

LEGAL DIMENSIONS OF ARTIFICIAL INTELLIGENCE IN INDIAN AGRICULTURE

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Artificial intelligence (AI) has become a favourable factor influencing agriculture and crop production. Keeping in mind its benefits, steps have been taken in India to integrate artificial intelligence in agriculture. In this context, this paper provides a brief description of artificial intelligence and its meaning. The paper focuses on the existing legal framework related to the integration of AI in agriculture in India. To understand the legal issues related to this matter, the paper also covers the social issues and challenges faced by farmers due to the integration of artificial intelligence in agriculture. In order to gain insights from the laws of other countries, it refers to European Union's and American laws. Finally, based on these insights, it recommends agriculture-specific artificial intelligence laws and what must be included in such a law.

Introduction

Artificial intelligence (AI)¹ has started to lead modern society in almost every aspect of human life. Agricultural production is also being influenced from this development. Artificial intelligence-induced agriculture is more productive, as its integration in agriculture increases food production with sustainability and precision. The application of artificial intelligence changes the manner as to how food production is monitored and how it is grown and marketed. In addition to this, artificial intelligence can help use water and pests efficiently². Application of AI can raise farm productivity and reduce input costs³. In India, the government has taken initiatives to promote the integration of Artificial intelligence in agriculture⁴. For example, NITI Aayog's National Strategy for Artificial Intelligence, 2018, gives priority to agriculture with assistance from artificial intelligence⁵. In order to modernise farming, the Digital Agriculture Mission (2021–2025)⁶ aims to build digital infrastructure for farmers, such as decision support systems, AgriStack, etc. However, the use of digital technology raises issues as to who controls and owns

the farming and agricultural practices related data gathered for training artificial intelligence system⁷. Then, who is liable if a farmer suffers loss when artificial intelligence monitoring fails? This brings us closer to issues like farmers' right to data protection and accountability for wrong estimates of artificial intelligence in relation to agricultural production. In this respect, this paper discusses the integration of artificial intelligence in the Indian agriculture system.

Conceptual Background

Artificial Intelligence (AI) refers to machine-based systems that, for specific objectives, use input data to produce outputs such as predictions, recommendations or decisions that influence physical or virtual environments⁸. In agriculture, this translates into applications such as predictive analytics (forecasting yields or pest outbreaks), precision irrigation (optimizing water and nutrient use via sensor and weather data), and crop disease detection through computer vision and drone imaging. For instance, in India, AI tools help monitor soil moisture, weather and crop health to guide farmers' decisions.

International law governing use of AI include the Organisation for Economic Co-operation and Development (OECD) Principles on AI (2019, updated 2024). This

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instrument call for human-centred, transparent and accountable AI systems. Likewise, the EU Artificial Intelligence Act aims to regulate high-risk AI applications through mandatory risk assessments and governance obligations (pending full adoption). In India “Digital India” campaign and the vision “Make AI in India and Make AI Work for India” emphasise inclusive digital infrastructure and AI for all sectors including agriculture.

Legal Framework in India

Legal framework⁹ in India concerning Artificial Intelligence (AI) in agriculture is still evolving and fragmented. Several existing laws indirectly address the issues arising from AI use. But none form a comprehensive AI-specific statute. The Digital Personal Data Protection Act, 2023 provides a basis for data privacy and consent but does not clearly define ownership of agricultural or farm-generated data¹⁰. This leaves farmers uncertain about control and usage rights. Under the Consumer Protection Act, 2019¹¹ and the Indian Contract Act, 1872, questions of liability arise when AI-driven advisories or automated systems cause losses. While discussing the integration of artificial intelligence in Indian agriculture, we come across many legal issues. These legal issues can be addressed by considering the legal framework governing artificial intelligence. The major issue is on whom the burden of loss falls due to inaccurate estimates generated by artificial intelligence in agricultural production, and who owns the agricultural practice-related data gathered by the employed artificial intelligence system. The Indian intellectual property law, specifically the Patent Act, 1970, and the Copyright Act, 1957, is silent on artificial intelligence-generated data ownership¹². Issues related to cybersecurity are governed by the Information Technology Act, 2000, which does not contain any specific provisions that address the issue of data breaches and artificial intelligence misuse in agriculture. NITI Aayog’s Artificial Intelligence Approach, 2021, and the proposed AgriStack digital platform, however, aim at enhancing data transparency. But in the absence of statutory backing, these safeguards are mainly advisory in nature. This creates uncertainty due to the lack of dedicated artificial intelligence law in respect of Indian agriculture.

Social Dimensions

Use of artificial intelligence, of course, increases productivity, but its use in agriculture raises certain social concerns. Its deployment requires digital literacy and economic resources. Small and marginal farmers, being often illiterate and economically weak, may find it difficult to arrange the finances needed to integrate artificial

intelligence into their agricultural practices. Those who are wealthy can afford it and reap the benefits of increased agricultural production by using artificial intelligence. Another aspect of artificial intelligence in agriculture is that it reduces the need for manual labour due to automation. This causes agricultural labourers to lose employment opportunities essential for their livelihood. In addition to this, in rural areas, digital infrastructure is much weak than in urban areas. This further creates a disparity in access to the benefits of artificial intelligence in agriculture in India.

Comparative and International Perspective

The European Union, United states of America etc. provide rules concerning the use of artificial intelligence in agriculture. The Artificial Intelligence Act in the European Union classifies some artificial intelligence systems used in agriculture as high-risk systems and requires pre-market risk assessment before deployment for safety. The Act also requires human oversight so that AI tools do not operate autonomously when errors may threaten human health or rights of human beings¹³. In the United States, agriculture sector-specific approach is being proposed to be followed. Under the proposed Farm Tech Act, the relevant laws require the U.S. Department of Agriculture to certify artificial Intelligence software before its use in agricultural production¹⁴. The law requires such tools to comply with standards of risk management, including safety, accuracy, and data protection. Another widely adopted international standard is the OECD Principles, which require artificial Intelligence to be accountable and human concerned system¹⁵.

Challenges and Research Gaps

Adoption of artificial intelligence in agriculture in India is not free from challenges. These challenges involve both legal and institutional issues. Firstly, in India there is an absence of a law focused on the use of artificial intelligence in agriculture. There is no guidance on matters such as who will own the data collected from agricultural practices and outputs, and who will be responsible if artificial Intelligence leads to adverse results in production or generates inaccurate predictions. The answers to these questions are ambiguous. It is not clear whether the farmer, or the developer, or the service provider is accountable or must bear the loss caused by the malfunctioning of artificial intelligence system meant for quality production in agriculture. The proposed AgriStack also raises issues relating to the privacy rights of farmers because it lacks a clear framework on consent of real agro-data owners and

creates uncertainty about how data are collected and used¹⁶.

Conclusion and Recommendations

No doubt using artificial intelligence in agriculture will benefit Indian agriculture in terms of production, efficiency, and sustainability. But it is necessary to address the reality that the existing legal framework governing artificial intelligence in agriculture is fragmented. Rather it is apt to say that there is an absence of suitable laws to guide the integration of artificial intelligence into Indian agriculture. Farmers may even face liability for inaccurate results despite using advanced technology like artificial intelligence.

India can learn from the laws of the European Union and the United States of America and adopt a risk-based regulatory approach. The Indian law when formulated must include impact assessments of artificial intelligence in agriculture and benefit-sharing arrangements to protect farmers. International experience supports this submission. What is necessary is interdisciplinary collaboration between legal experts, data scientists, and agriculturists.

It is suggested that a dedicated law should be enacted by Parliament with clear rules on how artificial intelligence should be used in agriculture. Among other aspects, such a law must include and recognise farmers' ownership of data; and further their consent must be obtained before such data are used. □

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