methodological approach, this research aims to provide a deep and nuanced understanding of how the biogas and silage empowerment program affects socio-economic dynamics and power negotiation processes within the ethnic minority community in Rukti Endah Village, Central Lampung. This approach allows for a rich exploration of context and sensitivity to the socio-cultural complexities present in Indonesia's pluralistic society.

3. RESULTS AND DISCUSSION

Changes in Community Energy Consumption Patterns After Biogas Use

The use of biogas in Rukti Endah Village has brought significant changes in the community's energy consumption patterns. Before the implementation of the biogas program by BAZNAS, the community relied heavily on firewood and fossil fuels such as kerosene for household energy needs. The use of these fuels is not only expensive but also has negative impacts on health and the environment. With biogas, the community now has access to a cheaper and more environmentally friendly energy source. Biogas produced from organic waste allows households to cook without the

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need to purchase fossil fuels or collect firewood, which often requires time and effort. Furthermore, according to Bekchanov et al. (2019), Mac Kinnon et al. (2018), O'Shea et al. (2020), Obaideen et al. (2022), Paolini et al. (2018), and Somanathan and Bluffstone (2015), biogas also contributes to reducing greenhouse gas emissions, which supports global efforts to mitigate climate change.

One of the new findings that emerged from this research is that the transition to using biogas as the primary energy source not only impacts the reduction of energy costs but also significantly changes the community's energy consumption patterns. Before the biogas program, the people of Rukti Endah Village heavily relied on firewood and kerosene, which had negative effects on the environment and health. With the introduction of biogas, the community experienced a shift towards cleaner and more sustainable energy sources, reducing greenhouse gas emissions and deforestation.

Biogas, as a more efficient energy source, has changed the way people use energy in their daily lives. The use of biogas allows households to cook faster and with better temperature control compared to firewood or kerosene. This efficiency not only saves time but also reduces overall fuel consumption, improving the quality of life for the community.

The shift from firewood to biogas has had a significant positive impact on public health. Burning firewood and kerosene produces smoke and pollutants that are harmful to respiratory health. According to Bakar and Abdghani (2011), Buysman (2015), Lewis et al. (2017), and Wilson (1996), by switching to biogas, the air quality in households improves, reducing the incidence of respiratory diseases, particularly among women and children who are more frequently exposed to kitchen smoke.

Changes in energy consumption patterns also have important social impacts, particularly in women's empowerment. Before biogas, women spent a significant amount of time collecting firewood. With biogas, the time previously spent on this activity can be redirected to other productive activities, such as education, micro-enterprises, or involvement in community activities. This aligns with the assertion by Meeks et al. (2019), Momanyi and Benards (2016), and Yasmin and Grundmann (2020) that the utilization of biogas increases women's participation in the household economy and the community as a whole.

Another significant finding is the use of organic waste as a raw material for biogas, offering a dual solution to the problems of energy and waste management. Previously, organic waste was often simply discarded, causing environmental issues. Now, this waste is utilized to generate energy, not only reducing waste volume but also providing a sustainable energy source (Badan Amil Zakat Nasional, 2021).

The use of biogas has also opened up new economic opportunities for the community. For example, the solid waste remaining after biogas production can be used as high-quality organic fertilizer, potentially increasing agricultural yields. Additionally, with reduced expenditure on fuel, the community has more funds that can be invested in other productive sectors.

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Increasing Farmers' Economy, Productivity, and Welfare through Silage Use

Silage, as animal feed produced from the fermentation of forage crops, has been proven to increase the productivity and welfare of farmers in Rukti Endah Village. Before the silage program, farmers often faced problems in providing quality feed, especially during the dry season when forage availability decreased (Balehegn et al., 2022). By using silage, farmers can ensure a stable and quality feed supply throughout the year. This not only improves livestock health and productivity but also reduces feed costs, as silage can be produced from locally available ingredients (Bradford & Mullins, 2012; Makkar, 2016).

Consequently, increased productivity and reduced feed costs have a direct impact on increasing farmers' income. With higher milk and meat production, as well as lower operational costs, farmers can earn greater profits. This additional income allows farmers to improve their quality of life, invest in their children's education, improve household facilities, and access better healthcare services (Dixon et al., 2001; Quisumbing & Pandolfelli, 2010; Russell, 1996).

One of the main findings of this study was a significant increase in livestock productivity due to the use of silage. Before the implementation of the silage program, farmers in Rukti Endah Village faced difficulties in providing adequate and quality feed, especially during the dry season. This is supported by Borreani et al. (2018), Driehuis et al. (2018), and Kalač (2011), who state that silage produced through the fermentation of green crops provides high-quality feed throughout the year, positively impacting livestock health and growth.

The use of silage has been shown to increase milk and meat production. For example, cows fed with silage experienced a 20-30% increase in milk production compared to traditional feed (Grant & Ferraretto, 2018). Additionally, livestock growth was also faster, allowing farmers to market their livestock in a shorter time (Herrero et al., 2013).

This research found that silage significantly helps reduce feed costs. Silage production utilizes local materials that are cheap and easily obtainable, such as cassava leaves and stems. This allows farmers to reduce their expenditure on expensive commercial feed. The reduction in feed costs increases farmers' profit margins and enables them to invest more in livestock care and improving livestock facilities.

Feed supply stability is another important finding of this research. Before silage, farmers were highly dependent on the availability of forage, which fluctuated according to the season. With silage, farmers can store large amounts of forage during the harvest season and use it throughout the year, avoiding the problem of feed shortages during the dry season. This not only ensures sustainable feed availability but also ensures that livestock health and productivity remain optimal year-round.

Increased productivity and reduced feed costs directly impact farmers' income. With higher milk and meat production and lower operational costs, farmers can earn greater profits. This additional income allows farmers to improve their quality of life, invest in their children's education, improve home facilities, and gain access to better healthcare services.

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The empowerment program through silage also includes training and education for farmers on effective silage production techniques and feed management. This new knowledge enhances farmers' ability to manage their livestock businesses more efficiently and sustainably (Badan Amil Zakat Nasional, 2021). Moreover, this knowledge can be passed on to the next generation, ensuring the continuation of good agricultural practices.

This research demonstrates that the use of silage in Rukti Endah Village has resulted in significant improvements in farmers' economy, productivity, and welfare. These new findings include increased livestock productivity, reduced feed costs, stabilized feed supply, increased income, business diversification, and enhanced farmer capacity. This unique perspective provides valuable insights into how agricultural technologies like silage can serve as a catalyst for economic and social transformation in minority farming communities.

Social Impact of Empowerment Programs, Including Economic Improvement, Quality of Life, and Women's Empowerment

The empowerment programs involving biogas and silage have also had significant social impacts in Rukti Endah Village. Increased access to energy and livestock productivity have improved the overall quality of life for the community. People now have more time and resources to spend on education, health, and other productive activities.

One of the most striking social impacts is women's empowerment. In many households, women are responsible for managing energy and animal feed. With biogas, their workload is reduced, as they no longer need to search for firewood or manage traditional fuels, which are time-consuming. Additionally, women are more actively involved in the silage production process, providing them with opportunities to make more significant contributions to the household economy.

This research reveals that the empowerment program through biogas and silage has had a significant impact on economic improvement in Rukti Endah Village. Prior to the implementation of this program, many households relied on unstable and often insufficient income sources to meet their basic needs (Wichern et al., 2017). With the biogas and silage program, the community now has a stable and sustainable source of energy and feed, reducing household expenditure on fuel and animal feed (Dixon et al., 2010; Omer, 2017; Surendra et al., 2014).

This economic boost provides an opportunity for the community to allocate more funds to other needs, such as education, health, and small business development. The use of silage for income diversification also creates new economic opportunities and strengthens the overall economic resilience of the community (Lin, 2011; Vernooy, 2022).

A significant new discovery from this research is the improvement in the quality of life for the people of Rukti Endah Village. With easier and more efficient access to energy through biogas, households can enjoy a healthier environment with reduced smoke from burning firewood. Moreover, the use of silage as high-quality animal feed

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ensures better livestock health and higher production yields, which in turn increases farmers' income.

This improvement in quality of life can be seen in several aspects, including:

1. Health: The use of biogas reduces exposure to harmful smoke, which has a positive impact on respiratory health, especially for women and children.
2. Education: With reduced time needed to search for fuel and feed, children have more time to study and attend school.
3. Leisure time: Reduced household workload provides more time for family members to participate in social and recreational activities, improving mental and emotional well-being.

One of the most prominent findings from this research is the positive impact of empowerment programs on women. In many households, women are responsible for energy and animal feed management. The biogas and silage program has significantly reduced their workload. Previously, women spent a substantial amount of time searching for firewood and managing animal feed traditionally. With biogas and silage, this time can be used for other productive activities, such as education, micro-businesses, and participation in community activities.

Women's empowerment can also be seen in the increase in skills and knowledge they gain through training and education related to biogas technology and silage production (Kalyani et al., 2013; Kiyimba, 2011; Mottaleb & others, 2019). This not only enhances their capacity in household management but also opens up opportunities for them to contribute more significantly to the household and community economy.

Another new finding is the strengthening of social networks and community solidarity through this empowerment program. The implementation of biogas and silage involves collaboration among community members, which reinforces social ties and a sense of togetherness. Training activities and mutual cooperation in silage production create opportunities to share knowledge and experiences, thereby strengthening social cohesion (Badan Amil Zakat Nasional, 2021). This community solidarity is also evident in the way the community addresses common challenges, such as food security and energy security. By collaborating to utilize local resources and sustainable technologies, the community can develop more effective and efficient strategies to improve their welfare.

This research demonstrates that the empowerment program through biogas and silage in Rukti Endah Village has had a significant social impact. New findings include improvements in economic and community sustainability, enhanced quality of life, women's empowerment, and strengthened social networks. This unique perspective provides valuable insights into how sustainable technology and community empowerment can serve as catalysts for social and economic transformation, particularly in minority communities. This program not only improves material well-being but also empowers individuals and strengthens the social fabric of the community.

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Program Impact on Power Dynamics and Identity of Minority Communities

The empowerment program through biogas and silage in Rukti Endah Village not only provides economic and social benefits but also influences the power dynamics and identity of minority communities within the context of the broader society. As an ethnic minority community that has long been marginalized socially and economically, this program becomes a tool to negotiate their position within the existing power structure.

Before the empowerment program, the power relations between the minority groups in Rukti Endah Village and the majority groups in the surrounding areas reflected the dynamics of unequal access to resources, information, and decision-making processes. The majority group, often holding a more dominant position in the social and economic structure, tends to dictate local policies that benefit their interests (Atkinson & Coleman, 1992; Salamon & Siegfried, 1977).

However, with the biogas and silage program, the people of Rukti Endah now have access to technology that enhances their independence. This not only reduces their reliance on the majority group but also strengthens their bargaining position in power negotiations. The Rukti Endah community can now advocate for their interests with more confidence, supported by the increased economic and social capacity resulting from the empowerment program.

Qualitative data from in-depth interviews with community members and traditional leaders show significant changes in the way the Rukti Endah community perceives themselves and their position within the broader society. A community leader stated, "Previously, we often felt inferior and dependent on the majority group. However, with this program, we realize that we have the ability to determine our own destiny and contribute to wider well-being." (Interview, July 12, 2023).

This statement reflects how the empowerment program has strengthened the identity of the Rukti Endah community as capable and empowered actors. With increased economic independence and access to sustainable technology, this minority community can position itself as an equal partner in development, no longer passive recipients of changes imposed by external forces.

However, it is important to note that the change in power dynamics does not occur without challenges. Resistance from the majority group, who may feel threatened by the increasing independence of the Rukti Endah community, can be an obstacle in this transformation process. Additionally, internal hierarchies and gender inequalities within the Rukti Endah community itself can also affect participation and the distribution of benefits from the empowerment program.

Therefore, the success of this program is measured not only by the increase in economic productivity but also by the ability of the minority community to articulate their interests in a broader arena of power. This involves strengthening the community's capacity to engage in decision-making processes, advocate for inclusive policies, and build strategic alliances with other key actors.

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This study also finds a shift in the cultural identity of the Rukti Endah community as a result of the empowerment program. By adopting sustainable technologies such as biogas and silage, this minority community not only strengthens their identity as empowered economic actors but also as pioneers in the sustainability movement. This creates a strong sense of pride and ownership towards the program, which in turn encourages greater participation and commitment from community members.

This identity transformation is also reflected in the way the Rukti Endah community interacts with other communities. They are now more confident in sharing their knowledge and experiences related to sustainable technology, reinforcing their position as valuable partners in sustainable development. This not only strengthens social bonds between communities but also encourages the replication of similar programs in other regions.

Nevertheless, it is important to consider the potential negative impacts of this identity shift. When minority communities adopt new technologies and practices, there is a risk of losing traditional knowledge and practices that have been an integral part of their cultural identity. Therefore, empowerment programs should be accompanied by efforts to preserve and integrate local wisdom into sustainable development approaches.

Overall, this research demonstrates that the empowerment program through biogas and silage in Rukti Endah Village serves not only as a technical solution to energy and feed problems but also as a tool for power negotiation and identity strengthening for minority communities. By empowering the community to take control of their resources and destiny, this program contributes to the transformation of power structures towards greater inclusivity and equality in society.

However, it is important to acknowledge that this transformation process is a complex and ongoing journey. Continuous efforts are needed to overcome barriers, both external and internal, and ensure that the benefits of this empowerment program are distributed fairly throughout the community. This requires a holistic approach involving sustained dialogue, adaptive learning, and inclusive partnerships between the community, civil society organizations, government, and other key actors.

This study provides important insights into the potential of sustainable technology as a catalyst for social and economic transformation in the context of minority communities. However, it also highlights the complexities and challenges involved in the empowerment process. Further research is needed to better understand the long-term dynamics of such interventions and explore alternative models and approaches to community empowerment that are sensitive to diverse socio-cultural contexts.

In conclusion, the empowerment program through biogas and silage in Rukti Endah Village illustrates the transformative potential of sustainable technology when applied with an approach that is sensitive to the social and cultural dynamics of the community. By empowering the minority community to become active agents of change, this program not only contributes to improved economic and social well-being but also drives shifts in power structures towards a more inclusive and equitable society. Lessons from the experience of Rukti Endah Village can inform community empowerment efforts in other contexts, with an emphasis on the

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importance of local ownership, inclusive participation, and the integration of local wisdom in sustainable development approaches.

4. CONCLUSION

This study examined the impact of the biogas and silage empowerment program on the socio-economic transformation and power negotiation of the ethnic minority community in Rukti Endah Village, Central Lampung. The findings reveal that the adoption of biogas technology significantly changed the community's energy consumption patterns, reduced energy costs, improved air quality, and empowered women. Meanwhile, the use of silage increased farmers' productivity and welfare through increased livestock production, reduced feed costs, and feed supply stability. The program also had significant social impacts, including improvements in quality of life, women's empowerment, and strengthened social networks. More importantly, biogas and silage technology served as tools for power negotiation and identity strengthening for the Rukti Endah minority community, enabling them to advocate for their interests and position themselves as equal partners in development. Overall, this research highlights the transformative potential of environmentally friendly technology when applied with an approach that is sensitive to the community's socio-cultural dynamics, providing valuable lessons for community empowerment efforts in diverse contexts.

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