



A Collaborative Knowledge Portal Model for Paddy Farming in Southeast Asia

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Abstract. In Southeast Asia's culturally and ecologically diverse agricultural landscape, effective knowledge management has become increasingly important. This paper introduces the Paddy Knowledge Portal, a specialized platform for paddy cultivation, focusing primarily on Malaysia and Indonesia. It emphasizes the vital role of knowledge in enhancing agricultural efficiency and competitiveness in these countries, both of which have strong agricultural traditions and are major contributors to global rice production. The proposed knowledge portal as a strategic solution for promoting innovation and knowledge sharing in a competitive market. The portal framework includes an overview of user categories—administrators, agencies, and the public—and outlines key knowledge components, such as general information, tutorials, FAQs, questions, and tips, ensuring the platform is accessible and valuable to a broad audience. The paper also discusses the potential impact of the Paddy Knowledge Portal, its collaboration with government agencies like MADA and DOA, and its role in supporting sustainable agricultural practices and collaborative problem-solving. This initiative envisions the portal as an essential tool for enhancing the collective knowledge base, improving adaptability in rice farming, and strengthening the resilience and sustainability of Southeast Asia's agricultural sector.

Keywords: Knowledge Management · Paddy Knowledge Portal · Paddy Cultivation · Collaborative Model

1 Introduction

Knowledge is a valuable asset in the agricultural landscapes of nations like Malaysia and Indonesia, increasing efficiency and competitiveness. These agriculturally rich nations are increasingly understanding the need of knowledge management in their farming communities.

Malaysia stands out in Southeast Asia for its rich culture and beautiful surroundings. Notably, Malaysia is one of the world's leading rice producers, with paddy production playing a critical role in the country's economy. This sector creates jobs, earns revenue, and assures food security [1, 2].

Meanwhile, with its wide archipelago, Indonesia is a leader in paddy farming. The country has a long agricultural tradition, with rice farming at the heart of its agricultural industry [3]. Indonesia's diversified agro-ecological zones and large size make it a suitable place for rice production. Rice production has enormous cultural, social, and economic importance in Indonesia, serving as a staple food for the population and adding significantly to the country's export revenues.

In today's highly competitive economy, using information as a driver of innovation is critical [4–6]. As a result, knowledge portal-based application systems are critical to the performance of organizational operations and objectives across a wide range of agricultural contexts [7, 8].

This research describes a knowledge portal approach designed for paddy agriculture. The planned portal, which has been methodically built to centralize rice production knowledge and expertise, is intended for a wide range of audiences, including farmers, researchers, agricultural specialists, and enthusiasts from Malaysia and Indonesia alike. The portal is an important instrument for distributing knowledge throughout these nations' rice farming communities, and it includes a variety of features and functionalities. These include sharing best practices, communicating research findings, demonstrating cutting-edge agricultural technologies, and offering practical assistance. Users can actively participate in discussions, share their experiences, and give insights, creating a collaborative environment that promotes learning and growth.

Over time, the Paddy Knowledge Portal has the potential to have a tremendous influence on rice farming communities in Malaysia and Indonesia. It can gradually improve the community knowledge base, promote sustainable agricultural practices, and help the rice farming business adapt to changing requirements and challenges. As more users from both countries actively contribute to and engage with the platform, it has the ability to expand and flourish, ensuring that rice farming remains resilient and capable of meeting future global demands and environmental considerations.

2 Literature Review

Knowledge portals are specialized internet platforms. It is critical for centralizing and facilitating access to vast amounts of knowledge, expertise, and resources in certain sectors or themes [9]. The portals provide access to organized and selected knowledge, appealing to a wide range of users, from novices to experts. These portals are often designed with user-friendly interfaces, extensive search capabilities, and tools to encourage knowledge exploration and exchange [10, 11].

Many agricultural knowledge portal formats have been created to encourage interactivity, smooth data access, and effective content management. These portals allow for collaborative participation among various agricultural stakeholders, with the primary goal of acquiring and sharing agricultural knowledge. This knowledge sharing supports innovation, sustainability, and informed decision-making in the agricultural domain, eventually benefiting farming communities.

A study by Van-Baalen et al. [8], for example, focuses on the formation of networks of practice via information portals. This study highlights the importance of information portals in promoting knowledge dissemination across weakly connected organizational contexts. This study emphasizes the importance of a sense of urgency, fragmented awareness, and the function of information brokers in forming networks of practice. It also provides a conceptual framework for understanding how knowledge portals work in network development.

FisOmics, developed by India's Center for Agricultural Bioinformatics, is an example of an information portal focused on agricultural bioinformatics and biotechnology [12]. FisOmics provides a diverse set of fish genomics data and related analysis, making it an invaluable resource for academics and anglers looking for information on types of fish and habitats.

Another innovation in knowledge portals is e-KrishiShiksha, developed on the e-learning platforms [13]. This e-learning platform has had a tremendous impact on agricultural education and research, attracting a large number of undergraduate students from a variety of agricultural fields. It successfully offers online courses, decreasing the need to physically distribute course materials while also offering access to carefully designed content that corresponds to the ICAR-approved syllabus.

As discussed above, the key needs for an agricultural information portal include a number of important characteristics. First, the portal should include comprehensive material [8, 9] that covers a wide range of agricultural issues, from crop cultivation to pest control and market trends. This is to ensure that it fulfills the unique demands of its visitors. Furthermore, accessibility and usability are critical. Therefore, user-centered design with an intuitive interface and adaptability to various devices is vital [12]. A search functionality is also required for rapid information retrieval [14]. The collaborative features that support discussion and active communication among members are also required [12].

3 Methodology

This study includes the following steps:

a) Literature Review

This phase consists of three components:

- 1) Exploration of existing literature: In this phase, the existing literature, research papers, and case studies that are related to knowledge portal design within the agriculture domain are examined.
- 2) Identification of key concepts, best practices, and challenges: As part of the literature review, there is an emphasis on identifying the critical conceptual underpinnings governing knowledge portal design in the agricultural domain. Furthermore, the review identifies the best practices that have demonstrated efficacy in agricultural knowledge management and dissemination.
- 3) Analysis of successful knowledge portals in other domains: The literature review also covers knowledge portals in diverse domains. This cross-domain perspective gives an idea of the new concepts and features that may not have been explored within the agricultural context.

b) Stakeholder Engagement

During this phase, our study focuses on identifying and engaging various stakeholders in the agriculture sector. These stakeholders include agricultural professionals and government agencies, whose input is critical due to their domain-specific knowledge and practical experience. Their involvement is critical in developing a knowledge portal that fits the agricultural sector's diverse and evolving needs. This study's key government agencies include the MUDA Agricultural Development Authority (MADA), the Kedah State Department of Agriculture (DOA), and the Lembaga Zakat Negeri Kedah (LZNK). Table 1 summarizes the roles and contributions of various agencies.

Table 1. Stakeholders.

Agency	Role
MADA	MADA is responsible for Kedah's granary region, which is a significant area for paddy farming. The granary region is distinguished by its vast rice fields and is an important part of Kedah's agricultural environment. MADA's role in this region is to provide effective water resource management, infrastructure upkeep, and farmer support
DOA	DOA oversees and nurtures Kedah's agriculture economy. Its complex responsibilities include ensuring expansion, sustainability, and adherence to agricultural practices, which contribute significantly to the state's agricultural and economic development. In terms of paddy farming, the DOA has control over Kedah's non-granary paddy fields, actively regulating, advocating for, and supporting this essential component of state agriculture
LZNK	Lembaga Zakat Negeri Kedah (LZNK) is the Kedah State Zakat Board, responsible for collecting and distributing Zakat, a form of almsgiving in Islam, within the state of Kedah, Malaysia. While the primary mission of LZNK is related to charitable and welfare activities, it also extends its role to paddy estates, particularly in supporting and uplifting paddy farmers' welfare

To better understand stakeholders' specific requirements and expectations, we employ a straightforward, multi-step methodology. This includes open, two-way discussions to identify each group's specific needs, challenges, and goals for sharing agricultural knowledge. The information gained from these talks serves two main functions. First, they supply critical information that influences the design and content of the knowledge portal. Understanding stakeholders' actual demands and expectations allows us to ensure that the portal satisfies the actual requirements of the agricultural community. Second, this technique allows stakeholders to communicate their ideas and expectations, which fosters a sense of involvement and collaboration in the portal's design and development.

c) Conceptual Model Development

The conceptual model of the knowledge portal serves as a roadmap for its design and development, providing a clear strategy for its creation. The model defines three main user categories—administrators, farmers, and agricultural agencies—each with

specific roles and access levels tailored to their needs. Administrators have full access to system management, while farmers use the portal to acquire knowledge. Agricultural agencies may have access to specialized tools and resources. The model outlines the portal's core purpose of sharing agricultural knowledge, detailing the types of information and resources it will provide. This includes identifying relevant agricultural topics, selecting data sources, and organizing content to meet the diverse needs of its users.

4 The Proposed Framework for the Paddy Knowledge Portal

Figure 1 illustrates the proposed conceptual framework of the envisioned knowledge portal designed exclusively for paddy cultivation. In essence, this knowledge portal serves as a centralized, one-stop reference center that connects various stakeholders, including farmers and researchers, with agricultural agencies involved in paddy cultivation. The knowledge repository comprises tacit (experiential) and explicit (documented) knowledge addressing fundamental agricultural questions. It addresses fundamental agricultural questions, such as when to plant, which crops to select, who is involved in the process, how to implement specific practices, where to obtain resources, why certain methods are effective, and what tools or techniques to use.

The portal caters to three main user categories: administrators, agencies, and the public. A breakdown of these user categories and their subcategories, along with examples in the context of Malaysia, is visually presented in Fig. 2. Public users encompass a diverse range of individuals, including farmers, researchers, suppliers, and other interested parties. The portal is conceived as a pivotal platform where users can seamlessly interact and access valuable information.

Farmers stand to benefit significantly from this initiative. The portal offers a treasure trove of resources on best practices for paddy cultivation, covering planting, nurturing, and harvesting techniques, strategies for identifying and managing paddy diseases, comprehensive recommendations on irrigation systems, and insights into effective fertilization methods.

Government agencies, prominently MADA and DOA, play a pivotal role by contributing their expertise and knowledge to the portal. Their contributions aim to meet the needs of public users, fostering a collaborative environment for knowledge sharing.

This extensive knowledge reservoir (tacit and explicit) is thoughtfully categorized into five distinct segments. A comprehensive breakdown of the knowledge components is presented in Fig. 3.

1. General Information: Providing comprehensive insights into foundational aspects of paddy cultivation, including information on crop varieties, climate considerations, and historical context.
2. Tutorials: Offering step-by-step guides and instructional materials, walking users through various facets of paddy cultivation, from the initial planting stages to the final harvest.
3. FAQs (Frequently Asked Questions): A repository of common inquiries and their corresponding solutions, enabling quick resolutions to frequently encountered challenges.
4. Questions: Creating a platform for users to pose their unique queries and receive expert responses from the community and agricultural agencies, encouraging collaborative problem-solving.
5. Tips and Tricks: Comprising a collection of practical advice, time-tested strategies, and innovative techniques to enhance the efficiency and effectiveness of paddy cultivation.

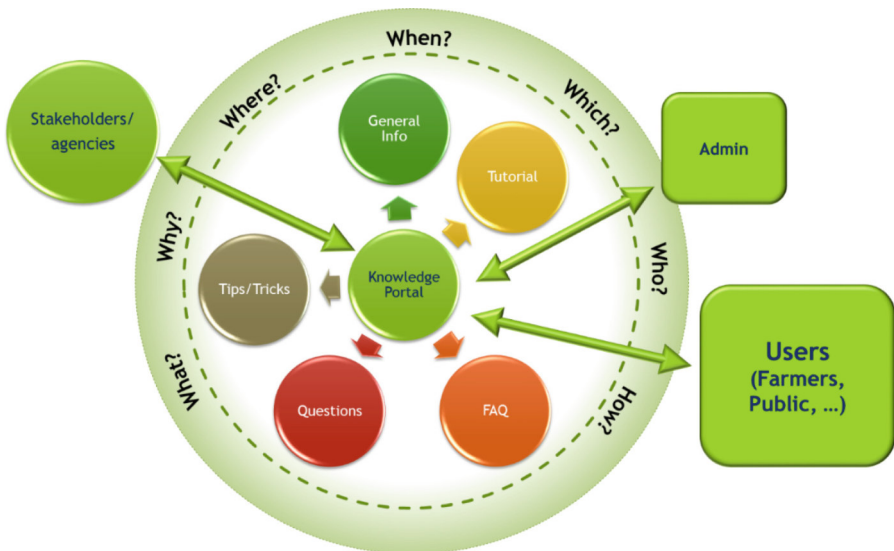


Fig. 1. Conceptual framework

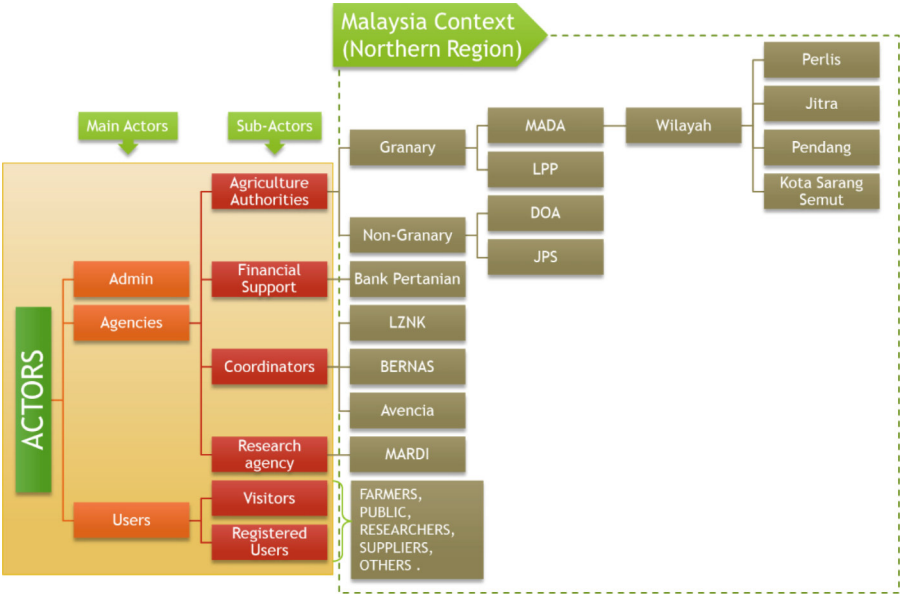


Fig. 2. Users of the knowledge portal

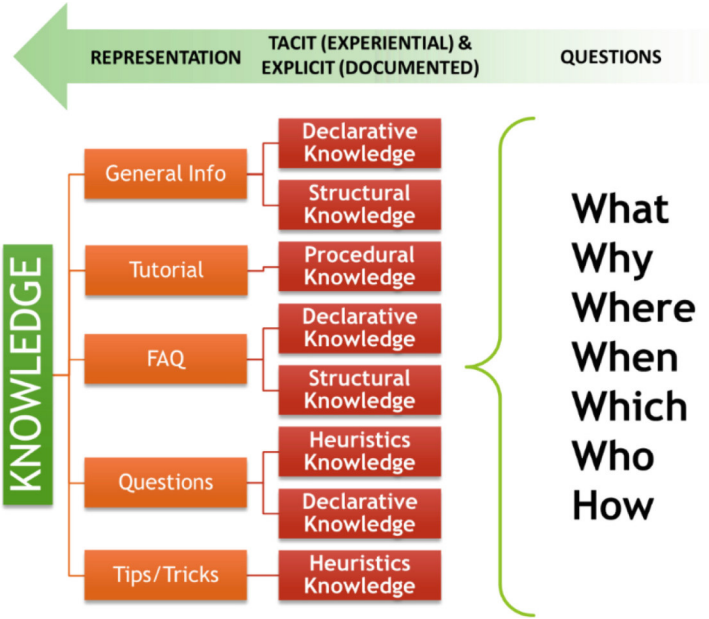


Fig. 3. Knowledge components

5 Conclusion

In conclusion, as outlined in the proposed framework, the envisioned Paddy Knowledge Portal offers a holistic and innovative solution to address the diverse needs of stakeholders involved in paddy cultivation. This knowledge portal is a centralized hub connecting farmers, researchers, and agricultural agencies, fostering a collaborative environment for knowledge sharing and promoting best practices in paddy cultivation.

The portal's user-centric design, catering to administrators, agencies, and the general public, ensures that it is accessible and valuable to a wide range of users. It significantly benefits farmers by providing a comprehensive repository of resources on paddy cultivation, covering everything from planting and nurturing to disease management, irrigation, and fertilization techniques. This wealth of knowledge is complemented by the active participation of government agencies, such as MADA and DOA, who contribute their expertise to meet the needs of the public and enhance the collaborative knowledge-sharing environment.

The thoughtful categorization of knowledge components, including general information, tutorials, FAQs, questions, and tips and tricks, ensures that users can easily access the information they require and engage in collaborative problem-solving. This approach is designed to enhance the efficiency and effectiveness of paddy cultivation while promoting sustainable agricultural practices.

The proposed framework for the Paddy Knowledge Portal represents a significant step forward in addressing the knowledge needs of the paddy cultivation community. Centralizing and sharing both experiential and documented knowledge can revolutionize how knowledge is exchanged and applied in this critical agricultural sector. As the portal continues to evolve and expand, it will serve as a vital resource for those involved in paddy cultivation, ultimately contributing to the prosperity and sustainability of this essential agricultural practice.

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