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Empowerment of Geddongnge Youth Group through the Development of IoT-Based Rooster Farming

Pemberdayaan Kelompok Pemuda Geddonge melalui Pengembangan Peternakan Ayam Jago Berbasis IoT

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Abstract

The rooster farming business in Geddongnge Village, Parepare City, holds significant economic potential, yet its growth is hampered by reliance on traditional coops and minimal monitoring management, frequently leading to high livestock mortality rates. This community engagement program zeroes in on boosting farmer productivity through innovative technology. The primary goal is to revitalize coops with a durable, modern, healthy design and implement an Internet of Things (IoT)-based monitoring system. We employed a participatory approach, which included socialization, comprehensive training, technology implementation, and ongoing mentorship. The practical solutions involved constructing galvanized iron coops with thermal insulation, installing cross-ventilation with an exhaust fan, and setting up temperature/humidity sensors and CCTV. The results demonstrate a potential for reduced livestock mortality, evidenced by the visibly healthier and improved condition of the roosters, marked by increased responsiveness and activity according to partner reports. This program successfully establishes an efficient and sustainable farming model.

Keywords: Rooster Farming, Smart Coop, Internet of Things (IoT), Real-time Monitoring System, Productivity Enhancement

Abstrak

Usaha peternakan ayam jago di Kelurahan Geddongnge, Kota Parepare, memiliki potensi ekonomi besar, namun terhambat oleh kandang tradisional dan manajemen pengawasan yang minim, yang menyebabkan tingginya angka kematian ternak. Pengabdian ini berfokus pada peningkatan produktivitas melalui inovasi teknologi. Tujuannya adalah merevitalisasi kandang dengan desain sehat bermaterial modern yang tahan lama serta mengimplementasikan sistem pengawasan berbasis Internet of Things (IoT). Metode yang digunakan adalah pendekatan partisipatif yang meliputi sosialisasi, pelatihan, penerapan teknologi, dan pendampingan. Solusi yang diterapkan meliputi pembangunan kandang besi galvanis berlapis insulasi termal dan instalasi sensor suhu/kelembapan serta CCTV. Hasil pengabdian menunjukkan adanya potensi penurunan angka kematian ternak yang ditandai dengan kondisi ayam yang terlihat sehat dan membaik, dengan respon dan keaktifan ayam yang meningkat sesuai laporan mitra. Program ini berhasil menciptakan model usaha peternakan yang efisien dan berkelanjutan.

Keywords: Peternakan Ayam Jago, Kandang Sehat, Internet of Things (IoT), Real-time, Peningkatan Produktivitas

1. Introduction

Parepare is recognized as a developing city, with its economy growing by 3.88% in 2023 compared to the previous year, according to BPS data. Notably, the education services sector saw the highest production growth, reaching 8.26% (Badan Pusat Statistik Kota Parepare, 2024). This economic momentum urgently needs reinforcement across various sectors that can deliver direct impact. Rooster farming, in particular, stands out as a highly promising economic venture,

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catering both to the culinary market and to collectors who are passionate about fighting cocks. Beyond that, this industry has the potential to generate decent employment opportunities, making it a viable pathway for Parepare's residents to strengthen their local economy. However, those currently in the rooster farming business face significant hurdles that hinder their productivity. Key issues for our partner farmers include outdated coop designs that fail to meet "healthy coop" standards, and a livestock monitoring system that has yet to integrate IoT-based technology. It's worth noting that implementing IoT-based technology has been shown to deliver substantial positive effects on livestock health (Umam, 2018). Our initial survey and observation revealed that existing coops are still traditional, built primarily from bamboo and wood, with severely sub-optimal ventilation. This setup creates problems such as high humidity, exposes the animals to extreme weather, and leaves them vulnerable to predators. These compounded issues directly compromise the animals' health, resulting in a worryingly high mortality rate (Rohman & Isnaini, 2025). Furthermore, livestock supervision is entirely manual, forcing farmers to always be physically present at the farm. This direct, on-site management is clearly inefficient for effectively monitoring the roosters' condition and mitigating other threats that could jeopardize the sustainability of their business.

Monitoring coops through an IoT-based system significantly simplifies the farmers' management of the livestock's condition (T. Saputra et al., 2017). Given the problems we have identified, the solutions proposed in this program center around two key areas: implementing a healthy coop design integrated with the Internet of Things (IoT) to enhance the roosters' quality of life, and utilizing IoT-based livestock monitoring to make the management of the rooster flock more effective and efficient (Septian et al., 2025). The target partners for this program are a group of young individuals who currently manage their rooster farm using traditional methods. They are located in the Geddongnge area, which falls under the administrative region of Cappagalung Urban Village, Bacukiki Barat District, Parepare City, South Sulawesi. Specifically, this involves IoT-based livestock condition monitoring, where CCTV feeds can be observed directly via a dedicated application on a mobile phone. By implementing this specific IoT technology, the project aims to give farmers the capability and ease to oversee the roosters' condition in real-time (Ilham Sayekti et al., 2020).



Figure 1. Existing Coop Exterior Condition



Figure 2. Existing Coop Interior Condition

2. Methods

To effectively address the challenges encountered by our partner rooster farmers, the execution methodology of this program has been systematically designed. This ensures that the proposed solutions are applied effectively and yield a sustainable impact. Specifically, our method comprises distinct stages: initial socialization, hands-on training, technology implementation, continuous mentorship and evaluation, and planning for program sustainability. The overarching approach is fundamentally participatory, technology-driven, and centered on boosting productive economic capacity. Crucially, every member of the implementing team is assigned roles and responsibilities based on their specific expertise, which includes mobilizing students to provide essential support during the fieldwork.

2.1. Stages of Solution Implementation

a. **Socialization** serves as the initial phase, introducing the program to the partners and aligning perceptions regarding the program's objectives and anticipated benefits. Activities include:
   - An initial meeting between the implementing team and partners to detail the background, goals, and expected outputs of the program.
   - Identifying the priority needs and challenges faced by the partners through structured discussion.
   - Presenting the proposed solutions, such as the healthy coop development and the utilization of IoT technology.
   - Signing a cooperation agreement as a formal expression of the partner's commitment.

b. **Training** is conducted to enhance the partners' technical and managerial capacity, covering:
   - Hands-on training in designing healthy coops with durable materials, including the technical use of anti-rust galvanized iron, heat-resistant aluminium foil insulation, and the active ventilation system (exhaust fan).
   - Training on the use of the Internet of Things (IoT)-based monitoring management system, specifically the temperature and humidity sensors, and CCTV for livestock surveillance.

c. **Technology Implementation** Technology implementation is the primary solution for increasing farm productivity and operational efficiency. This stage involves:
   - Revitalizing the partner's coops using modern construction materials, such as galvanized iron frames, adding layers of thermal insulation, and installing an active ventilation system.
   - Installing IoT monitoring tools within the coop, including temperature and humidity sensors, CCTV, and the corresponding monitoring dashboard.

d. **Mentorship and Evaluation** Following the technology implementation, routine mentorship is carried out to ensure the effectiveness and long-term sustainability of the provided solutions:
   - Monitoring the healthy coop application to assess thermal comfort and material durability.
   - Evaluating the IoT system to determine data accuracy and its benefit in real-time livestock surveillance.
   - Providing periodic technical feedback and recommendations.

e. **Program Sustainability** To ensure the program continues to provide benefits after the completion of the main activities, specific steps for sustainability are designed:
   - Establishing a nurtured farmer group as a forum for sharing knowledge and experience.
   - Compiling an operational manual for IoT usage and coop management.
   - Conducting advanced training sessions involving external experts such as the Livestock Agency or cooperatives.
   - Facilitating access to micro-financing institutions and cooperatives to enable partners to develop their business independently.

2.2. Approach Method and Application of Technology and Innovation

The program execution utilizes a combination of several methodical approaches:

- **Participatory:** Partners are actively involved from planning, execution, through to evaluation. This is done to foster a sense of ownership and responsibility for the implemented innovations.

- **Appropriate Technology:** The integration of IoT technology, such as temperature/humidity sensors and CCTV surveillance, contributes to operational efficiency and real-time livestock monitoring.
- **Productive Economy:** The program is geared towards boosting productivity and reducing operational costs, primarily by optimizing coop efficiency.
- **Human Resources Capacity Building:** Continuous training and mentorship are provided to ensure that partners fully understand and can apply the technology independently.
- The volume of work is meticulously tailored to the scale of partner priorities, focusing specifically on two main aspects: production enhancement through healthy coops and IoT technology management.

2.3. Partner Participation in Program Implementation

Partners maintain an active role throughout the entire program execution process. Forms of participation include:

- Providing the coop location as the object for technology application and installation.
- Dedicating time and effort to attend training and fieldwork activities.
- Adopting the new technologies and methods introduced during the activities.
- Offering input and feedback during the program evaluation process.
- Serving as a dissemination agent to other farmers after the activity is concluded.

2.4. Evaluation of Implementation and Program Sustainability

A comprehensive evaluation is conducted to assess the program's overall success. The evaluation encompasses:

- **Technical Evaluation:** Assessing the post-construction condition of the healthy coop, measuring thermal comfort and air quality, and evaluating the functionality of the IoT technology.
- **Economic Evaluation:** Reviewing the increase in livestock productivity and the reduction in operational costs.
- **Sustainability Evaluation:** Analyzing the partners' readiness to manage the technology independently, examining the continuity of the nurtured group, and assessing their preparedness to collaborate with third parties.

3. Result and Discussion

The execution of this community engagement program did not merely involve the construction of physical infrastructure but also encompassed a series of intensive mentorship actions that collectively drove social and managerial transformation within Geddongnge Village. The dynamic of the participatory mentorship process was comprehensive, starting with socialization, followed by *hands-on training* in healthy coop construction, and culminating in the full implementation and guidance on technology use.

The core technical action of this program was the application of Science and Technology (*Ipteks*) focused on drastically improving the micro-environment of the coop. The resulting social changes observed among the target partners, particularly the youth group, include the creation of new institutional structures in the form of data-driven farm management, and a new awareness that technology is the crucial key to increasing economic productivity, rather than simply being a tool for leisure.

Optimal ventilation systems possess the capacity to significantly elevate both air quality and thermal comfort within a structure. The deliberate combination of ample natural lighting and robust ventilation creates an environment that is both healthier and substantially more comfortable. Within the context of performance-based design, the proposed approach can be effectively utilized to ensure that buildings are engineered with both energy efficiency and superior air quality as primary considerations. Therefore, any design that comprehensively integrates aspects of ventilation, natural lighting, and air humidity must be prioritized in facility construction. (Ismajaya et al., 2025)

The following section provides a detailed discussion of the results and impact derived from the application of the proposed technology:

a. Implementation of IoT as an Integrated Coop Monitoring System

The deployment of Internet of Things (IoT) technology at the dedication site served as the primary catalyst for resolving the persistent problem of ineffective manual monitoring. In general, the installed IoT system functions as a real-time information and control hub, fully accessible to partners via a dedicated mobile application. This robust system integrates sensors for temperature and humidity monitoring as well as CCTV cameras for visual surveillance. It was specifically engineered to mitigate the environmental volatility and security vulnerabilities previously inherent in traditional coops. Consequently, rooster farm management has decisively shifted from a reactive and speculative approach to one that is entirely proactive and data-driven.

b. Positive Impact of Temperature Monitoring on Thermal Comfort

Temperature monitoring within the coop demonstrated a significant positive correlation with enhancing the thermal comfort of the roosters. Prior to the intervention, coop temperatures frequently spiked to critical limits (above 30°C) during the day—a factor that directly triggered thermal stress and increased the risk of livestock mortality. Through the strategically installed temperature sensors, farmers can now receive instant notifications and activate the active ventilation system (*exhaust fan*) precisely when necessary. Post-implementation data unequivocally indicate a notably improved temperature stability within the optimal range.



Figure 3. Ventilation conditions for mitigating temperature fluctuations in the coop

The precise control of temperature is crucial, as excessively high temperatures can decrease feed intake and cause fatal heat stress in poultry (Mansyur, 2018). As a result, the behavior of the roosters that previously exhibited symptoms of thermal stress (such as heavy panting or huddling in corners) has drastically subsided, proving that the coop environment is now far more conducive to health.

Table 1. Comparison of Rooster Coop Thermal Conditions

Observation Period	Parameter	Average Daytime Temperature (∘C)	Maximum Recorded Temperature (∘C)	Frequency of Critical Condition (> 30∘C)	Rooster Behavior (Owner Observation Report)
2 Weeks Before Intervention	Traditional Coop	29.5	34.2	High (Average 5-6 hours/day)	Panting, lethargic movement, huddling in corners.
2 Weeks Post-Implementation	IoT Coop (with *Exhaust Fan*)	27.8	29.8	Low (Less than 1 hour/day)	Normal, actively moving, stable appetite.

c. Positive Impact of Humidity Monitoring on Animal Health

Controlling air humidity proved to be a crucial contribution to comprehensive disease prevention. High humidity levels within the traditional bamboo coops often created an ideal environment for the proliferation of pathogens and fungi,

frequently leading to respiratory diseases. Excessively high humidity, especially when combined with high temperatures, can severely worsen health conditions and increase ammonia levels inside the coop (Fattah et al., 2023). With accurate humidity sensors in place, coop management is now grounded in concrete data, rather than being based solely on intuition.



Figure 4. Temperature and humidity monitoring device

Farmers make precise, data-backed adjustments to ventilation and litter management to consistently maintain humidity at safe levels (approximately 60-70%). The direct impact of this data-driven management is a palpable decrease in the clinical symptoms associated with respiratory and skin ailments. This clearly demonstrates the creation of a more hygienic micro-environment, which fundamentally sustains the robust health of the livestock.

Table 2. Comparison of Rooster Coop Humidity Conditions

Observation Period	Parameter	Average Maximum Humidity (%)	Primary Risk	Health Impact (Owner Observation Report)
2 Weeks Before Intervention	Traditional Coop	Often above 80%	High (Pathogens, Fungus, Ammonia)	Roosters appeared lethargic, watery eyes, dull feathers, and fast/noisy breathing.
2 Weeks Post-Implementation	IoT Coop (Data Monitoring)	Average 71.8%	Low (Controlled)	Roosters appeared active, bright eyes, shiny feathers, and normal respiration.

d. Utilization of CCTV for Behavioral Surveillance and Security

The implementation of CCTV successfully transformed the surveillance system from merely a security measure into an effective behavioral diagnostic tool. In addition to providing enhanced security against theft or predatory animals, the CCTV allows farmers to monitor the roosters' activities in real-time via their mobile phones without the necessity of being physically on-site. This change has induced a profound shift in farmer behavior, making them far more proactive in detecting subtle anomalies—such as a decrease in appetite or the early signs of illness—which are clearly observable through the livestock's movement patterns. The use of visual technology and real-time monitoring in livestock farming has been proven effective in monitoring the health and welfare of animals and in the early detection of abnormal behavioral changes (J. Saputra & Siswanto, 2020).

The Most Valuable Social and Factual Impact lies in the confirmation from the coop owners that the physical activity of the roosters is noticeably better, more active, and appears healthier than before. This tangible increase in quality of life fosters optimistic potential and strong conviction among the partners that the lifespan of the roosters will be significantly extended. This simultaneously underscores the program's success in instilling a new awareness that investment in a healthy coop environment and technology directly impacts the economic value of their livestock.



Figure 5. Coop monitoring via CCTV

4. Conclusion

The Community Empowerment Program for the Geddongnge Youth Group through the Development of IoT-Based Rooster Farming has been successfully executed utilizing a participatory approach focused on boosting productive economic capacity. The core solutions—the revitalization of healthy coops and the implementation of the IoT-based monitoring system were applied comprehensively.

The application of this science and technology (*Ipteks*) has yielded clear, tangible results. Based on direct observation and reports from the coop owners, the physical condition of the roosters shows significant improvement. This positive change is specifically evidenced by the increased responsiveness and superior physical activity observed in the livestock.

Crucially, this early success has generated high optimism among the partners (the coop owners) regarding the possibility of extending the lifespan of the roosters and sustainably suppressing the mortality rate. This hope is strongly supported by the newly controlled coop environment (in terms of temperature and humidity) and the real-time surveillance system, which together enable rapid intervention, making the entire farming venture more efficient and sustainable in the long run.

Ultimately, this program has not only delivered technical solutions but also successfully enhanced the partners' human resources capacity in technology-driven farm management, thereby preparing a solid foundation for their future economic independence.

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We sincerely hope that this contribution marks a significant first step toward the development of a more modern, efficient, and sustainable rooster farming business.

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