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## AI in the Fields of Change: A Sociological Lens on Technology's Rural Revolution

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**DOI : <https://doi.org/10.5281/zenodo.20046435>**

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### ARTICLE DETAILS

**Research Paper**

**Accepted:** 01-04-2026

**Published:** 18-04-2026

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**Keywords:**

*Rural AI adoption, Sociological lens, Labor and cultural disruption, Surveillance capitalism*

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### ABSTRACT

Global societies are changing due to artificial intelligence (AI), but little is known about how it affects rural communities. This article uses sociological perspectives like structuration theory, the digital divide, and social capital frameworks to analyse how AI is incorporated into rural life. It examines issues like labour displacement, cultural disruption, and inequality amplification in addition to opportunities like precision agriculture and telemedicine. The article makes the case that the adoption of AI in rural areas is a socially constructed process influenced by power dynamics, community structures, and policy gaps rather than just a technological one, drawing on case studies from India, the US, and sub-Saharan Africa. To fully utilise AI's potential without worsening rural marginalization, policymakers must place a high priority on inclusive governance.

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### Introduction

Over 3 billion people live in rural societies, which are known for their close-knit communities, agrarian economies, and resiliency in the face of resource scarcity. However, the emergence of AI, which includes automation, machine learning, and predictive analytics, poses a threat to these pillars. Technology promises efficiency and prosperity, from drone-monitored farms in Punjab, India, to AI-driven irrigation in rural Kenya. However, from a sociological perspective, AI is not an impartial instrument; rather, it represents power dynamics and transforms identities and social structures.



A sociological viewpoint is used in this article to examine "AI and Rural Society." We frame AI as a duality a structure that rural actors adapt while it restructures their world using Anthony Giddens' structuration theory, which holds that social structures both limit and facilitate human agency. To draw attention to disparities and inequalities, we also utilise Pierre Bourdieu's ideas of cultural and social capital as well as Manuel Castells' network society thesis. The analysis calls for sociologically informed policies and highlights AI's two-edged sword, which empowers some while marginalising others.

Sociology offers useful tools to analyse the effects of AI in rural areas. For example, structuration theory shows how rural farmers use AI apps for crop prediction, recycling technology into local practices. However, as Giddens points out, systems like corporate AI algorithms have unforeseen repercussions, like data biases that favour big farms. Jan van Dijk's extension of the digital divide theory highlights the differences between rural and urban areas. Broadband, electricity, and digital literacy are frequently lacking in rural areas, resulting in a "second-level divide" where the digitally elite benefit from AI. For instance, according to 2025 NITI Aayog reports, only 30% of villages in rural India have dependable internet, which restricts access to AI tools.

Another lens is social capital, according to Robert Putnam. AI has the potential to strengthen community ties through platforms that link farmers to markets or weaken them by automating social roles (imagine chatbots taking the place of village extension workers). Resistance is further explained by Bourdieu's habitus: AI's data-driven rationality may clash with rural cultural norms, resulting in technophobia. According to these frameworks, AI is socially mediated and dependent on local agency, institutions, and international capital flows rather than being deterministic.

### **Rural Areas and the Use of AI**

There are many different ways that AI exists in rural communities including agriculture, healthcare, and government services.

### **Economic Growth and Precision Ag**

USDA statistics show that AI in precision agricultural systems, such as John Deere's tractors with computer vision used to optimize planting and yield, can increase a farmer's yield by up to 20% in the Midwest. In India, AI-based mobile applications such as CropIn's smartphone app help smallholder farmers in Maharashtra identify insect pests on their crops through the use of machine learning algorithms. Collectively, these elements represent "smart farming." With satellite imagery and IoT



(Internet of Things) sensors, farmers can better prepare for future weather conditions, such as the growing season, or assess overall soil health.

### **Educating and Addressing Health Issues**

In rural Australia, telehealth applications using AI, such as Google's DeepMind diagnostic tool, allow doctors to diagnose illnesses with 95% accuracy, from remote healthcare clinics. Across sub-Saharan Africa, there is often a shortage of medical specialists; however, platforms such as Kenya's mPedigree help to close the gap by providing assistance through chatbots via AI-based applications for farmers regarding questions related to their health; this way, farmers no longer need to make an appointment to see a physician.

### **Governance and Livelihoods**

AI improves the administration of rural areas; China uses facial recognition technology to provide subsidies to village residents, while India uses an Aadhaar-linked AI to prevent fraud in crop insurance. In Nigeria, FarmCrowdy offers an algorithmic matching capability that connects rural farmers and producers with buyers in urban areas using gig economy apps.

### **Sociological Effects: Opportunities and Disruptive Opportunities**

#### **Empowerment and Possible Improvements in Mobility**

AI aids rural users to be empowered; for example, rural women in Bangladesh have become financially autonomous and have challenged traditional patriarchal power structures through AI-enabled microfinance apps (e.g., bKash) that allow users access to prospective loans based on their credit history. In many instances, users have been able to "hack" the applications to meet their specific social needs by creating cooperative groups for making group loan pools.

AI has provided rural users with new social capital through the creation of social networks. For example, the Hello Tractor network in Nigeria helps create service organizations by allowing individuals to borrow and share equipment, thereby creating cooperative groups based on mutual trust. A 2024 report by the World Bank found rural incomes in pilot areas grew through the use of these types of technologies by 15-25%.



## **Inequality and Access to Technology**

Unfortunately, the gap between the richest and poorest has increased as a result of the use of technology. As noted by a 2025 report from the Brookings Institution, small rural farms are falling further behind larger corporate farms that have technology that includes artificial intelligence, resulting in a widening income gap. Additionally, according to data from ITU, approximately 70% of the rural population around the world lacks 4G technology, which creates additional barriers to accessing job opportunities in urban areas.

Bourdieu would assert that the mismatch between cultural capital and understanding of technology can create barriers to accessing technology. In the rural communities of Japan, the adoption rate is estimated at 40%, indicating that older generations within those communities lack the ability to navigate technology.

Job loss due to automation (30% of the manual labor force since 2020) is causing rural-to-urban migration and the loss of identities associated with rural life as young people no longer feel connected to the land and pursue urban technology jobs, which deteriorates their local community ties.

There are many ethical questions arising from the use of AI. An example of this would be the "black box" nature of AI and its ability to create unfair lending systems that reject credit to rural women, as noted in Ruha Benjamin's book, "The New Jim Code."

AI is transforming how we relate to each other. For example, Virtual Extension Services are taking the place of in-person visits to Extension Offices, which may contribute to the decline of rural social capital, or to how Robert Putnam describes it, the decline of bowling alone. Conversely, AI-enabled social media proved to be a way for farmers in India to coordinate protests against the government's AI subsidies in 2024.

From an Environmental Sociology perspective, while AI has the potential to create environmentally-friendly agricultural practices by reducing water consumption by 30%, it also has the potential to strain rural power grids due to the energy consumption of data centers.

## **Global Snapshots of AI Impact through Case Studies**

When viewed together globally, these 3 snapshots show two sides of AI within agriculture. For example, Fasal's sensors in India offer farmers essential weather forecasts but are limited to only 25% of smallholder farmers due to cost and literacy challenges. In the United States' Corn Belt, AI-powered



drone technology produces 18% greater yield of corn; however, it has contributed to an increase in the number of farms being consolidated into larger operations and displacing farming families. In Kenya, Twiga Foods connects more than 10,000 farmers by using AI and SMS to reduce food waste from 50% to virtually nothing, while raising questions about data ownership in a new form of neocolonialism. The overall messaging is that AI has the ability to create a significant amount of value when the required infrastructure and inclusiveness are in place, but it can be disruptive when they are not.

### **India - Agribusinesses are Using Technology to Help Farmers Adapt to Climate Change**

Farmers in Rural Karnataka can take advantage of the uses of AI to combat climate change thanks to AI sensors from Bengaluru company Fasal, which provide real-time weather forecasting information to over 50,000 farmers in this area

### **United States - Farmers Are Using AI Drones for Agriculture in the Corn Belt**

Farmers in the rural midwestern United States have created a command and control centre for the use of AI drones to assist with the management and harvesting of 1 million acres of corn in Iowa, and yield increases of 18% have been documented as a result of the use of AI for crop management and harvesting. Still, according to a recent paper published by the Rural Sociological Society, 15% of the farms in the region have closed since 2025 due to the increasing consolidation of farms, displacing farming families into ghost towns. As the number of farms in the region continues to dwindle, family farming is losing the social capital that was historically created by family-owned farms. The trend of families leaving the rural community is escalating. While different policies have been implemented to assist farmers, such as the granting of USDA AI technology assistance funding, most of these policies disproportionately favour the agribusiness sector versus the small family farm sector because of the increasing economic integration of farmers in agribusiness and the significant amount of capital that agribusinesses have to invest in AI technology.

### **Sub-Saharan Africa - The Use of AI to Bypass ICT and Literacy Barriers in Africa**

Kenya's Twiga Foods Corporation has implemented an efficient distribution system using AI and digital technology to link 10,000 smallholder farmers, reducing food waste by 50%. A recent IFPRI (International Food Policy Research Institute) report documented that most of the smallholder farmers in Kenya are using Twiga's services to access the market and sell their products using SMS technology, even if they may not be able to read or write. However, while the use of Twiga's technology by smallholder farmers is probably creating positive social capital for the farmers, there are concerns about



foreign ownership of the supply chain and the flow of data from farmers to Twiga to the United States for analysis in Silicon Valley, creating concerns of new forms of neocolonialism, where smallholder farmers in Kenya are thought to be deprived of the potential benefits of technology, and new forms of social capital continue to grow via the development of farmer cooperatives that can help to bridge the gap between smallholder farmers and global agribusiness.

All three case studies illustrate that while AI is a tool that has the potential to create value for farmers either when there is a match between the infrastructure and the degree of inclusivity, AI can create disruption in a market when the lack of alignment occurs.

### **Ethical Concerns and Difficulties**

The rollout of AI in rural areas faces a number of challenges. One is a lack of infrastructure. For example, according to the IEA's 2025 benchmark report, only 45% of the world's rural areas currently have electricity, which greatly hampers the development of an AI technology that relies upon the use of cloud computing.

Another is the way farmers' data is collected by agriculture businesses without their prior knowledge or consent, and used as a source of profit for large corporations. This is a classic example of Shoshana Zuboff's theories concerning "surveillance capitalism." Historically, rural residents are extremely distrustful for being exploited so many times.

Another reason why rural residents experience distrust toward AI is because there is a great deal of bias and exclusion in AI. Most AI technologies are trained on datasets composed primarily of people that live in urban areas, and do not account for the unique conditions present in rural areas. This results in AI technologies creating crop models that do not include crops being raised by Indigenous residents.

The existing power dynamics create an environment where rural residents have limited power over AI technologies in their communities. As Bourdieu pointed out, there are power brokers at the local level that control the use of AI, while ignoring the voices of the rural residents that have limited power and little representation.

From an ethical perspective, sociologists have been advocating for reflexivity when working with AI technologies. It is important for developers of AI technologies to work with rural residents to reduce the effects of technological colonialism.



## Future Directions and Policy Recommendations

Policymakers must implement strategies to help mitigate against the potential harms posed by AI. Some recommendations include:

1. **Bridging the Digital Divide:** Policymakers must subsidize investments into rural broadband and AI literacy programs, such as those outlined in the EU's Common Agricultural Policy 2025 Reforms.
2. **Promoting Inclusion:** Policymakers should work with agricultural communities to create a community owned co-data database and require jurisdictions to audit for bias in AI technologies.
3. **Building Capacity:** Local AI "champions" should be created and supported in embedding AI into the various social structures of rural communities.
4. **Regulating Ethically:** Global ethical regulations, such as those created by UNESCO concerning ethical guidance for AI, need to be enforced and provide ethnically appropriate recommendations to rural communities.

Moving forward, it is clear that a number of hybrid futures may exist, including AI-assisted ruralism that supports and improves traditional activities. According to McKinsey, AI technologies could add another \$500 billion to the global agriculture industry by 2035. However, this growth will only occur with proper sociological safeguards in place. Historically, rural cultures have demonstrated a great deal of resilience and will continue to remain resilient as long as rural residents are empowered to lead.

## Conclusion

The invasion of the countryside by artificial intelligence (AI) consists of social relationship dynamics and social systems that provide opportunity and risk/effect. This relationship between the physical and social world has been visible through sociological theories, where technology is seen as an equalizing force rather than a savior. Inclusive adoption means putting the voice of rurality at the centre, or we could allow AI to create larger disparities between rural communities. Sociologist Anthony Giddens explains how we create our history, but certainly not always under circumstances of our choosing, however we should use discretion when making our choices.

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