

学位論文要旨 Dissertation Abstract

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学位論文題目 : Bridging traditional knowledge for sustainable irrigation
Title of Dissertation management in West Sumatra Indonesia
(インドネシア西スマトラ州における持続的な灌漑管理のための伝統知の役割)

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Traditional knowledge, which has been created from a long experience of human activities with ecosystem and environment, is a fundamental solution for the sustainability of natural resources. In West Sumatra, agricultural water has been managed in traditional ways based on *Adat* (custom) for over centuries. Due to the introduction of modernization, indigenous knowledge has been mostly disappearing. In turn, a modern system for agricultural water management i.e., Water Users' Association ("P3A" in Indonesia) has been introduced under government totalitarianism. As a result, many irrigation systems have been experiencing institutional problems in a region where the traditional knowledge, especially of irrigation management, has been disappearing. Nevertheless, in some regions where the traditional values have still survived, the farmers could have managed irrigation systems under the changing policy for irrigation management. In many regions, traditional knowledge has been adapted and integrated in the current irrigation system.

This study aims to: (1) reassess traditional knowledge in irrigation management; (2) compare irrigation management in three irrigation institutions; (3) evaluate the persistence of the traditional value in the current irrigation system; (4) evaluate the challenges and opportunities of traditional knowledge and; (5) assess the collaborative action to integrate the traditional knowledge in the current irrigation system, in West Sumatra. Qualitative research methods were used to collect data on the traditional management of irrigation water in three P3As in Tanah Datar District and Agam District, West Sumatra from December 2019 to December 2021. The data were gathered through semi-structured interviews and Focus Group Discussions. The study used narrative analysis to explore in-depth histories of irrigation management, farmers' experiences of the management and challenges to integrate traditional knowledge in current irrigation management.

By comparing irrigation management from the institutional viewpoint in the research area, this study found that an institutional problem has occurred in the governmental-created institution where traditional knowledge has mostly disappeared, as in P3A *Jorong Biaro*. On the other hand, the community-created institution, where traditional knowledge is still conserved and practiced as in P3A *Karya Mandiri*, has managed to minimize institutional problems. Furthermore, the traditional irrigation institution, as in P3A *Jorong Situgar*, is successfully managed the irrigation system under traditional knowledge and practices. This study found that the institutional problems, such as low participation in irrigation management, in P3A *Jorong Biaro* occurred because the establishment of the P3A was initiated by the local government

without *Mufakat* (consensus) by all farmers. This study also found that the P3A *Karya Mandiri* was initiated by the local community through *Mufakat*. In this case, local community members can express their interest and participate in the P3A decision making process.

This research found three types of fundamental traditional knowledge that can be integrated into the current irrigation system i.e., *Mufakat* principle, *Alek Banda* (the harvest ceremony), and the functions of *Tuo Banda* as a knowledge translator. In addition, some traditional practices in irrigation management were found in the research area, which are: regulating *Aia Adat* (customary river) for protecting irrigation water; regulating the construction of weirs; regulating planting schedule during the dry season; *gotong royong* (communal work) activity to maintain irrigation facilities organized by *Tuo Banda* (water master) and *Penghulu* (clan leader) concern. Furthermore, the study found that the traditional knowledge has been adapted in the current irrigation system in a region where the *Adat* have been preserved.

Nevertheless, there are some challenges of integrating traditional knowledge, which are: the decreasing practice of *Adat* in recent years; changes in the farmers' minds and values regarding the farming preferences; knowledge gap between stakeholders in irrigation management; and non-inclusion of traditional knowledge of water management in government regulations. Despite those challenges, the study revealed that traditional knowledge could be expected to overcome irrigation institutional problems. In addition, it could function well in managing irrigation systems. Against those challenges, this study suggests that the government should recognize traditional knowledge as a fundamental principle in managing the irrigation system. In addition, the *Mufakat* principle should be implemented in the P3A decision-making process to encourage farmers' participation in irrigation management. Lastly, collaborative action with diverse stakeholders is needed to overcome the knowledge gap between government and farmers regarding irrigation management.