Chapter 14
Integrating Tradition and Innovation:
The Role of Indigenous Knowledge Systems in Modern Agriculture

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ABSTRACT

This chapter examines the integration of Indigenous Technical Knowledge (ITK) with modern agricultural practices to promote sustainability, productivity, and resilience in farming systems. Rooted in centuries of adaptation to local environments, ITK encompasses diverse methods such as water harvesting, soil health management, animal health practices, and biodiversity conservation. Highlighting practices like the khadin system, johads, panchagavya, and sacred groves, this chapter showcases ITK's relevance in addressing contemporary agricultural challenges. It explores the potential of combining ITK with advanced technologies like the Internet of Things (IoT), Geographic Information Systems (GIS), and Machine Learning (ML) to optimize resource use, improve soil fertility, and conserve biodiversity. The chapter addresses the challenges of merging traditional wisdom with modern innovations, emphasizing this integration as a vital strategy for agricultural sustainability in the face of climate variability and resource constraints.

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INTRODUCTION

To thrive and advance, humans seek knowledge. Understanding and navigating our environment teaches us how to survive but finding meaning and purpose is necessary for advancement. Indigenous cultures have preserved natural landscapes for thousands of years by creating knowledge systems for ecological stewardship, survival, values, and purpose. Sustainability and cultural heritage are harmed by the loss of wisdom. We must make use of all the resources and knowledge systems at our disposal to meet the Sustainable Development Goals by 2030. Globally as well in India centuries-long accumulation of knowledge, customs, and inventions is known as its indigenous knowledge systems (IKS). Numerous agricultural and animal agriculture disciplines are covered in this collection. Even though these knowledge systems have the potential to significantly advance modern science, they are currently frequently overlooked (Kumar, 2024).

Understanding and sharing indigenous knowledge(IK) is essential for the society's farming progress, but it is still hard to record and share. It's possible for agriculture to grow faster with IK. Therefore, for IK to have a good effect on agricultural growth, effective steps should be taken to reduce the problems (Ekobi et al.,2023).This includes greater urgency to address gaps in integrating Indigenous Technical Knowledge (ITK) with advanced artificial intelligence(AI) technologies. Despite, emerging artificial technologies revolution such as Internet of things (IoT), Machine learning (ML) and modern technologies such as Geographic Information Systems (GIS), are transforming knowledge systems, ITK remains marginalized. ITK can help achieve global sustainability by understanding and negotiating the intricacies and interdependencies of sustainable social development. Modern techniques can be combined with traditional agricultural practices to encourage sustainable farming practices and protect natural resources. This will undoubtedly bolster the acceptability of technologies for sustainability and guarantee the livelihood security of farmers (Pandey et al, 2025). Therefore, this chapter aims to provide documentation of ITK related to agricultural and animal agricultural practices along with integration with advanced technologies. Therefore, the research question(s) were:

1. What are the ITK related to agricultural and animal agricultural practices?
2. How can the integration of Indigenous Technical Knowledge (ITK) with advanced emerging technologies can enhance agricultural resource management
3. What are the challenges in blending ITK with modern technologies

Using a review of literature methodology, it explores the potential of combining ITK with advanced technologies like the IoT, GIS, and ML to optimize resource use, improve soil fertility, and conserve biodiversity. The chapter addresses the benefits and challenges of merging with modern innovations, emphasizing this integration as a vital strategy for life agricultural sustainability in the face of climate change.