

SMART FARMING: LEGAL ISSUES AND CHALLENGES

Md. Asraful Islam,¹ Md. Zahidul Islam,*² Rabeya Anzum³

¹ Ph.D. Candidate, Ahmad Ibrahim Kulliyah of Laws, International Islamic University Malaysia (IIUM), Jalan Gombak, Kuala Lumpur, Malaysia. 53100. Email: maislam.law@gmail.com

² Assistant Professor, Ahmad Ibrahim Kulliyah of Laws, International Islamic University Malaysia (IIUM), Jalan Gombak, Kuala Lumpur, Malaysia. 53100. Email: zahidul@iium.edu.my

³ Postgraduate Student, Kulliyah (faculty) of Engineering, International Islamic University Malaysia (IIUM). Email: rabeyaanzum@gmail.com

*Corresponding author: zahidul@iium.edu.my

<https://doi.org/10.55327/jaash.v8i2.261>

(Received: 19th January 2022; Accepted: 10th February 2022; Published: 30th June 2022)

Keywords:

Smart Farming; Agriculture; Internet of Things (IoT); Artificial Intelligence (AI);

ABSTRACT

Smart farming is a revolutionary concept of modern science that denotes conducting farming activities using smart devices such as, IoT, robotics, drones, and AI. It can increase the quantity and quality of products significantly while optimizing the human labour. This paper explores different legal aspects of smart farming from the viewpoint of both the farm owner and the service provider. The purpose of this study is to analyse the legal issues and challenges arising out of smart farming and to suggest some recommendations to mitigate these issues. The study uses doctrinal legal research methodology followed by exploratory and analytical approach. Both primary and secondary sources are considered for identifying and interpreting data. The study finds that without specific, dedicated, and comprehensive legal regime it is impossible to govern the legal aspects of smart farming for any country. Therefore, it is recommended that every country needs a comprehensive legal regime to mitigate the legal issues and challenges

of smart farming so that optimum benefit from smart farming can be attained and at the same time farm owners and service providers can be legally protected.

INTRODUCTION

Agriculture is the lifeline of every civilisation. The agriculture sector has been playing a major role in human history throughout the world since the beginning. Nowadays, the rapid advancement in Information and Communication Technologies (ICT) significantly enhanced the structure and the procedures of modern agriculture (Gondchawar & Kawitkar, 2016). According to the Food and Agriculture organization of the United Nations, the world population is estimated to reach almost 10 billion in 2050. Hence, the world will need to produce 70% more food than, in comparison with recent food production. Consequently, the market size of the smart farming sector is also expected to grow significantly to address these increasing needs, supported by the anticipated increase in the number of Internet of Things (IoT) devices employed for agricultural purposes (Anzum et al., 2021).

The world food issue can be addressed using agricultural technologies (AgriTech) tools that makes food production 'smarter' and creating data-driven food chains, with the aim of improving yield, efficiency, and profitability of agriculture in general. Artificial Intelligence (AI), drones, 5G, blockchain, the Internet of Things (IoT) and big data analytics deserve special thanks for this because this kind of farming is already in operation in many parts of the world, as the concept of industry 4.0 spreads (Scherr et al., 2012). The proportions of this type of farming will have a much bigger impact in the future. This interesting and revolutionary innovation in the farming sector is called 'smart farming' or 'precision farming,' a farming management concept that makes extensive use of modern-day digital technologies in agricultural production (Mehta & Patel, 2016). In fact, smart farming technologies provide farmers, corporations, and farm offices with actionable information on their crops or animals which they can use to improve the quantity and quality of food production in a certain area. This article is an attempt to explore and analyse the legal issues and challenges of smart farming and to outline some protection measures which would benefit both the farm owners and the smart service providers (Anzum et al., 2021).

What is Smart Farming?

Smart farming implies managing farm activities using modern Information and communication technology devices which not only increase the quantity of products but also enhance quality of products without optimizing the human labour required. The concept of smart farming owes its origin to the massive use of technology worldwide in agriculture sector. Nowadays, the activities of the agri-business enterprises are based on

smart farming techniques (Hakim et al., 2022). This can help farmers better monitoring of the needs of individual animals and crops, adjust their nutrition and farming accordingly which will eventually enhance the food production chain (Scherr et al., 2012). As interest in process optimisation and sustainability achieved new heights by using modern technologies like AI, IoT and big data analytics, smart farming is also on the rise globally. For example, there is practical application in the field of precision farming and the use of drones and self-driving tractors. In spite of the hype around ‘connected agriculture’ and ‘smart food chains,’ smart farming is still in a progressive stage, while the AgriTech sector in general is booming. In fact, farming equipment manufacturers and agricultural service providers are continuously looking forward to digital developments in agriculture sector, as this area is anticipated to have an increased impact on production methods in years to come (Anzum et al., 2022).

The technologies that are available to present-day farmers are:

Sensors: For soil, water, light, humidity, temperature management.

Software: specialized software solutions that target specific farm types or applications agnostic IoT platforms.

Connectivity: cellular, LoRa (Long Range wireless platform).

Location: GPS, Satellite.

Robotics: Autonomous tractors, processing facilities.

Data analytics: Standalone analytics solutions, data pipelines for downstream solutions.

LEGAL ISSUE AND CHALLENGES CONNECTED TO SMART FARMING

In almost all the countries of the world, the agricultural industry is fairly regulated by legislations that govern both crop and animal farming. However, these formulated policies and existing laws in most of the cases do not effectively address current technology advancement within the agriculture arena. Moreover, smart farming is continuously generating an ever-expanding amount of agricultural data which is being used to forecast production and to maximise yields. This vast amount of data produced gives rise to several legal issues too. Thus, smart farming raises diverse legal issues, some of which remain partially unanswered. Below is a list of some of the major legal issues, of which some are related to the development, use, adoption, and commercialization of smart farming tools: Contracts (AboBakr, & Azer, 2017).

The issue of protecting data used for smart agriculture is important for the development of every successful digital farming and Agri-Tech projects. Therefore, contract negotiation in this field is crucial for achieving all the possible benefits while protecting the value of data as an asset. Apart from data privacy, security and IP protection clauses also need to be addressed. Prior to signing the agreement with smart farming device and IoT service providers, users of smart farming equipment need to identify who will be responsible in case the processing of data leads to wrong decisions resulting in serious harm to the food production chain.

Such agreement may also include the use of self-driving tractor, which are subject to the general set of obligations applicable to self-driving cars. In this scenario, strong compensation and limitation of liability clauses may help, as IoT providers should also be able to guarantee their reliability by means of adequate certifications and audits.

Data Ownership

Due to rise of smart farming technologies, a lot of new technology players appeared in the farming sector together with potentially complex software licencing agreements. Hence, utmost care is required to ensure that farmers/users (or the technology suppliers) do obtain the contractual rights that they need to use data and software. The only safe legal way to ensure rights of use or ownership of such data is through well-drafted contracts as these data is not a traditional intellectual property right (Uddin, 2022).

Data security

Data security is one of the most important aspects of smart farming. It is a common apprehension from the part of the farmers that their data ends up in the wrong hands, from competitors to the public. In this regard, IT security is crucial, and agreements with IoT providers should include specific clauses in this regard. Moreover, loss of personal data may prompt to data breach obligations under data protection laws as well as jeopardize companies' confidentiality principles. In any case, a digitised agriculture needs adequate safeguards for its data sets, which should be treated as an actual asset by each agri-business venture. In this regard, safeguard clauses in the contract are not only sufficient; national legal framework is also indispensable (Chen et al., 2021).

Data privacy

Although the data arising out of smart farming are non-personal in nature, the assignment of such data to a specific identifiable individual can be possible in many ways. For instance, data of animals directly indicates the livestock owner; crops data refers to farmers' personal details. As there would be a personal data processing activity, data privacy law should apply here (Alam, 2015). Further issues concerning modern machines may arise as they can track their users, monitor their performance, and identify them. Such as remote-controlled drones or tractors can monitor the user, track performance, and identify the user. In this case, data privacy issue may also arise. Hence, companies and IoT providers should investigate creative ways to address these issues and also national legislation on data privacy should cover these types of matters (Islam, 2015).

Intellectual Property

Ownership and intellectual property rights over the data generated through smart farming cannot be covered by data privacy laws. It is IP law that protects exclusive rights on intangible assets and regulates the granting of right of use and licensing them to third parties (Islam & Anzum, 2019).

Yet there is no legal provision for protecting data by itself. However, best possible protection can be guaranteed through copyright provisions in numerous ways. Therefore, it is especially important to include IP protection clauses in contracts relevant to IoT services or products.

Regulatory

Food is one of the most disciplined and well-regulated industries in the world. There are number of laws, regulations, policies, and guidance of supervisory authorities to comply with in producing, selling, importing, or exporting food and agricultural products in general. These tasks will certainly become easier if IoT tools and other smart farming tools are used. These tools can monitor, track and record every step of the food chain in detail. These tools can also be used for achieving an elevated level of regulatory compliance in case of audits and inspections by competent authorities (Pandey & Litoriya, (2020).

Liability for the use of AI

The Artificial Intelligence used in smart farming continuously apply sophisticated algorithmic systems to assist with forecasting and decision-making using patterns emerging from data and the system's own machine learning techniques. Because of complexity and lack of transparency of some AI systems, it is exceedingly difficult to determine who will be legally liable if the use of AI result in incorrect forecasting and monetary loss to the farmer. The contract between the service provider and the user must cover the potential adverse results that may arise and assign legal liability for such results until the enactment of national law or development of case laws (Karale, 2021).

Thus, it is impossible to attain and achieve the full potential of smart farming without solving the legal issues and challenges. These challenges are not only related to a particular country, but a common problem of all. That is why each and every country needs to address these legal issues before introducing smart farming technologies in the agricultural sector.

CONCLUSION

The concept of smart farming is a revolution for today's farmers/farm owners. Thanks to smart farming technologies, which have changed the meaning of traditional farming. However, every revolution has its limitation too. Smart farming is not an exception. From the above discussion, it is evident that there are number of legal issues of smart farming that need to be settled for getting optimum benefit from smart farming. Some of these issues can be settled by the contract between the smart farming equipment providers and the farmers. But this is not a permanent solution to the problem addressed. For this, States encouraging their farmers to implement smart farming techniques should introduce a separate legal framework in this regard that will address all the legal issues and challenges arising out of smart farming.

REFERENCES

- AboBakr, A., & Azer, M. A. (2017, December). IoT ethics challenges and legal issues. In *2017 12th International Conference on Computer Engineering and Systems (ICCES)* (pp. 233-237). IEEE.
- Alam, S., & Islam, M. Z. (2015). Offensive Statements on Social Networking Platforms with the special reference to Cyber Defamation: A Comparative Analysis between Malaysia and Bangladesh. *Journal of Asian and African Social Science and Humanities*, 1(3), 40-57.
- Anzum, R., & Naeem, J. (2021, May). Leveraging LoRaWAN technology for smart agricultural monitoring of Malaysian palm oil plantation. In *IOP Conference Series: Earth and Environmental Science* (Vol. 756, No. 1, p. 012052). IOP Publishing.
- ANZUM, R., ALAWAMLEH, H. S. K., BOKOV, D. O., JALIL, A. T., HOI, H. T., ABDELBASSET, W. K., ... & KUROCHKIN, A. (2022). A review on separation and detection of copper, cadmium, and chromium in food based on cloud point extraction technology. *Food Science and Technology*, 42.
- Anzum, R., Habaebi, M. H., Islam, M. R., & Hakim, G. P. (2021, August). Modeling and Quantifying Palm Trees Foliage Loss using LoRa Radio Links for Smart Agriculture Applications. In *2021 IEEE 7th International Conference on Smart Instrumentation, Measurement and Applications (ICSIMA)* (pp. 105-110). IEEE.
- Anzum, R., Habaebi, M. H., Islam, M. R., & Hakim, G. P. (2021, August). A Study of LoRa Signal Propagation in Hilly Suburban Area for Smart City Applications. In *2021 IEEE 7th International Conference on Smart Instrumentation, Measurement and Applications (ICSIMA)* (pp. 16-20). IEEE.
- Chen, T. C., Elveny, M., Surendar, A., Lawal, A. I., Zekiy, A. O., & Anzum, R. (2021). Developing a multilateral-based neural network model for engineering of high entropy amorphous alloys. *Modelling and Simulation in Materials Science and Engineering*, 29(6), 065019.
- Gondchawar, N., & Kawitkar, R. S. (2016). IoT based smart agriculture. *International Journal of advanced research in Computer and Communication Engineering*, 5(6), 838-842.
- Hakim, G. P., Habaebi, M. H., Toha, S. F., Islam, M. R., Yusoff, S. H. B., Adesta, E. Y. T., & Anzum, R. (2022). Near Ground Pathloss Propagation Model Using Adaptive Neuro Fuzzy Inference System for Wireless Sensor Network Communication in Forest, Jungle and Open Dirt Road Environments. *Sensors*, 22(9), 3267.
- Islam, M. Z., & Anzum, R. (2019). Internet governance: present situation of Bangladesh and Malaysia. *International Journal of Recent Technology and Engineering*, 7, 176-180.
- Islam, M. Z., & Jahan, A. (2015). RIGHT TO PRIVACY: IS IT A FUNDAMENTAL RIGHT IN BANGLADESH CONSTITUTION?. *Journal of Asian and African Social Science and Humanities*, 1(1), 1-7.
- Karale, A. (2021). The Challenges of IoT Addressing Security, Ethics, Privacy, and Laws. *Internet of Things*, 15, 100420.
- Mehta, A., & Patel, S. (2016). IoT based smart agriculture research opportunities and challenges. *Int. J. Technol. Res. Eng.*, 4, 541-543.
- Pandey, P., & Litoriya, R. (2020). Legal/Regulatory Issues for MMBD in IoT. In *Multimedia big data computing for IoT applications* (pp. 367-388). Springer, Singapore.

- Scherr, S. J., Shames, S., & Friedman, R. (2012). From climate-smart agriculture to climate-smart landscapes. *Agriculture & Food Security*, 1(1), 1-15.
- Uddin, M., Chowdhury, A., & Kabir, M. A. (2022). Legal and ethical aspects of deploying artificial intelligence in climate-smart agriculture. *AI & SOCIETY*, 1-14.