

Ethical Concerns of AI Automation in Agriculture

Mr. Ojas Vikas Karanjikar¹, Prof. Dr. Laxmi Charudatta Awati²

¹Student, School, Nashik Cambridge School

²Head of the Department, BBA, BCA, Panchavati College of Management and Computer Science

Abstract

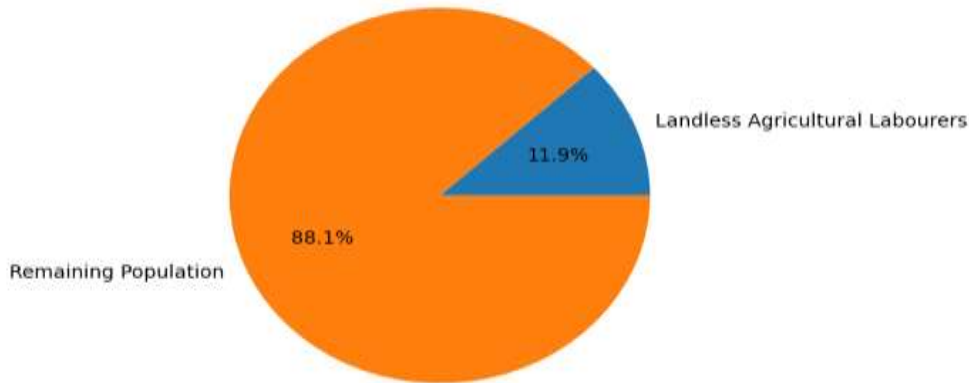
This research paper states the ethical concerns that rise due to AI automation in agriculture. It highlights the huge impact it creates not only on farmers but traders, landless labourers and village communities. It also states various other environmental, social and economic ethical concerns such as including unemployment, weakening of rural economies, social instability, technological dependence, loss of traditional farming knowledge, environmental degradation, intergenerational concerns, and increasing corporate control over farming systems. The study further discusses the preventive measures and ethical solutions that can be implemented such as training, regulations and sustainable agricultural practices. The paper concludes that AI should assist and empower farmers rather than completely replace human participation in agriculture ensuring that technological advancement supports both agricultural development and social welfare.

Keywords: Agriculture, Artificial Intelligence, Ethical concerns, Technological dependence, Environmental degradation

1. Introduction

India is land of agriculture. It is a backbone of Indian economy. Agriculture plays an important role in providing food, employment and raw materials for most of the industries. Around 70% Indian population directly and indirectly get employment through agriculture. AI have had widespread impact on various industries like Financial Services, Logistics, manufacturing, Healthcare, research and development and education and significantly in the field of agriculture. From precise farming, livestock management to automated machinery, it is cost-efficient and time saving for farmers. Research from the Indo-Gangetic Plains found precision farming methods reduced cultivation costs by 23.7% and various studies show that a large land holding farmer can save up to 20 lakhs INR per annum. But there is a very underappreciated danger caused by this huge change in the agriculture sector. In India, according to the 2011 Census of India, there were about 14.43 crore (144.3 million) landless agricultural labourers in the country. This huge segment of population does not own any land and work on other farms as their occupation. The work is mostly seasonal leading to seasonal unemployment among them. Now due to recent developments of AI in agriculture, they are permanently losing the job opportunities.

Landless Agricultural Labourers in India (Census 2011 approx.)



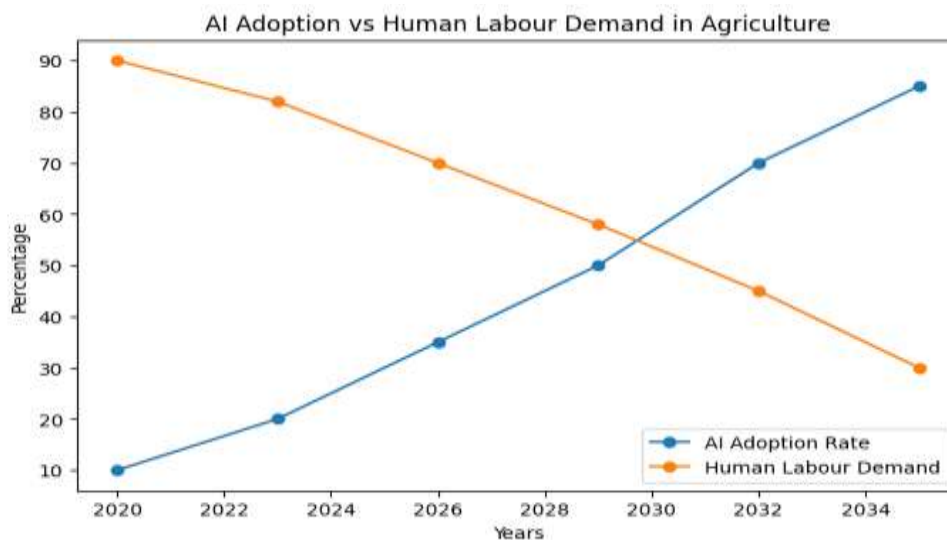
2. Reasons for loss of Employment and Livelihood

AI-powered machines can and robotics can perform many agricultural tasks traditionally done by humans such as robotic harvesting, automatic seed sowing, AI-based spraying systems, autonomous tractors, drone monitoring, automated irrigation systems. There are various companies like DJI Agriculture and XAG which build Develops smart irrigation, autonomous farming technologies, autonomous agricultural drones and robotic farming systems. Previously, workers manually sowed, harvested, irrigated and supervised the crops and removed weeds. These workers are no longer required.

With emergence of apps like Dehaat and CropIn which suggests crop treatments, irrigation timing, fertilizer quantity remove the need of local middlemen and manual advisors.

Traditionally, the workers manually graded crops, but with invention of new technologies such as Agnext which is used for food quality testing, grain grading, crop sorting their opportunities are limited.

This has raised a serious ethical concern regarding unemployment and the displacement of human labour, especially in a country like India where many depend on agriculture for livelihood. This has led to another major concern that is weakening of village economy in India. The wages earned by labourers circulated in local markets. As employment opportunities decline, rural purchasing power also decreases, leading to economic slowdown within villages.



This graph shows future risk of declining employment.

3. Negative Impact of AI on Rural Communities

Agriculture is not only an occupation but the foundation of rural life in India. Millions of people such as agricultural labourers, transport workers, local shopkeepers, food vendors, and small business owners depend directly or indirectly on farming activities for income and survival. Thus, due to AI automation, the job displacement also extends beyond farms.

Another concern due to AI is social instability which can be seen in the form of increased poverty, financial debt, family stress, reduced access to education and healthcare, child labour, rising crime in economically distressed areas.

Due to huge job loss, the gap between land owning people and landless labourers widened. This may create dissatisfaction due to poverty and financial stress, social tension, and instability in rural communities where agriculture is the primary source of livelihood. AI-driven automation can also increase migration of unemployed rural workers from rural to urban areas in search of work and opportunities. The migration of rural youth also has long-term consequences for agricultural sustainability and leading to aging rural populations and declining agricultural participation in villages. This will also lead to overcrowded slums, pressure on housing and public services in cities, rapid population decline and economic stagnation in rural areas. Thus, AI improves agricultural efficiency and productivity, its impact on rural communities must be carefully considered.

4. Risk of Technological Dependence

One of the major ethical concerns associated with the increasing use of Artificial Intelligence (AI) in agriculture is the growing dependence of farmers on technology for essential farming decisions and operations. Recent developments in AI heavily depends on algorithms and data but agriculture still depends on uncertain conditions like pests and weather. Traditionally, farmers relied on personal experience, local environmental knowledge, seasonal observations, and practical understanding developed over generation. Farmers will start to completely on machine recommendations more than their own judgment and experience.

The actual problem will start if the machine or system fails due to cyberattacks, biased data, software bugs or programming errors. Whole farming system can disrupt. If technical issues occur in irrigation systems, soil moisture will not be monitored correctly or crops may not get adequate water. Failure in recommendation systems can cause crop diseases, poor productivity, financial losses, waste of fertilizers and chemicals. If automated machinery fails, farming operations may be delayed. Failures related to software, internet connectivity, machinery, electricity, and cybersecurity may disrupt farming activities and cause severe financial losses. This overdependence leads to another ethical concern that is loss of traditional knowledge. Many AI farming systems require constant internet access and cloud-based data processing. In rural areas of India, digital infrastructure is limited leading to malfunctioning of AI systems and reduces of reliability of machines.

5. Loss of Traditional Knowledge

Agriculture is a very old occupation and significantly developed by farmers through their personal experience. The traditional techniques like crop rotation, natural pest control, organic fertilizers, water conservation techniques, and indigenous seed preservation helps to maintain soil fertility and agricultural sustainability. These practices were specifically adjusted according to local climatic conditions, soil type, and environmental challenges which are faced, making them very important for sustainable farming. Due

to automation by AI, farmers depend on machine recommendations and inputs and use automated machinery instead of traditional practices. Traditional knowledge loss is both an agricultural and cultural concern. Farming techniques in India have a deep rooted connection with rural communities and biodiversity. If future generations rely only on AI, the traditional sustainable practices as well as local farming knowledge may disappear. The disappearance of traditional knowledge may weaken our cultural heritage and reduce the diversity of agricultural methods.

6. Environment related ethical concerns

Excessive industrial automation and large-scale AI-driven agriculture may also create serious environmental ethical concerns. One major issue is monoculture farming. Monoculture refers to the large-scale cultivation of a single crop over extensive areas of land. AI systems are programmed for maximizing the profit for farmers and sometimes not suitable for a long run because growing same profitable crops over the years using highly standardized methods can damage soil fertility, reduce biodiversity, increase pest vulnerability, and weaken ecosystem stability over time.

Commercialization of Agriculture leads to overproduction leading to indiscriminate use or exploitation of natural resources leading to major ecological crises like environmental degradation, ozone layer depletion and global warming.

AI based systems also lead to overconsumption of energy resources. AI systems cannot work alone. They require huge machinery, sensors and drones which depend on electricity and digital infrastructure which lead to higher carbon emissions.

Another environmental concern is generation of e-waste or electronic waste. Sensors, batteries, drones, processors, and digital devices become outdated or damaged, and may harm the environment if not disposed properly.

7. Intergenerational Ethical Concerns

The increasing use of Artificial Intelligence (AI) in agriculture raises important intergenerational ethical concerns because the decisions made today will shape the future of farming for coming generations.

One major concern is whether any employment will be remaining in agriculture sector for future generations. As machines increasingly replace human labour in activities such as harvesting, spraying, irrigation, and monitoring, the demand for manual workers may continue to decline. Future generations may inherit farming systems where human involvement, traditional knowledge, and community participation are greatly reduced.

If this trend continues, future agricultural systems may become controlled mainly by large industrial farms rather than community-based rural farming systems which leads to another ethical concern which can change the face of this sector.

8. Corporate Control of Agriculture

Many AI systems are owned by big agritech companies and software providers which may aim to increase control over the farms by making farmers rely on proprietary software, subscription-based platforms, and company-controlled digital systems for essential farming operations.

These companies also gather massive amounts of data related to soil conditions, crop performance, weather patterns, production levels, farmer behaviour which has great value and can be used to monopolize agricultural markets and influence farming decisions. Another major concern is the monopolization of

seed and technology markets. Large agritech corporations may combine AI technologies with patented seeds, fertilizers, and farming systems, forcing farmers into long-term dependence on company-controlled products and services.

Ethically, food production is one of the most essential activities for human society. Corporate control over this activity can compromise autonomy and economic freedom of people.

9. The preventive measures and possible solutions for ethical concerns

- AI should help in assisting farmers rather than completely replacing labourers.
- AI should not make the society socially unstable and rather provide more employment in agriculture sector.
- It should not make farmers technologically dependent rather enhance their personal experience and preserve traditional knowledge.
- It should help in optimising resources rather than exploiting them.
- Strong regulations and ethical safeguards are necessary to prevent excessive corporate control on agriculture.

Solutions include presence of a collaborative model that will enhance the efficiency of farmer but also involve workers in them thus preventing from complete eradication of jobs.

Example- Drones can assist workers in monitoring crops

As agriculture becomes increasingly technology-driven, rural workers must be provided with proper education and technical training to adapt to changing agricultural systems. This will ultimately increase the involvement of people in agricultural activities. Without proper training, workers may lose employment opportunities as automation increases.

Example- Training programs initiated by government and agritech companies can create new job roles such as drone operators, smart irrigation supervisors, etc.

AI systems used in agriculture should follow strong ethical principles to ensure that technology benefits society and also reduce the consumption of natural resources.

Example- Introducing AI based sustainable techniques in Agriculture.

Strict regulations to ensure that agriculture is not industrialised and completely controlled by large corporations and automated systems.

Example- Introducing ways to ensure less corporate control in agriculture sector

Ethical Concerns and Possible Solutions

Ethical Concern	Possible Solution
Unemployment	Skill development programs
Technological Dependence	Human-AI collaboration
Corporate Control	Government regulation
Environmental Degradation	Sustainable AI policies
Loss of Traditional Knowledge	Knowledge preservation programs

10. Conclusion

Artificial Intelligence is rapidly changing agricultural sector with an unprecedented pace by introducing advanced technologies such as autonomous tractors, drones, smart irrigation systems, robotic harvesting, and AI-based crop monitoring. This automation has led to increased efficiency, productivity and food security. However, due to this automation various ethical concerns have risen which includes loss of employment and livelihood, risk of technological dependence, and industrialisation of agriculture. Therefore, the future of agriculture should focus on creating a balanced system where humans and AI work together, optimise resources, preserve the traditional knowledge and ensure social stability. It should help in farming rather than dominating it and create a future where innovation, sustainability, and human welfare grow together in harmony.

11. References

1. <https://censusindia.gov.in>
2. <https://agricoop.nic.in>
3. <https://www.dehaat.com>
4. Rotz, S., Gravely, E., Mosby, I., et al. (2019). “Automated Pastures and the Digital Divide”. *Journal of Rural Studies*, 68, 112–122.