

ABSTRAK

Ekosistem peternakan bebek pedaging di Desa Krajan, Kabupaten Sukoharjo, dipengaruhi oleh ketersediaan dedak padi sebagai pakan tambahan yang bergantung pada musim panen dan aktivitas penggilingan padi. Kondisi ini menyebabkan ketidakstabilan pasokan pakan, variasi kualitas nutrisi, serta ketidakteraturan waktu panen akibat pertumbuhan ternak yang tidak optimal. Meskipun praktik ekonomi sirkuler seperti pemanfaatan dedak dan pupuk kandang telah berlangsung secara lokal, pengelolaannya masih bersifat informal, tidak terdokumentasi, dan belum terkoordinasi secara sistematis antar aktor dalam ekosistem.

Penelitian ini bertujuan merancang desain sistem Teknologi Informasi dan Komunikasi (TIK) sebagai solusi konseptual untuk mendukung praktik ekonomi sirkuler dalam ekosistem peternakan bebek pedaging. Penelitian menggunakan pendekatan kualitatif dengan kerangka *Design Science Research* (DSR) yang meliputi pemetaan ekosistem, identifikasi permasalahan operasional, perancangan desain sistem, serta demonstrasi skenario penggunaan.

Data dikumpulkan melalui wawancara, observasi, dan dokumentasi untuk mengidentifikasi alur sumber daya, pola koordinasi antar aktor, serta kebutuhan pengguna. Rancangan sistem dikembangkan dalam bentuk model proses dan prototipe antarmuka yang merepresentasikan aktivitas operasional utama. Evaluasi dilakukan secara konseptual melalui *expert judgement* dengan melibatkan aktor ekosistem setelah demonstrasi prototipe.

Hasil penelitian menunjukkan bahwa rancangan sistem TIK memiliki potensi untuk meningkatkan efisiensi dan keteraturan operasional dalam praktikekonomi sirkuler, khususnya pada aspek *design out waste*, *cycling*, dan *think in systems*. Peningkatan tersebut tercermin pada kemampuan sistem dalam meningkatkan transparansi informasi, memperkuat koordinasi antar aktor, serta mendukung pengelolaan alur sumber daya yang lebih terstruktur. Secara khusus, sistem memungkinkan integrasi informasi ketersediaan pakan, distribusi limbah, dan perencanaan produksi secara lebih terkoordinasi. Namun demikian, hasil evaluasi masih bersifat konseptual dan belum mencerminkan implementasi nyata di lapangan.

Kontribusi utama penelitian ini adalah menghasilkan desain sistem TIK berbasis prinsip ekonomi sirkuler serta kerangka evaluasi konseptual yang dapat menjadi dasar bagi

pengembangan dan implementasi solusi digital pada ekosistem peternakan rakyat di wilayah perdesaan.

Kata kunci— Design Science Research, sistem TIK, ekonomi sirkuler, peternakan bebek pedaging, perancangan sistem.

ABSTRACT

The broiler duck farming ecosystem in Krajan Village, Sukoharjo Regency, is influenced by the availability of rice bran as a supplementary feed, which depends on the rice harvesting season and rice milling activities. This condition leads to instability in feed supply, variations in nutritional quality, and irregular harvesting schedules due to suboptimal livestock growth. Although circular economy practices, such as the utilization of rice bran and duck manure, have been locally implemented, their management remains informal, undocumented, and not systematically coordinated among actors within the ecosystem.

This study aims to design an Information and Communication Technology (ICT) system as a conceptual solution to support circular economy practices in the broiler duck farming ecosystem. The research adopts a qualitative approach using the Design Science Research (DSR) framework, which includes ecosystem mapping, identification of operational problems, system design development, and demonstration of usage scenarios.

Data were collected through interviews, observations, and documentation to identify resource flows, coordination patterns among actors, and user needs within the ecosystem. The system design was developed in the form of process models and an interface prototype representing key operational activities. The evaluation was conducted conceptually through expert judgement involving ecosystem actors following a prototype demonstration.

The findings indicate that the proposed ICT system design has the potential to improve operational efficiency and structure within circular economy practices, particularly in the aspects of design out waste, cycling, and think in systems. These improvements are reflected in the system's ability to enhance the transparency of operational information, strengthen coordination among actors, and support more structured management of resource flows. Specifically, the system enables the integration of feed availability information, waste distribution, and production planning in a more coordinated manner. However, the evaluation results remain conceptual and do not yet reflect real-world implementation.

The main contribution of this study lies in the development of a circular economy-based ICT system design and a conceptual evaluation framework that can serve as a foundation for future development and implementation of digital solutions in smallholder farming ecosystems in rural areas.

Keywords— Design Science Research, ICT system, circular economy, broiler duck farming, system design.