

Institutional Development of Village-Owned Enterprises in Managing Water Resources and Tourism Villages Through a Stakeholder Collaboration Approach

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Abstract

This study aims to analyze the development of Village-Owned Enterprises (VOE) in managing water resources and tourism villages through a stakeholder collaboration approach. VOE strategically optimizes local potential, including sustainable water resource management and tourism village development to boost the local economy. This research uses a qualitative method with a case study approach in villages with abundant tourism potential and water resources. We collected data through in-depth interviews with key stakeholders, such as village government officials, VOEs managers, and local community members involved in tourism village development. The results show that collaboration among stakeholders, involving the village government, VOEs, and the community, creates an effective synergy in managing water resources and developing tourism villages. VOEs serve as the main drivers coordinating various interests and resources, while active community participation is critical to maintaining the sustainability of the programs. Additionally, policy support from the village government and partnership patterns help overcome the technical and financial challenges VOEs face. This study concludes that a collaborative approach among stakeholders is an effective strategy for developing VOEs to manage water resources and tourism villages. Successful implementation requires a shared commitment, transparency, and good communication among all parties.

Keywords: local economic development, stakeholder collaboration, tourism village, water resources, VOEs.

1. Introduction

Water resources can benefit the surrounding communities, including management and funding for sustainable development programs in different regions (Moridu et al., 2023). Village-owned enterprises (VOEs) have the potential to act as managers of water resources, ensuring their sustainability and promoting community empowerment at the local level. Many abundant water resources must be utilized more, mainly for agricultural irrigation and other natural needs. Effective and sustainable water resource management requires increased awareness and active community participation (Putra et al., 2019). Environmental care programs focusing on water resources can equip communities with the knowledge and skills to manage water resources optimally and sustainably (Weningtyas & Widuri, 2022).

VOEs were established to manage the resources available in their area, including water resources, to create new sources of income. However, managing various water sources in tourism villages by VOEs has not been optimal, leading to unmet water needs (Setiawan et al., 2023; Suryoto et al., 2022). The imbalance between the increasing number of tourist visits and water needs underscores the urgency for a structured collaborative approach to manage both potentials efficiently and sustainably (Purwanto & Susanto, 2017). The poor water resource infrastructure in tourism villages highlights the need for immediate action (Angela, 2023;



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Asyim & Yulianto, 2022). Stakeholder involvement, such as VOEs, local government, and the community, in managing water resources needs to be optimized (Alfian & Vitaloka, 2018). A structured collaborative approach is not just a suggestion but necessary to manage water resources efficiently and sustainably (Mustofa, 2022a).

Previous research has discussed various aspects of water resource management, but the focus on the role of VOEs in the context of tourism villages still needs to be expanded (Hastutik et al., 2021). Considering their unique characteristics, it is important to understand further VOEs' involvement in managing water resources in tourism villages (Siswanda & Meirinawati, 2021). This research aims to analyze the role of VOEs in managing water resources in tourism villages. This innovative approach aims to optimize collaboration in managing water resources in tourism villages managed by VOEs to create a model that not only strengthens the role of VOEs in maintaining water resource sustainability but also increases contributions to economic and social development in tourism villages (Suryoto et al., 2022).

The involvement of VOEs in managing water resources and tourism villages represents an innovative and advanced form of organizational governance. That can positively impact environmental sustainability and local community empowerment (Dewantara et al., 2021). Effective water resource management ensures the community has easy and affordable access to their water needs. Additionally, the community can benefit economically by purchasing water at lower prices. Access to clean water also contributes to better health, as it can be used for drinking, bathing, cooking, and sanitation (Ostadtaghizadeh et al., 2022). Providing access to clean water can reduce the incidence of water-borne diseases, thereby improving overall community welfare (Djaja et al., 2022).

Increasing collaboration among stakeholders involved in water resource management can yield more effective and sustainable results, benefiting both the community and the environment (Desderius et al., 2023). The wise and sustainable use of water resources can have a positive impact on the community in terms of health, economy, and the environment, contributing to overall community welfare (Capah et al., 2023). Water resources, when managed effectively, can support the development of various local economic activities, such as fisheries, water tourism, the drinking water industry, and other water-related creative industries. By utilizing the economic potential of water resources, communities can increase their income and reduce unemployment rates, offering a hopeful future (Desderius et al., 2023).

Referring to the above explanation, institutional development in managing water resources and tourism villages still needs to be improved (Junita & Buchori, 2016; Luthfi, 2019; Manggat et al., 2018). Therefore, the problems that need to be addressed are as follows: First, how can VOEs develop in managing water resources and tourism villages? Previous research shows that VOEs can improve resource management through community empowerment and institutional capacity building. Second, how can stakeholder collaboration enhance the performance of water resources and tourism village management? Effective collaboration between government, community, academia, and the private sector can create solid and innovative synergies in resource management. Third, what are the obstacles in managing water resources and tourism villages? The main challenges often faced are a need for coordination among parties, limited funds, and low community participation. To address these issues, this research aims to examine the development of VOEs in managing water resources and tourism villages through a stakeholder collaboration approach.

2. Methods

This study employs a qualitative approach to comprehensively understand the optimization of collaboration in managing water resources to empower VOEs. The researchers use a qualitative approach to delve into the villages' social, economic, and cultural contexts and a quantitative approach to measure the impact of optimized collaboration. This research mainly evaluates the dynamics of collaboration in managing water resources by VOEs. The researchers will conduct an in-depth examination of existing water management practices, the role of VOEs in this context, and their impact on the sustainability of water resources and local community empowerment.

The research subjects include (i) government officials from the Department of Water Resources and the Environmental Agency of Malang Regency; (ii) VOEs managing water resources; (iii) representatives from local communities involved in water resource management programs; and (iv) representatives from the private sector participating in water resource management programs. The study was conducted in Karangsono Village, Pagelaran Subdistrict, Malang Regency, which VOEs manage.

Data is meticulously collected through comprehensive field surveys, in-depth interviews, and thorough document studies. Field surveys involve direct observation of water resource management practices in selected villages. Researchers conducted extensive interviews with relevant parties, including VOE members, local stakeholders, and related experts. Document studies review a wide range of existing data and information on water resource management in the villages and the role of VOEs.

Qualitative data is analyzed using a thematic approach. Researchers analyze interviews and observations to identify patterns, themes, and relationships within the research focus. The data analysis steps include: (1) coding data from various data collection methods, (ii) presenting data by creating matrices that show the relationship between identified themes and research subjects, (iii) creating flow charts of collaboration between institutions, (iv) verifying data through triangulation by comparing interview results with program documents and field observations and analyzing data with the theory used, and (v) drawing conclusions from the data analysis results regarding the success of collaboration in managing water resources.

3. Result and Discussion

Institutional Development of VOEs

VOEs employ several approaches to foster innovation in their management. First, they create a culture of innovation. The initial step in creating this culture is to involve, encourage, and support employees to think creatively and take risks in developing innovative solutions. An innovation culture is an organizational activity aimed at enhancing the efficiency and effectiveness of VOEs' operations (Hanila, 2019). Second, VOEs engage external parties. They collaborate with external entities such as universities, private companies, or research institutions to gain new knowledge, different perspectives, and additional resources. Collaboration with external parties enriches innovation and improves the performance of VOEs (Phitaloka & Wibawani, 2023). Third, VOEs enhance the capacity of their employees. Besides external collaboration, they provide continuous training and education to employees to develop the necessary skills for implementing and creating innovations. Continuous training enhances employees' competencies and their innovative abilities (Rizal et al., 2022; Zulfirman, 2022). Fourth, VOEs reward innovation. They not only develop skills but also provide rewards and recognition to employees who successfully generate innovative ideas, encouraging them to keep creating. A study published in the Journal of Business Research confirms that incentives and rewards increase employee motivation and productivity (Putra et al., 2019; Rokhman, 2019).

VOEs also form partnerships with local governments, non-governmental organizations, or the private sector to enhance capacity and resources in managing water resources. They undertake various types of businesses to foster creativity in management. Innovation management is key to creating an environment conducive to the development and implementation of new ideas. The types of businesses VOEs engage in are presented in Table 1 below.

Table 1. Types of Businesses Implemented by VOEs Amanah

| Business Type of VOEs | Business Implemented by VOEs Amanah |
|----------------------------------|--|
| Serving / Social Business | The serving type implemented by VOEs Amanah in Karangsuko Village includes providing benefits to residents, although not gaining significant economic profit, through clean water resources. |
| Renting / Rental Business | The renting type implemented by VOEs Amanah in Karangsuko Village includes the rental of meeting halls at Sumber Maron Tourism. |
| Holding / Joint Business | The holding type implemented by VOEs Amanah in Karangsuko Village involves businesses managed by VOEs aimed at reducing unemployment in the village. |

Source: VOEs Amanah Document, 2024

VOEs Amanah in Karangsuko Village have already implemented several types of businesses. These include providing services through the Clean Water and Sanitation Facilities Management Agency, which performs business and social functions. For the serving/social business type, this includes free water for orphanages, free mosques/musholla, and a 50% tariff for Islamic boarding schools and households with orphans (Katko & Hukka, 2015). The renting/rental business type implemented by VOEs Amanah involves collaboration with local community members who own land, building meeting halls for group tourists, and constructing parking areas for tourist buses (Febriana & Meirinawati, 2021).

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VOEs Amanah's Unique Approach to Water Resource Management

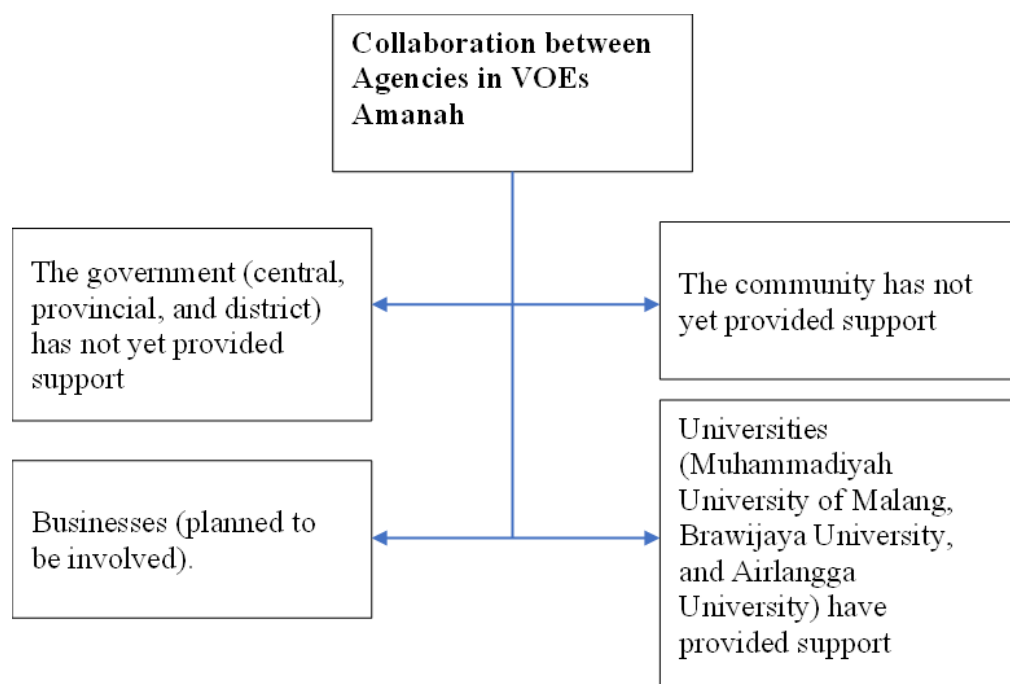
VOEs Amanah established a tourist village in Karangsuko Village, often called Sumber Maron. This tourist village was created not only for tourism and preserving the archipelago's natural beauty but also to provide employment opportunities for unemployed residents, allowing them to work or trade in the tourist village (Philip et al., 2023). VOEs Amanah ensures good coordination and communication among the community to achieve common goals. Planning for each activity is done through mutual consultation and evaluation to identify mistakes or problems and find solutions (Nilawati & Harvitrananda, 2021).

Community participation, especially in Karangsuko Village and its surroundings, is essential for the advancement of each village. Community participation is also a key asset in achieving the objectives of the VOEs Amanah program. With community participation, the village government and VOEs can manage and achieve the programs implemented or planned (Galvez & Rojas, 2019). Providing job opportunities is one of the VOEs Amanah programs that

enables the community to participate in building a better and more innovative village. The Clean Water and Sanitation Facilities Management Agency (CWSFMA) is one of the clean water business holdings of VOEs Amanah for the village community, offering lower tariffs compared to the Regional Drinking Water Company (RDWC). CWSFMA has a tariff of Rp. 10,500/10m³, while the RDWC tariff can reach three times that amount, i.e., Rp. 30,000/10m³.

The community must develop and sustain business activities through the established institution, VOEs. They established VOEs with a clear objective: to empower the village community's economy. They aim to achieve this by providing services for productive business needs, especially for poor groups in rural areas, creating equal business opportunities, and increasing village community income (Andayani & Rahmiyati, 2020). VOEs should educate the community to save regularly. This approach will promote the village community's independent and sustainable economic development (Sastika & Batubara, 2023). As VOEs Amanah focuses more on business holdings, their revenue can be seen as an income growth indicator.

Graph 1. Collaboration Among Actors in VOEs Amanah



Source: VOEs Amanah Document, 2024

VOEs Amanah manages Sumber Maron and BPSABS. Sumber Maron Tourism has eight employees, as does BPSABS. In addition to employees, the local community also participates in building the tourist village to improve the community's economic quality and living standards. VOEs Amanah collaborates not only with residents but also with higher education institutions. This collaboration aims to bring more innovation to the tourist village and provide significant learning opportunities for the village community (Mustofa, 2022b; Sutikno et al., 2022). The universities involved include: (i) University of Muhammadiyah Malang, through Community Service Programs in 2017 and 2019, assisted in designing and partially procuring micro hydro technology, providing technicians or experts, and contributing approximately 25% of the technology funding; (ii) Brawijaya University, through Community Service Programs 2021, helped create a large Sumber Maron logo placed at the center of the waterfall, provided tourism training to tourism operators, and offered training in water service and tourism management; (iii) Airlangga University, contributed through research and studies and awarded outstanding VOEs.

Optimization of VOEs in Managing Water Resources

Optimization is improving the performance, efficiency, or outcomes of a system, process, or activity most effectively and efficiently. Optimization can be the best solution, which only sometimes yields the highest profit if the goal is to maximize profit or only sometimes results in the lowest cost if the goal is to minimize cost (Rattu et al., 2022). Optimization can mean maximizing water utilization for various purposes without compromising the sustainability of the resource. That may involve using more efficient technology, better management of irrigation infrastructure, water conservation, pollution management, and other measures (Wulandari & Ilyas, 2019). Optimization can also enhance collaboration and coordination among various stakeholders involved in managing water resources, ensuring that the needs of all parties are considered and accommodated in decision-making.

1. Optimization of VOEs Institutional Strengthening

VOEs Amanah provides clean water and manages Sumber Maron tourism to help traders and underprivileged communities improve the local economy. VOEs Amanah has indirectly improved community welfare, but its management has not been optimized. That is evident from the development of VOEs Amanah's business, which still focuses on each unit's activities. Therefore, to optimize the role of VOEs Amanah in managing clean water and Sumber Maron tourist village, several efforts are needed to ensure that the benefits of this village-owned enterprise are evenly felt by the village community with abundant water sources. To improve water resource management, the optimization steps based on interviews with the Village Head, VOEs Managers, and the community are as follows:

Table 2. Optimization of VOEs Institutional Strengthening

| No | Informant | Interview Summary | Explanation of Interview Results |
|----|---------------|-------------------------------------|--|
| 1 | Village Head | Capacity Building for Managers | The Village Head emphasized the importance of enhancing the capacity of VOEs (Village-Owned Enterprises) managers through management and technical training. We need more intensive training for VOEs managers to equip them with adequate managerial skills |
| | | Business Diversification | The Village Head suggested business diversification to reduce dependency on a single type of business. Business diversification will help mitigate risks and increase VOEs' revenue. |
| 2 | VOEs Managers | Collaboration with External Parties | VOEs managers stated the need to establish cooperation with private and government institutions to obtain financial and technical support. We need support from external parties to develop infrastructure and facilities |
| | | Service Quality Improvement | VOE managers highlighted the importance of improving the quality of clean water services and tourism facilities. We need to enhance service quality to attract more visitors and users. |
| | Community | Community Participation | Residents expressed a desire to be more involved in the management of VOEs. We want to be more involved in decision-making and water resource management. |

| | |
|------------------------|--|
| Technology Utilization | The community wants to utilize technology to improve the efficiency of water resource management. The use of technology will facilitate the management and monitoring of water quality |
|------------------------|--|

Source: Interview Results from February 5, 2024

Based on the interview data in Table 2 above, enhancing managerial and technical skills is critical to optimizing resource management and increasing organizational efficiency, according to capacity-building theory (Mustofa et al., 2022; Nugraha, 2004). Furthermore, business diversification is crucial as it minimizes business risks while increasing business revenue. According to Ansoff's diversification theory (1965), expanding the range of business activities can improve organizational stability and sustainability through risk distribution and new opportunities (Rorah et al., 2022)

Collaboration with external parties aims to build infrastructure. According to the collaboration theory by Bryson, Crosby, and Stone (2006), cross-sector cooperation can enhance development programs' effectiveness by leveraging various parties' resources and expertise (Taqiyah et al., 2024). Additionally, VOE managers view the improvement of clean water services and tourism facilities as not just a task but a crucial aspect of their operations. According to the service quality theory by Parasuraman, Zeithaml, and Berry (1985), improving service quality is about satisfying customers and valuing them and their loyalty, ultimately boosting revenue and organizational reputation (Febriyanti et al., 2023; Mustofa et al., 2019, 2020). The local community desired to be involved in decision-making and water resource management. According to the participatory approach in natural resource management, as described by Pretty (1995), this can enhance the sense of ownership and responsibility within the community, leading to more sustainable management (Iqbal, 2020). On the other hand, using technology facilitates managing and monitoring water quality. According to Rogers' technology adoption theory (2003), new technology can improve operational efficiency and provide a competitive advantage. Communities wishing to advance the village economy should participate in managing VOEs. That can maximize the future implementation of VOEs (Lukmawati et al., 2020b).

2. Socialization of Clean Water Management and Tourism Village to the Community

VOEs Amanah can make efforts by providing further socialization about managing clean water and tourism villages to the community of Karangsuko Village. In addition, it is necessary to provide assistance and training on business institutional governance, the "Sapta Pesona" principles for business actors, and VOEs management to improve managerial capacity and especially human resources, which are still low in terms of management, innovation, and marketing of tourism villages and clean water (Rahmadani et al., 2022).

According to the Head of Karangsuko Village, socialization is crucial for the community to gain independence and skills in resource management. VOE managers stress the importance of comprehensive support for training in clean water management and tourism villages. The benefits of this training are evident in the improved business management, cleanliness maintenance, and promotion of tourism villages by the residents (Source: Interview Results from February 5, 2024).

Based on the interview data above, when VOEs have conducted socialization, comprehensive training, and community involvement in VOEs management, the businesses created by this institution will develop independently and sustainably. High community participation in managing VOEs can be projected to ensure its sustainability in the future (Lukmawati et al., 2020a).

3. Resource Development Strategy

The strategy for village development can be implemented by maximizing the utilization of natural and human resources. The lack of high-quality human resources and the abundance of natural resources can lead to inequality in efforts to improve the welfare of rural communities. Each hamlet has different potential natural resources, determined by the terrain and contours of the area. Additionally, improving human resources can be achieved through counseling and training and promoting community enthusiasm for pursuing higher education (Mustofa & Rahayu, 2019; Kehik, 2018). The high potential of the village and its community resources will create synergy in achieving progress.

The quality, in addition to the quantity, dramatically determines the advancement of a rural area. Therefore, villages are expected to progress in line with the times. The adaptive capacity of the village area has a significant impact on the village's economic independence. One way to realize the village economy is through business institutions such as VOs. The resource optimization strategies, according to the interview results with the Village Head, VOs Managers, and the Community, are as follows:

Table 3. VOs Resource Optimization Strategies

| No | Strategy | Interview Summary | Explanation of Interview Results |
|----|---|---|---|
| 1 | Optimization of Natural Resources | Identification and Utilization of Natural Resources Potential | Each village has different natural resource potential according to its topography and contours. Identifying this potential is essential to determine the types of businesses that can be developed. For example, a village with abundant water resources can develop a clean water supply business, as VOs Amanah has done. |
| | | Sustainable Management | Natural resources must be managed sustainably to ensure their availability for future generations. That involves using environmentally friendly techniques and responsible management practices. |
| 2 | Enhancement of Human Resources | Counseling and Training | Counseling and training can enhance the skills and knowledge of the village community. That includes technical training in natural resource management and business management. |
| | | Higher Education | Increasing the community's interest in higher education can help create quality human resources. That can be done through scholarship programs and educational support. Higher education enables the community to develop new skills and contribute more effectively to village development. |
| 2 | The synergy between Natural Resources and Human Resources | Collaboration and Community Participation | Collaboration between the community, government, and private institutions can improve the efficiency of natural resource and human resource management. Active community participation in decision-making and program implementation is crucial. |
| | | Use of Technology | The utilization of technology can enhance efficiency in the management of natural resources and human resource development. Technology can monitor |

water quality, manage resources, and provide online training. Technology can also support marketing village products to a broader market, increasing income and community welfare.

Source: Interview Results from February 6, 2024

Based on the data in Table 3, the management of VOEs can achieve sustainable progress. Adapting to changing times and increasing human resource capacity allows the village to develop independently. VOEs are crucial in realizing a strong and sustainable village economy (Haryati & Mustofa, 2022; Mustofa et al., 2022). VOEs Amanah continues to engage in activities that increase village income, which aligns with its vision and mission. Its primary goals are to improve community welfare and quality of life and address issues by providing basic needs, developing infrastructure and economic potential, and sustainably utilizing natural resources.

The formation of Village-Owned Enterprises (VOEs) is designed to engage local labor, foster innovation, and generate economic opportunities for underprivileged communities. VOEs Amanah oversees village facilities and administers aid. The Head of the Social Business Unit, a pivotal figure in VOEs Amanah's management, noted that labor recruitment poses a challenge as the community needs to display more interest in running VOEs due to the relatively low wages. Young individuals seek higher-paying jobs upon completing their high school education or equivalent.

Challenges of VOEs in Managing Water Resources

1. Limited Human Resources

The lack of human resources impacts the progress and development of an institution. If resources are inadequate, the activities or progress of the group will not be optimal (Frederickson et al., 2018). Community involvement in VOEs programs often encounters disagreements between residents and village authorities, leading to misunderstandings (Luthfi, 2019). Currently, VOEs Amanah is managed by the village head alone, resulting in organizational structure issues that require changes to prevent overlapping duties (Siswanda & Meirinawati, 2021). The management of VOEs currently needs to improve in terms of human resources. The results of interviews with the Village Head, VOEs Managers, and the Community are shown in Table 4.

Table 4. Human Resources Condition of VOEs

| No | Informant | Interview Results |
|-----------|------------------|--|
| 1 | Village Head | The limited human resources indeed hinder the management of VOEs Amanah. I have to manage many things simultaneously, so I can only partially focus on VOEs. We also often need clarification with the community, especially when making strategic decisions for water resource management. |
| 2 | VOEs Manager | We are in great need of training and capacity building. Many residents still do not understand the importance of participation in VOEs programs. Additionally, funding limitations are a major problem. Water resource management requires adequate equipment and technology, but we do not have a sufficient budget for that. |
| 3 | Community Member | I feel there is not enough transparency from the VOEs management. Many decisions are made without involving us as a community. The need for more information on how we can contribute is also a hindrance. |

Source: Interview Results, February 6, 2024

From the interviews with the village head, VOEs managers, and the community, as shown in Table 4, it can be concluded that the lack of human resources and misunderstandings between village authorities and the community are the main obstacles in managing VOEs. Based on this data, active involvement from all stakeholders is crucial for the success of community programs, which aligns with the community participation theory (Rosyida & Tonny, 2011). Furthermore, team member training and development are key factors in improving organizational performance.

Misunderstandings between village authorities and the community also highlight the importance of effective communication. According to organizational communication theory, transparency and active participation in the decision-making process can enhance trust and cooperation among all parties (Ansell & Gash, 2007; Galvez & Rojas, 2019; Ullah & Kim, 2020). In terms of VOEs organizational structure, the dual roles performed by the village head indicate the need for reform in the division of tasks and responsibilities. Organizational management theory suggests a clear division of labor and more efficient structuring to improve productivity. Overall, to overcome these challenges, it is necessary to enhance human resource capacity through training, improve communication and community participation, and restructure VOEs organizations to be more efficient and effective.

2. Limited Village Infrastructure

The infrastructure in Karangsuko Village is still lacking in supporting the productivity of the tourism village, particularly in terms of technological facilities. The village has not yet received support from the central, provincial, or district governments, so the existing infrastructure has been obtained through community service programs by universities and businesses such as BRI, which is only now constructing the main gate. Village business managers need to improve their managerial capacity to be professional and innovative in order for village businesses to develop (Afifah & Mustofa, 2023). Infrastructure includes all facilities that support community activities, both physical and non-physical, to meet basic needs within the economic and social scope. The results of interviews with the Village Head, VOEs Managers, and the Community are as shown in Table 5.

Table 5. Infrastructure Condition in Karangsuko Village

| No | Informant | Interview Results |
|----|------------------|--|
| 1 | Village Head | The infrastructure in Karangsuko Village is still minimal. We lack technological facilities, which hampers our productivity as a tourism village. We have not received support from the central, provincial, or district governments. The existing infrastructure has been obtained through university community service programs and businesses like BRI, which is just now building our main gate. |
| 2 | VOEs Manager | Our village business managers require significant improvements in their managerial capacity to be both professional and innovative. Without proper infrastructure, it's challenging to develop our village enterprises effectively. |
| 3 | Community Member | The current infrastructure does not meet our basic economic and social needs. We need more support to enhance our facilities, both physical and non-physical, to improve our living conditions and productivity. |

Source: Interview Results, February 6, 2024

Based on the interview results in Table 5, the lack of infrastructure support from the government in Karangsuko Village is a major obstacle to developing the tourism village. Infrastructure development theory states that good infrastructure is the backbone of economic

growth and the improvement of people's quality of life (Putra et al., 2019). Without adequate infrastructure support, it will be challenging to increase the productivity of the tourism village.

Support from universities and businesses highlights the importance of collaboration between the education and business sectors in village development. According to the triple helix theory, collaboration between the government, universities, and industry is crucial for innovation and local economic development (Mustofa & Rahayu, 2019). However, the absence of government support in providing basic infrastructure remains a significant obstacle. Additionally, village business managers' need to improve managerial capacity underscores the importance of continuous training and education. Management theory states that strong managerial capacity can enhance organizational efficiency and innovation (Fernanda & Frinaldi, 2023). Training and development programs should focus on enhancing managerial skills and understanding business innovation to support better tourism village management.

The limitation of technological facilities, such as internet access, is also a serious constraint. According to digital economy theory, access to information and communication technology is key to increasing competitiveness and global connectivity (Aprilia et al., 2021). Therefore, improving technological infrastructure should be a priority in the village development plan. Overall, Karangsuko Village requires more comprehensive infrastructure support from the government, improved managerial capacity, and adequate technological facilities to support the development of a productive and sustainable tourism village.

4. Conclusion

Optimizing collaboration in water resource management requires an innovative and integrated approach, such as using digital technology and online platforms to facilitate stakeholder collaboration. A community-based approach leverages local knowledge and community experience in water management and involves them in decision-making processes and program implementation. Multi-stakeholder partnerships involving the government, academic institutions, and civil society organizations can expand the available resources and support. Additionally, a rights-based approach strengthens the role and access of vulnerable groups in water management. Empowering the community through training and education on efficient irrigation techniques, environmentally friendly agricultural technology, and ecosystem-based water management is essential. Increasing environmental awareness through outreach and public campaigns is also necessary. Recognition and incentives for innovation and collaboration will encourage the development of sustainable solutions. This approach will likely create an inclusive, adaptive, and sustainable water management system, enhancing community well-being and environmental sustainability.

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