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COLLABORATIVE KNOWLEDGE SHARING MODEL TO STRENGTHENING STAKEHOLDER ROLES IN KNOWLEDGE PORTAL FOR PADDY FARMING

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Abstract: *Knowledge sharing in paddy farming faces persistent challenges due to fragmented information, limited access, and weak stakeholder engagement. Although digital platforms exist, many are underutilized because they lack clear stakeholder roles and long-term collaboration mechanisms. This study proposes the Collaborative Knowledge Sharing Model (CKSM), a framework that integrates digital tools with active stakeholder participation to support inclusive knowledge exchange. Using the Design Science Research (DSR) approach, the study involved problem identification, literature review, field consultations, model design, and validation. Consultations with three key organizations in Kedah, Malaysia—Kedah Department of Agriculture, MADA, and LZNK—ensured real-world relevance. CKSM comprises three components: (1) the Central Knowledge Hub (CKH), a cloud-based repository; (2) the Stakeholder Collaboration Layer (SCL), which fosters communication and coordination; and (3) the Monitoring and Feedback Mechanism (MFM), which allows continuous improvement. The model defines clear roles for six stakeholder groups: farmers, agricultural agencies, research institutions, financial institutions, agri-tech providers, and NGOs or community organizations. Each group contributes to creating, validating, and sharing knowledge. CKSM not only centralizes information but also encourages collaboration and shared governance. It offers a flexible and scalable solution to enhance decision-making and productivity in paddy farming. Future work includes developing and testing a prototype based on this model.*

Keywords: *Knowledge Management, Stakeholder Engagement, Paddy Farming, Collaborative Model, Digital Agriculture*

Introduction

Paddy farming remains a critical pillar of food security and rural livelihoods in Southeast Asia, yet persistent challenges continue to constrain its productivity and sustainability, particularly in the way agricultural knowledge is generated, shared, and applied. Many farmers still rely heavily on informal experience-based practices or fragmented advice from extension agents, with limited access to scientific research, financial instruments, and modern agricultural technologies (Ali, Man, & Muharam, 2019; Assefa et al., 2011). These gaps in accessible and actionable knowledge weaken farmers' decision-making capacity, contributing to inefficiencies and suboptimal farm performance.

The agricultural knowledge ecosystem is further complicated by institutional fragmentation, where information is dispersed across research institutions, government agencies, financial bodies, and non-governmental organizations that often operate in silos. Limited coordination among these actors restricts effective knowledge exchange, reuse, and contextualization, while valuable indigenous and experiential knowledge is frequently underrepresented in formal systems (Abbas, 2016; Ali & Avdic, 2015; Tumwebaze, Walsh, & Lannon, 2024). Although digital technologies such as mobile applications, cloud platforms, and data analytics offer significant potential to bridge these gaps and enable real-time, two-way communication, their impact remains constrained when implemented without clear governance structures, role definitions, and sustained stakeholder engagement (Petana & Rosa, 2020; Chatterjee & Samanta, 2022; Ahmad & Karim, 2019).

Addressing these limitations requires a shift toward collaborative knowledge sharing, where digital systems support interaction, trust, and shared ownership rather than serving solely as information repositories. Prior studies emphasize that effective knowledge management depends on meaningful stakeholder interaction, role clarity, and mutual benefit (Alavi & Leidner, 2001; Amayah, 2013). Building on this foundation, this article introduces the Collaborative Knowledge Sharing Model (CKSM), an extension of the Collaborative Knowledge Portal Model for Paddy Farming (Fadhilah et al., 2025). CKSM integrates clearly defined stakeholder roles with structured interaction mechanisms in a unified digital environment to support the co-creation, validation, exchange, and application of knowledge. By aligning human expertise with digital infrastructure, the model aims to enhance evidence-based decision-making, reduce redundancy in knowledge delivery, and promote inclusive and sustainable development in the paddy farming sector.

Literature Review

Recent literature increasingly emphasizes that effective agricultural knowledge systems must be grounded in stakeholder collaboration rather than one-way information dissemination. Studies highlight the value of involving farmers, extension agents, researchers, financial institutions, and technology providers in the co-creation and validation of knowledge. Bernardi et al. (2021) demonstrate that community-based and participatory knowledge practices can foster more sustainable agricultural behaviors by treating knowledge as a shared and collectively governed resource. This perspective aligns with broader arguments that inclusive governance structures are essential for sustaining engagement and ensuring that knowledge remains relevant to local agricultural contexts.

Digital platforms have been widely explored as enablers of multi-stakeholder knowledge sharing, particularly in rural and agricultural development. Ali and Avdic (2015) propose a knowledge management framework that integrates local knowledge and encourages community participation, underscoring the importance of adapting content to the needs of different actors. However, their work addresses rural development in general and does not fully capture the complex, interdependent nature of paddy farming systems. Similarly, Amayah (2013) identifies trust and role clarity as critical enablers of effective knowledge exchange within public organizations, insights that are highly applicable to agricultural settings where overlapping institutional mandates often impede collaboration. Together, these studies suggest that clearly defined roles and participatory mechanisms are central to improving coordination across diverse agricultural stakeholders.

Despite growing investments in digital transformation, several studies caution that technology-driven solutions alone are insufficient. Chatterjee and Samanta (2022) report that knowledge management systems lacking human coordination and participatory design are prone to low adoption and underutilization. Complementing this, Tumwebaze, Walsh, and Lannon (2024) find that many agricultural knowledge initiatives fail to support continuous feedback, real-time collaboration, or adaptive learning, as they primarily focus on information delivery rather than interaction. These limitations underscore the need for a dynamic, human-centered model such as CKSM, which integrates digital infrastructure with structured stakeholder engagement, continuous feedback, and evolving roles to support collaborative and adaptive agricultural knowledge management.

Methodology

This study employs a Design Science Research (DSR) methodology (Brocke et al., 2020) to develop and validate the Collaborative Knowledge Sharing Model (CKSM) for agricultural knowledge management, with a specific emphasis on paddy farming. The iterative nature of DSR enables systematic refinement through problem identification, stakeholder engagement, model design, and validation, ensuring both theoretical rigor and practical relevance. A comprehensive literature review was conducted to identify limitations in existing digital agricultural knowledge systems, particularly the lack of structured stakeholder roles, inclusive feedback mechanisms, and active knowledge flow. Findings from prior studies and earlier work highlighted persistent challenges such as weak stakeholder ownership, low adoption of digital tools, and limited community involvement, which informed the need for a more collaborative and role-defined model.

To ensure contextual relevance, field consultations were carried out with key stakeholders in Kedah, including the Kedah Department of Agriculture, Muda Agricultural Development Authority (MADA), and Lembaga Zakat Negeri Kedah (LZNK), using semi-structured interviews and group discussions to uncover operational challenges and knowledge gaps. Insights from these engagements guided the design of CKSM as a multi-layered model comprising a Central Knowledge Hub, a Stakeholder Collaboration Layer, and a Monitoring and Feedback Mechanism, supported by clearly defined roles for six stakeholder groups. The model was subsequently validated through follow-up sessions with the same stakeholders, where feedback on feasibility and alignment with real-world practices was gathered. This validation process enabled further refinement of the CKSM to ensure its suitability across granary, non-granary, and estet paddy farming contexts.

Proposed Model: Collaborative Knowledge Sharing Model (CKSM)

The development of CKSM is based on the understanding that effective knowledge management in agriculture involves more than just disseminating content, it requires active collaboration and shared responsibility among all actors in the paddy value chain. CKSM introduces a multi-layered framework that supports structured knowledge exchange, grounded in stakeholder participation, strengthened by digital infrastructure, and continuously refined through feedback mechanisms.

At the core of the model is a central digital platform (Knowledge Hub) that serves as a repository for validated information. Surrounding this hub are collaborative engagement spaces

and moderation structures, which depend on the active involvement of key stakeholders, each with clearly defined roles and responsibilities.

CKSM defines six primary stakeholder groups with complementary roles that collectively support sustainable and inclusive knowledge sharing: farmers function as both users and contributors by applying validated information while sharing local knowledge and field experiences; agricultural extension agencies and government departments act as facilitators by translating research into practical guidance, supporting implementation, and moderating content; research institutions generate and validate knowledge while leveraging field feedback to enhance research relevance; financial institutions and cooperatives strengthen financial inclusion by providing education, digital tools, and data-driven financial services; agri-tech providers maintain and enhance the digital platform through usability improvements, real-time data integration, and technical support; and NGOs or community-based organizations promote inclusivity by addressing the digital divide, supporting marginalized groups, and fostering community trust. Collectively, these stakeholders form a collaborative ecosystem that enhances engagement, transparency, and continuous improvement, enabling the CKSM to promote shared knowledge ownership while remaining adaptable, scalable, and responsive to evolving agricultural conditions.

Figure 1 illustrates the proposed conceptual framework of a knowledge portal for paddy cultivation, which functions as a centralized knowledge hub (CKH) serving as a one-stop reference center for paddy-related information, while Figure 2 presents the CKSM that details stakeholder roles and interactions within this portal. The CKSM is structured around three integrated components aligned with clearly defined stakeholder responsibilities to ensure accountability and sustained participation: the Central Knowledge Hub (CKH), a cloud-based repository for validated resources such as scientific research, policy guidelines, financial tools, and user-generated content; the Stakeholder Collaboration Layer (SCL), which facilitates interaction, coordination, and co-creation of knowledge through forums, live sessions, and content review features; and the Monitoring and Feedback Mechanism (MFM), an analytical component that tracks engagement, captures stakeholder feedback, identifies knowledge gaps, and supports the continuous improvement of the model.

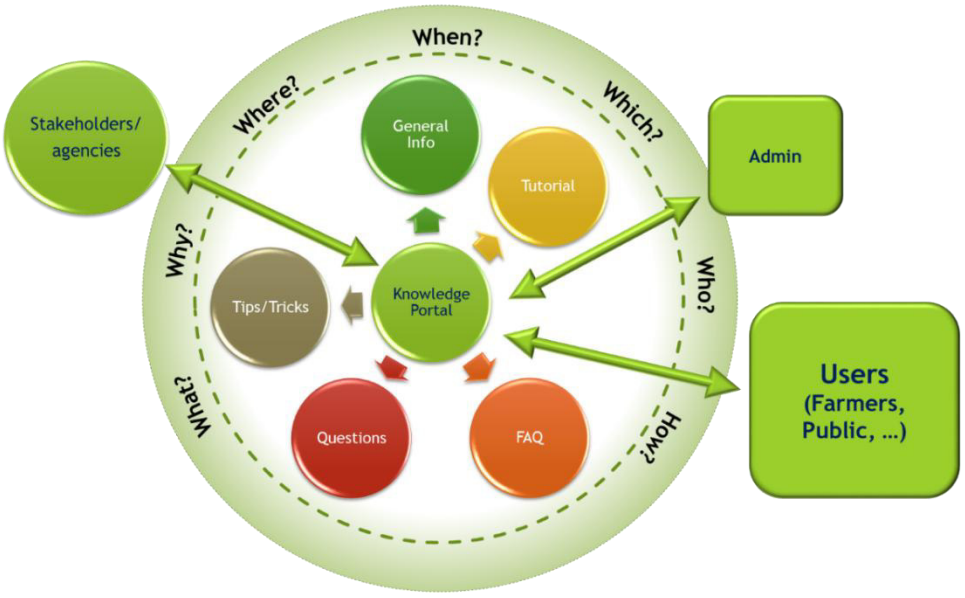

Figure 1: Conceptual Framework of Collaborative Knowledge Portal for Paddy Farming

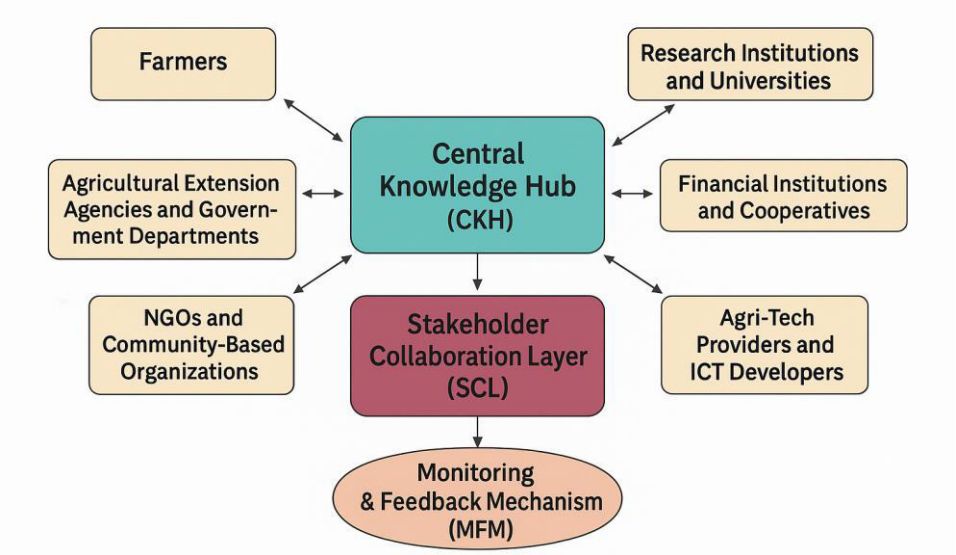

Figure 2: Collaborative Knowledge Sharing Model (CKSM)

Conclusion

The proposed CKSM addresses a fundamental limitation in existing agricultural knowledge systems, which often emphasize information centralization without sufficient stakeholder integration. Unlike earlier models that focused mainly on repository-based knowledge access, CKSM embeds clearly defined stakeholder roles, interaction mechanisms, and feedback processes to support co-creation, validation, and continuous refinement of knowledge. Its multi-layered structure that comprising the Central Knowledge Hub, Stakeholder Collaboration Layer, and Monitoring and Feedback Mechanism supports both reliable knowledge dissemination and active participation. By recognizing farmers as contributors rather than passive recipients and enabling two-way knowledge flows among agencies, researchers, and service providers, the model aligns digital infrastructure with real-world agricultural practices and evolving environmental and market conditions.

Feedback from key stakeholders such as MADA, LZNK, and the Kedah Department of Agriculture confirms the model's practical relevance and alignment with existing workflows, particularly in improving coordination, reducing redundancy, and strengthening shared accountability. At the same time, the findings highlight persistent challenges related to digital inclusion, especially among marginalized farming communities with limited ICT access or skills. In this context, NGOs and community-based organizations play a critical bridging role by supporting access, contextualizing information, and fostering trust at the community level. By integrating technological capabilities with human and institutional coordination, CKSM responds to shortcomings identified in prior studies where digital platforms were underutilized due to weak participatory governance, thereby promoting inclusivity, adaptability, and resilience in agricultural knowledge systems.

In conclusion, CKSM advances agricultural knowledge management by shifting from one-way information dissemination toward a collaborative, governance-oriented ecosystem that emphasizes shared ownership and sustained engagement. By structurally integrating farmers,

government agencies, research institutions, financial bodies, agri-tech providers, and NGOs, the model offers a scalable and adaptable framework to enhance productivity, sustainability, and decision-making in agriculture. Future work will focus on developing and piloting a CKSM-based digital platform within selected farming communities to empirically assess usability, impact, and adaptability, ensuring the model's long-term relevance and contribution to more equitable and effective agricultural knowledge ecosystems.

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References

Abbas, K. D. (2016). Trends in knowledge production and generation in the agricultural sector: Perspectives of Nigerian agricultural research institutes. *Mousaion, 34*(3), 123–145. https://doi.org/10.25159/0027-2639/1088

Ahmad, F., & Karim, M. (2019). Impacts of knowledge sharing: A review and directions for future research. *Journal of Workplace Learning, 31*(3), 207–230. https://doi.org/10.1108/JWL-07-2018-0096

Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly, 25*(1), 107–136. https://doi.org/10.2307/3250961

Ali, L., & Avdic, A. (2015). A knowledge management framework for sustainable rural development: The case of Gilgit-Baltistan, Pakistan. *Electronic Journal of Knowledge Management, 13*(2), 103–116.

Ali, M., Man, N., & Muharam, F. M. (2019). Perceptions of Malaysian farmers regarding their knowledge in agricultural risk management. *The Journal of Animal & Plant Sciences, 29*(4), 1204–1207.

Amayah, A. T. (2013). Determinants of knowledge sharing in a public sector organization. *Journal of Knowledge Management, 17*(3), 454–471. https://doi.org/10.1108/JKM-11-2012-0369

Assefa, H., G/Egziabher, T., Sehai, E., & Tegegne, A. (2011). Agricultural knowledge management in dairy production improvement: The case of Bure woreda, West Gojjam Zone, Amhara Region. *The IUP Journal of Agricultural Economics, 8*(4), 30–40.

Bernardi, P. D., Bertello, A., Venuti, F., & Zardini, A. (2021). Knowledge transfer driving community-based business models towards sustainable food-related behaviours: A commons perspective. *Knowledge Management Research & Practice, 19*(3), 319–326. https://doi.org/10.1080/14778238.2019.1664271

Brocke, J., Hevner, A., & Maedche, A. (2020). Introduction to Design Science Research. In J. vom Brocke, A. Hevner, & A. Maedche (Eds.), *Design Science Research. Cases.* Progress in IS. Springer, Cham. https://doi.org/10.1007/978-3-030-46781-4_1

Chatterjee, S., & Samanta, M. (2022, December 23). Knowledge management: A tool and technology for organizational success (MPRA Paper No. 115751). https://mpra.ub.uni-muenchen.de/115751/

Yamin, F. M., Ishak, W. H. W., Abu, N. H., Othman, Z., Imam Suroso, A., Dewi, F., Rizky, L., Kamilla, K., & Tandra, H. (2025). A collaborative knowledge portal model for paddy farming in Southeast Asia. In Z. Mat Aji, R. Romli, S. F. Packeer Mohamed, M. A. Saip,

& T. Herawan (Eds.), *Digital innovation in knowledge management* (pp. 452–460). Springer. https://doi.org/10.1007/978-3-031-91485-0_35

Panitz, R., & Glückler, J. (2024). Introduction: Knowledge and digital technology. In J. Glückler & R. Panitz (Eds.), *Knowledge and digital technology* (Vol. 19, pp. 1–10). Springer. https://doi.org/10.1007/978-3-031-39101-9_1

Petana, G., & Rosa, C. A. (2020). Digital transformation and the impact in knowledge management. In *Proceedings of the 12th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management (IC3K 2020) - Volume 3: KMIS* (pp. 180–187).

Swaty, & Kumar, M. (2021). Knowledge management: Process and challenges. *IOSR Journal of Business and Management (IOSR-JBM), 23*(5), 56–59.

Tumwebaze, R. P., Walsh, J. N., & Lannon, J. (2024). Knowledge management in the agriculture sector: A systematic literature review. *Knowledge Management Research & Practice, 23*(2), 131–148. https://doi.org/10.1080/14778238.2024.2359419

Yamin, F. M., Ishak, W. H. W., Mohd Nawi, N. S., & Abdul Hamid, F. L. (2024). Development and usability analysis of EfloraCyntok: A digital botanical repository for herbal plant conservation. *Journal of Technology and Operations Management, 19*(2), 1–8. https://doi.org/10.32890/jtom2024.1.1