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Enhancing Goat and Sheep Farm Management with IoT-Enabled Weighing Devices

Jahrizal Jahrizal [a*], M Dalil [b], Rahyul Amri [c], Indri Yovita [a], Jaswar Koto [d], Umar Faruq [e], Achmad Tavip Junaedi [f], Gusrio Tendra [g], Nicholas Renaldo [f], Ulviyya Mammadova [h]

[a] Faculty of Economic and Business, Universitas Riau, Indonesia

[b] Faculty of Engineering, Universitas Riau, Indonesia

[c] Informatics Engineering Study Program, Universitas Riau, Indonesia

[d] Ocean and Aerospace Research Institute, Japan

[e] Faculty of Tarbiyah and Teacher Training, Universitas Islam Negeri Sultan Syarif Kasim, Indonesia

[f] Business Faculty, Institut Bisnis dan Teknologi Pelita Indonesia, Indonesia

[g] Computer Science Faculty, Institut Bisnis dan Teknologi Pelita Indonesia, Indonesia

[h] Institute of Soil Science and Agrochemistry, Azerbaijan

*Corresponding Author: jahrizal@lecturer.unri.ac.id

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ABSTRACT

The objective of this community service activity is to introduce and demonstrate the use of IoT-enabled weighing devices for goats and sheep to local farmers. Local goat and sheep farmers in Riau Province who are interested in improving their farm management through the adoption of smart technologies. Participatory approach to ensure active engagement. Direct demonstration and supervised hands-on practice. Distribution of simple user manuals and instructional materials. Use of real livestock (goats and sheep) during the demonstration to enhance practical understanding. The community service activity successfully introduced and demonstrated the use of IoT-based weighing devices to local goat and sheep farmers. Through interactive demonstrations and hands-on practice, farmers gained a better understanding of the device's potential to improve livestock management. The successful demonstration of IoT-based weighing devices has significant implications for the future of livestock farming, particularly in rural and small-scale farming communities. By integrating IoT technology into farming practices, farmers can improve productivity, track livestock health and growth more effectively, and make data-driven decisions that optimize operations.

Keywords: Goat; Sheep; Management; IoT; Weight

Fields: Agribusiness; Management; Technology

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SDGs: No Poverty (1); Zero Hunger (2); Good Health and Well-being (3); Quality Education (4); Decent Work and Economic Growth (8)

INTRODUCTION

In this community service activity, our team demonstrated an Internet of Things (IoT)-based weighing device specifically designed for goats and sheep (Lohani & Bhandari, 2021). The purpose of this innovation is to assist farmers in monitoring the weight of their livestock more efficiently and accurately (Terence et al., 2024). By utilizing real-time data recording and remote monitoring features, this technology aims to improve farm management practices, optimize livestock growth tracking, and support better decision-making processes. Through this demonstration, we hope to empower local farmers with practical technological solutions that enhance productivity and promote the adoption of digital innovations in the livestock sector.

The traditional method of weighing goats and sheep often involves manual measurement, which can be time-consuming, prone to errors, and stressful for both farmers and animals. As livestock farming grows in scale and competitiveness, there is an increasing need for more efficient, accurate, and real-time data collection methods. However, many small and medium-scale farmers still rely on outdated practices, leading to challenges in livestock health monitoring, growth tracking, and business decision-making. In response to this issue, the adoption of IoT-based technologies, such as smart weighing devices, offers a promising solution to modernize farm management and improve productivity in goat and sheep farming.

The objective of this community service activity is to introduce and demonstrate the use of IoT-enabled weighing devices for goats and sheep to local farmers. Through this initiative, we aim to enhance farmers' understanding of smart farming technologies, improve the accuracy and efficiency of livestock weight monitoring, and promote the adoption of digital innovations in traditional farming practices. Ultimately, this program seeks to empower farmers to optimize livestock management, support data-driven decision-making, and increase overall farm productivity.

LITERATURE REVIEW

Community Service

Community service refers to efforts aimed at addressing the existing needs of a community to solve its problems. This service can take the form of physical development, such as improvements in health, education, transportation, and religious sectors. Another type of community service involves providing support to meet the community's needs for problem-solving, also through physical development in areas like health, education, transportation, and religion (Alfariz et al., 2019; Nyoto et al., 2022; Renaldo et al., 2023; Sudarno et al., 2022; Suyono et al., 2022).

IoT Integration

The integration of Internet of Things (IoT) technology in livestock farming has been increasingly recognized as a critical innovation for improving farm management and productivity. IoT-enabled devices allow for real-time monitoring, data collection, and automated reporting, offering farmers accurate and timely information to support decision-making processes (Wolfert et al., 2017).

Weighing livestock, such as goats and sheep (Sujarwanta et al., 2024), is an essential aspect of farm management, as it directly impacts feeding strategies, health monitoring, and marketing decisions. Traditional weighing methods often involve manual procedures that are labor-intensive, time-consuming, and prone to human error (Andrade et al., 2020). This inefficiency can lead to mismanagement of livestock growth rates and health conditions, ultimately affecting farm profitability.

Several studies have demonstrated the advantages of using smart weighing systems. For instance, IoT-based weighing solutions can automatically record and transmit animal weight data to centralized databases, reducing the need for manual record-keeping and minimizing human error (Li et al., 2019). In addition, real-time weight tracking enables early detection of health issues or growth abnormalities, allowing farmers to take immediate action (Nasirahmadi et al., 2020).

In the context of small and medium-sized farms, adopting IoT technology can significantly enhance operational efficiency (Renaldo et al., 2022) without requiring large capital investments. Practical demonstrations and community engagement are vital for introducing these technologies to farmers who may have limited exposure to digital innovations. Therefore, community service initiatives that focus on IoT technology adoption, such as the demonstration of IoT-based weighing devices, play a crucial role in bridging the gap between traditional practices and modern smart farming solutions.

METHODOLOGY

Target Audience

Local goat and sheep farmers in Riau Province who are interested in improving their farm management through the adoption of smart technologies (Jahrizal et al., 2025).

Activities

Introduction Session: Presentation on the importance of accurate livestock weight monitoring and the benefits of IoT technology in modern farming. Demonstration of the IoT-Based Weighing Device (Junaedi et al., 2024): Live demonstration of how to operate the smart weighing device, including data recording, real-time

monitoring, and interpretation of results. Hands-on Practice: Farmers are given the opportunity to operate the device themselves under the guidance of the team to build practical skills and confidence. Discussion and Feedback Session: Open discussion to gather feedback from participants, address any challenges, and explore ideas for future development and implementation (Sekaran & Bougie, 2016).

Methods

Participatory approach to ensure active engagement. Direct demonstration and supervised hands-on practice. Distribution of simple user manuals and instructional materials. Use of real livestock (goats and sheep) during the demonstration to enhance practical understanding (Sevendy et al., 2023).

Expected Outcomes

Increased awareness and knowledge of IoT technologies among farmers. Improved skills in operating IoT-based weighing devices. Higher adoption rates of smart farming tools in the local farming community. Better data-driven management practices in goat and sheep farming (Nyoto et al., 2024).

Evaluation

Pre- and post-activity surveys to measure knowledge improvement. Observation of participant engagement during hands-on practice. Collection of feedback to evaluate satisfaction and identify areas for improvement (Tavip Junaedi et al., 2025).

RESULTS AND DISCUSSION

Result

The community service activity was successfully conducted with the participation of 25 local goat and sheep farmers. During the introduction session, participants showed high interest in learning about the application of IoT technology in livestock management (Renaldo et al., 2024).

In the demonstration session, the IoT-based weighing device functioned properly, accurately capturing and transmitting real-time weight data to a connected monitoring system. Farmers were actively involved during the hands-on practice, and most of them were able to operate the device independently after brief instructions.

Based on post-activity surveys, 92% of the participants expressed satisfaction with the device's ease of use and its potential to improve farm operations. Furthermore, 88% indicated a willingness to adopt the technology in their own farms if made available at an affordable cost.

Discussion

The results of this activity highlight the effectiveness of direct demonstrations and hands-on learning in introducing new technologies to farmers. The use of real livestock during the practice sessions significantly enhanced participants' confidence in operating the IoT weighing device (Jahrizal et al., 2024).

This project also confirmed that farmers recognize the benefits of smart technologies, particularly in terms of improving the accuracy and efficiency of livestock monitoring. However, concerns about device affordability and maintenance were raised during the discussion session, emphasizing the need for further efforts to provide low-cost solutions and continuous technical support.

The findings are consistent with previous studies (e.g., Li et al., 2019; Nasirahmadi et al., 2020), which stated that IoT adoption in farming is highly dependent not only on the availability of technology but also on farmer readiness and access to necessary resources.

Overall, this community service activity successfully bridged the knowledge gap between traditional livestock management practices and modern IoT-based solutions, paving the way for broader adoption of smart farming technologies in rural areas.

CONCLUSION

Conclusion

The community service activity successfully introduced and demonstrated the use of IoT-based weighing devices to local goat and sheep farmers. Through interactive demonstrations and hands-on practice, farmers gained a better understanding of the device's potential to improve livestock management. The participants expressed strong interest in adopting this technology to enhance farm operations, with a significant majority recognizing its

benefits in terms of accuracy and efficiency. Overall, the activity was a success in promoting smart farming solutions to a traditionally low-tech sector, and it laid a strong foundation for future technology adoption in the community.

Implications

The successful demonstration of IoT-based weighing devices has significant implications for the future of livestock farming, particularly in rural and small-scale farming communities. By integrating IoT technology into farming practices, farmers can improve productivity, track livestock health and growth more effectively, and make data-driven decisions that optimize operations. The adoption of such technologies can also help bridge the digital divide in rural areas, providing farmers with the tools needed to compete in an increasingly technology-driven agricultural industry.

Limitations

While the demonstration was well-received, there were some limitations to the community service activity. One key limitation was the small sample size of participants, which may not fully represent the wider farming community. Additionally, the activity was limited to a one-time demonstration, which might not have been enough for farmers to fully integrate the technology into their daily operations. Some farmers also expressed concerns regarding the cost and maintenance of the devices, which may limit their willingness to adopt the technology in the long term. Furthermore, the level of technological literacy among farmers varied, with some participants requiring more support and training than others.

Recommendations

To maximize the impact of IoT-based solutions in livestock farming, we recommend several things. Follow-up Training: Organize additional workshops and training sessions to ensure that farmers have the knowledge and skills to operate IoT devices independently. Affordable Solutions: Work with technology providers to explore ways to make IoT devices more affordable for small and medium-sized farmers, potentially through subsidies or financing options. Ongoing Support: Establish a support system that includes technical assistance and maintenance services to address concerns related to device reliability and usability. Wider Outreach: Expand the community service initiative to include a larger and more diverse group of farmers to ensure that the benefits of the technology reach a broader audience.

Future Community Service

Looking ahead, future community service activities should focus on expanding the reach of IoT technology in agriculture, particularly in underserved rural areas. We recommend conducting follow-up programs that include both theoretical and practical training to address the varying levels of technological literacy among farmers. Additionally, partnerships with local agricultural organizations, government agencies, and technology providers can help ensure that IoT solutions are accessible, affordable, and sustainable for farmers. Future initiatives could also focus on integrating other smart farming technologies, such as automated feeding systems or health monitoring sensors, to further enhance farm management practices.

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