



The Provision of Human Resources Support for The Purpose of Enhancing Economic Growth Through Digital Innovation in The Processing of Animal Manure in Karyamulya Village, Karawang

Arip Solehudin^(✉) and Solehudin Solehudin

Universitas Singaperbangsa Karawang, Indonesia
arip.solehudin@unsika.ac.id

Abstract. This study examines the critical role of human resource assistance in the implementation of digital-based innovations for animal waste processing to enhance economic competitiveness in Karyamulya Village, Batujaya District, and the Karawang Regency. The main objective was to investigate the impact of human resource assistance on the adoption and successful integration of digital technology in the livestock waste treatment sector. Utilizing an interdisciplinary approach, this study seeks to develop a comprehensive mentoring model applicable on a larger scale, aimed at improving the efficiency and effectiveness of innovation at the village level. This study acknowledges the importance of bridging technological advancements with local knowledge and expertise, highlighting the need for customized support systems. By exploring the relationship between human resource assistance and digital innovation adoption, this study provides valuable insights into policies and practices for sustainable development. The ultimate goal is to empower communities such as Karyamulya to utilize digital solutions and promote economic growth while ensuring responsible livestock waste management practices that protect the environment.

Keywords: Human resource assistance, Digital innovation, Capacity-building

1 Introduction

The livestock sector has considerable economic significance in Indonesia[1]. An area within this sector that holds great potential is Karyamulya Village, Batujaya District, and Karawang Regency. However, the production process in this sector results in the generation of organic waste in the form of animal waste[2–5], which can have detrimental impacts on the environment, such as water, air, and soil pollution. To mitigate these negative impacts, it is essential to convert animal waste to economic value.

However, the processing of animal manure[6, 7] requires specialized skills and knowledge, making it imperative to provide adequate human resource (HR) assistance. Digital technology can be utilized as a solution to aid HR management[8] and animal waste processing [4, 9, 10].

The potential for economic value through animal waste processing is considerable[11], but several formidable obstacles impede its realization in Karyamulya Village, Batujaya District, Karawang Regency. The absence of knowledgeable and skilled human resources presents a considerable challenge[12], hindering the effective implementation of digital animal manure processing[13]. Furthermore, limited access to technology and a lack of support from relevant stakeholders exacerbate barriers to progress in this crucial aspect of the livestock industry. In light of these challenges, there is an urgent need for innovative solutions to increase economic competitiveness within the local livestock sector, particularly in the domain of human resource assistance [14].

To overcome these obstacles, a multifaceted approach that not only enhances the technical expertise of the workforce but also strategically addresses the issues of technology accessibility [15] and stakeholder collaboration [12, 16–18] is required. By designing and implementing innovative human resource assistance programs tailored to the specific needs of the village, a more conducive environment can be fostered for the successful integration of digital solutions in animal waste processing. Such initiatives are essential for unlocking the economic potential inherent in the livestock industry, thereby contributing to the overall prosperity of the village within the broader agriculturally focused economic ecosystem of the region.

This issue encompasses various factors, such as the level of comprehension[19, 20], proficiency, and preparedness of human resources[21] in Karyamulya Village when confronting technological advancements. Thus, the provision of human resource support is critical in overcoming this challenge[22], allowing for the optimal implementation of digital technology[23], and consequently enhancing the efficiency, productivity, and competitiveness of the village economy[24].

In light of the aforementioned, this study aims to explore the role of human resource assistance in fostering digital innovations in the animal waste processing sector of Karyamulya Village. The primary objective of this research is to investigate the impact of human resource assistance on the acceptance and effectiveness of digital technology adoption at the village level[25], and to make recommendations that would increase human resource participation and engagement in realizing economic potential through digital innovation[26, 27] in the animal manure processing industry.

2 Methods

2.1 Preliminary Study

Conducting an initial survey to assess the economic, social, and environmental circumstances in Karyamulya Village is a vital step in identifying the necessary requirements and potentials that can be effortlessly integrated into digital innovations for the processing of animal manure.

2.2 Primary Data Collection

Interview. Interviews with key stakeholders, including farmers and community leaders, are of paramount importance for gaining a comprehensive understanding of their

perspectives, concerns, and aspirations regarding digital innovations in animal waste processing. Engaging in direct dialogue with prominent individuals will yield valuable insights into the intricacies of their experiences and opinions, shedding light on the practical implications of integrating digital technologies in the agricultural domain.

As the primary actors in the livestock sector, farmers can offer firsthand perspectives on the challenges they face, such as limited resources, technical expertise, and the feasibility of embracing digital solutions. These interviews can reveal their expectations from technological interventions, facilitating the development of tailored solutions that cater to their specific needs and preferences. Concurrently, discussions with community leaders provide a more holistic view of communal dynamics, highlighting any potential resistance or support for digital initiatives within the community.

The Priest. Questionnaires were distributed to farmers and villagers to assess their level of comprehension, receptiveness, and preparedness for digital technology.

2.3 Human Resources Assistance

Training. Training to enhance human resource capabilities and knowledge in the area of digital technology for animal waste processing.

Guidance. Undertake frequent mentorship sessions aimed at providing guidance and support for the implementation of technology, resolving issues, and fostering greater engagement.

2.4 Digital Innovation

Implementation and Infrastructure. Measures should be taken to guarantee the existence of pertinent digital infrastructure, including internet connectivity and essential equipment.

Prototype Testing. Undertake the implementation of prototypes for digital innovations in the processing of animal manure and simultaneously carry out preliminary testing to identify potential areas for enhancement.

2.5 Evaluation and Recommendations

Execution Evaluation. Undertake an assessment of the implementation of digital innovation while simultaneously grappling with the challenges and challenges that present themselves.

Recommendations. The following recommendations are based on research findings to enhance the efficacy and sustainability of digital innovation in the treatment of animal waste in Karyamulya Village:

1. Establish a robust data collection system to track and monitor animal waste processing in real time, ensuring that accurate and reliable information is available for decision-making.
2. Implement advanced analytics and machine learning algorithms to optimize waste processing parameters, including temperature, pH levels, and feedstock composition, to maximize biogas production and minimize the environmental impact.
3. IoT and remote monitoring technologies are utilized to continuously monitor and control key process variables such as biogas production, feedstock consumption, and waste residue management, thereby enhancing operational efficiency and minimizing unscheduled downtime.
4. Develop and implement a comprehensive digital platform to facilitate collaboration among stakeholders involved in animal waste processing, including farmers, waste processors, and regulatory authorities, to enhance communication, knowledge sharing, and resource allocation.
5. Encourage local communities to participate in the digital innovation process through training programs, workshops, and educational initiatives, thereby fostering a culture of sustainability and promoting the adoption of best practices for animal waste management.
6. Foster partnerships with local institutions such as universities and research centers to leverage their expertise in digital innovation, data analytics, and biogas technology, thereby accelerating the development and deployment of advanced waste processing solutions in the region.
7. Implement strategies to ensure the long-term sustainability of digital innovation in animal waste processing, including the development of business models that promote investment in new technologies, establishment of public-private partnerships, and adoption of regulations and policies that support the growth of the biogas industry.

3 Results and Discussion

3.1 Results

Acceptance Rate of Innovation. A comprehensive analysis of the questionnaire findings provided valuable insights into the level of acceptance of digital innovation among the residents of Karyamulya Village. The results revealed a positive trend, with a significant majority of respondents expressing a favorable inclination towards the integration of technology in the processing of animal manure. This endorsement signifies a promising outlook for the adoption of digital solutions in the village, highlighting the community's openness to embracing advancements that could potentially enhance livestock waste management practices.

Furthermore, the findings shed light on the potential for successfully implementing digital technology to address the challenges associated with animal waste processing. The favorable response from the villagers suggests an eagerness to explore and incorporate innovative solutions, emphasizing the importance of tailoring interventions to align with the community's specific needs and preferences. This positive reception

serves as a foundation for further initiatives and underscores the potential for digital innovation to meaningfully contribute to sustainable and efficient practices in the agricultural sector at the village level.

Table 1. Data Response

	Initial	Age	Gender	Interest in Using Animal Manure Treatment Technology
1.	BS	40	Man	Tall
2.	HT	37	Man	Keep
3.	JT	47	Man	Low
4.	SM	53	Man	Tall
5.	DH	59	Man	Keep

Based on the data presented in Table 1, the majority of respondents demonstrated a high and moderate level of interest in utilizing technology for animal manure processing in Karyamulya Village. Only one respondent expressed a low interest. Consequently, it may be inferred that acceptance of digital innovation among respondents is favorable.

Impact of Human Resource Assistance. Human resource assistance played a crucial role in enhancing respondents' comprehension and proficiency in digital technology.

Table 2. Results of the HR mentoring impact questionnaire

	Initial	Work	Pre-training understanding	Understanding After Mentoring	Increased Understanding
1.	BS	Breeder	Low	Tall	Significant
2.	HT	Entrepreneur Teacher	Keep	Very High	Significant
3.	JT	Entrepreneur	Low	Tall	Significant
4.	SM	Entrepreneur	Keep	Very High	Significant
5.	DH		Low	Tall	Significant

Based on the data collected from five respondents (Table 2), it is evident that all exhibited a substantial improvement in their comprehension of digital technology following the provision of HR support. Each respondent demonstrated a shift from a low to high or medium to a very high level of understanding. Consequently, the HR mentoring program has proven to be effective in enhancing respondents' comprehension and capacity to implement digital innovation.

The utilization of digital innovation can be sustained through a combination of regular training and mentorship, which has proven to be beneficial in this regard.

Table 3. Results of the Regular Training and Guidance Impact Questionnaire

Initials	Work	Before Training and Guidance	After Training and Guidance	Contribution to Sustainability
1. BS	Breeder	Low	Tall	Significant
2. HT	Entrepreneur	Keep	Very High	Significant
3. JT	Teacher	Low	Tall	Significant
4. SM	Entrepreneur	Keep	Very High	Significant
5. DH	Entrepreneur	Low	Tall	Significant

Based on the data collected from the five respondents (Table 3), it is evident that regular training and guidance significantly promote sustainable utilization of digital technology. All the respondents reported an increase in the frequency and intensity of their digital technology usage following their participation in the program.

Changes in Animal Manure Treatment Process. The integration of digital technologies has substantially enhanced the efficiency and productivity of animal manure processing operations.

Table 4. Results of the Regular Training and Guidance Impact Questionnaire

Initials	Previous Processing Time	Processing Time Afterward	Previous Productivity	Productivity Afterwards
1. BS	3 days	1 day	Low	Tall
2. HT	4 days	2 days	Low	Keep
3. JT	5 days	2 days	Very Low	Tall
4. SM	4 days	1 day	Low	Very high
5. DH	4 days	2 days	Keep	Tall

Based on the data presented on Table 4, it can be inferred that the implementation of digital innovations has led to a decrease in processing time and an increase in productivity in animal manure processing. These developments have been deemed favorable and have bolstered the effectiveness of respondents' operations. Digital technologies have facilitated superior monitoring and optimized management of livestock waste.

The utilization of digital systems has facilitated the monitoring and enhancement of livestock waste management efficacy for all participants, rendering the measurement process simpler and the waste management performance more potent following the system's implementation.

Table 5. Results of the Questionnaire on the Impact of Digital Systems on Livestock Waste Monitoring and Management

Initials	Previous Monitoring Facilities	After-Monitoring Facility	Effectiveness of Previous Waste Management	Effectiveness of Waste Management Afterwards
1. BS	Difficult	It's Easy	Low	Very High
2. HT	Very difficult	Easy	Low	Tall
3. JT	Difficult	Easy	Keep	Very High
4. SM	Difficult	It's Easy	Low	Tall
5. DH	Very difficult	Easy	Very Low	Tall

3.2 Discussion

The Important Role of Human Resource Assistance.

Role of Human Resource Support in Facilitating Digital Technology Adoption.

This study indicates that human resource support plays a crucial role in boosting the adoption and use of digital technology in rural regions. This is evidenced by the substantial improvement in comprehension and proficiency among the majority of the respondents following the provision of assistance.

Several factors that contribute to the favorable outcomes of human resource coaching initiatives include the following.

- a. Delivery of materials and training in accordance with the needs of the village community
- b. Field assistants who have the ability both hard skills and soft skills
- c. Regular monitoring and evaluation of the program
- d. Support from the village government and local community leaders

The challenges that must be overcome in aiding human resources in rural regions comprise the scarcity of dependable Internet and electricity access. Therefore, it is essential to develop suitable and enduring programs. Moreover, it is crucial to equip rural communities with the necessary infrastructure to ensure the seamless execution of digital technology.

In summary, the findings of this study align with several prior investigations that underscore the significance of HR mentoring in addressing skill and knowledge deficits at the grassroots level. Well-crafted assistance that takes heed of field conditions has proven to connect remote communities with innovative digital solutions.

Direct engagement and connections between companions and community

The research findings indicate that direct engagement and connection between companions and the community have a significant impact on fostering trust and receptiveness towards innovative digital technologies. Through dialogue and guidance, mentors

effectively communicate the lasting advantages of digital solutions to the public, while simultaneously addressing any doubts or apprehensions that may arise.

Some of the underlying factors contributing to these outcomes include the following.

- a. The credibility and expertise of the companion in the eyes of the public
- b. Dialogical and persuasive material delivery methods
- c. Simulation and hands-on practice with the community
- d. Support from key figures in the village

The challenge that must be addressed in the future is how to sustain a trusting relationship over the long term through reliable mentoring mechanisms. Additionally, there is a need to enhance mentors' capacity to offer solutions to a wide range of complaints and obstacles faced by the community.

In summary, the study highlights the need for a collaborative mentoring model in which companies and users of digital technology actively participate from the outset. It is crucial to have an interactive process involving two-way feedback to ensure that the resulting innovations are suitable for the local socio-cultural context.

Recommendations for improving sustainability.

Transforming Rural Connectivity.

According to the findings of our research and consultations with local communities, an insufficient digital infrastructure remains a significant impediment. The dearth of broadband Internet connectivity and the fluctuating supply of electrical power are commonly recognized as primary barriers to the effective deployment of digital technology. In light of these findings, it is incumbent upon regional authorities and other stakeholders to augment their investment and expansion efforts in digital infrastructure. Therefore, we propose the following recommendations:

- e. Internet networks can be expanded to remote villages through smart palang programs or BTS compacts.
- f. Provision of livestock waste management facilities integrated with digital features.
- g. Strengthening rural electricity networks in collaboration with PLN.
- h. Providing incentives for mobile operators to expand signal coverage.
- i. Increased digital literacy and inclusion through regular training.

The development of appropriate infrastructure is essential to enable rural communities to access a wide range of digital applications and services that can enhance their livelihood and overall quality of life. This is expected to facilitate more effective poverty alleviation initiatives in rural areas. In accordance with international best practices, it is crucial to engage multiple stakeholders to expedite the expansion of the rural digital infrastructure in Indonesia. This is particularly important considering the significant potential for transformative impacts on rural communities.

Enhancing Digital Literacy in Villages.

The results of the investigation revealed that the training program and technical support furnished yielded substantial advantages in enhancing the comprehension and competencies of the villagers. Nevertheless, the degree of comprehension and capacity to employ digital technology still require improvement to attain optimal results. Consequently, it is recommended that training programs and technical assistance be reinforced through the following measures.

- a. A more comprehensive and gradual training curriculum, from basic to advanced.
- b. A more interactive training method with a proportion of 30% theory and 70% practice.
- c. Trainers have adequate competence in both hard and soft skills.
- d. Regular monitoring and evaluation are related to the effectiveness of knowledge and skills transfer.
- e. Ongoing mentoring program in the field post-training.
- f. Forum-sharing sessions periodically to share experiences and challenges.

With the implementation of a comprehensive and sustainable capacity-building program, it is anticipated that the adoption of digital technology in rural areas will significantly increase and produce tangible improvements in community well-being. To achieve this objective, the collaboration and commitment of numerous stakeholders is essential.

In light of the findings and discussions presented in this study, we believe that the application of digital innovation in the processing of animal waste can serve as a model that is widely embraced at the village level, leading to positive outcomes for the local economy and ecosystem.

4 Conclusion

The research and discussion presented led to several conclusive findings. One of the key findings is that human resource (HR) assistance plays a vital role in enhancing the understanding, skills, and acceptance of digital innovation, with success attributed to intensive interaction between mentors and residents. Another important conclusion is that the expansion of rural digital infrastructure, particularly Internet networks and stable electricity, is essential to optimize the implementation of digital technology in these areas.

In addition, the study emphasizes the need for continuous improvement and refinement of training and capacity-building programs to ensure more comprehensive utilization of digital technology at the grassroots level. The conclusions highlight the critical role of government support, commitment, and collaborative efforts among stakeholders in expediting the adoption of digital technology in rural regions.

In light of these conclusions, it is suggested that the outlined strategies be pursued actively. Strengthening HR assistance, prioritizing digital infrastructure expansion, refining training initiatives, and fostering collaborative efforts are crucial steps to ensure

the widespread application of digital innovation, thereby leading to significant improvements in the welfare and empowerment of rural communities.

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