Bridging the Digital Divide in Agriculture: Lessons from the United States and Africa in Smart Farming Adoption

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Abstract: The adoption of smart farming has altered food production by increasing efficiency, sustainability, and productivity. However, there is a digital divide, with affluent countries such as the United States benefiting from advanced agricultural technologies, nevertheless, many African countries face limited access to digital tools, inadequate infrastructure, and financial restraints. This disparity has implications for food security, economic development, and global agricultural sustainability, prompting an in-depth examination of the factors impacting smart farming adoption in different regions. This review examines the benefits and impact of smart farming adoption on agricultural productivity, as well as identifies the potential benefits of cross-regional knowledge sharing across the United States and Africa. The findings indicate that smart farming technologies have considerably increased agricultural productivity and sustainability in the United States, due to strong government initiatives, public-private collaborations, and widespread digital infrastructure. In contrast, African farmers confront limited broadband connection, financial constraints, and insufficient institutional support, which restricts the adoption of precision agriculture and data-driven farming. Therefore, bridging the digital divide in agriculture necessitates a comprehensive approach that combines technology, policy, and capacity-building efforts.

Keywords: *Agriculture, Technology, Innovation, Sustainable Farming, Agro-Transformation.*

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I. INTRODUCTION

The adoption of smart farming technologies, including the Internet of Things (IoT), Artificial Intelligence (AI), big data analytics, remote sensing, and automated machinery, has transformed how farmers manage their crops, livestock, and supply chains (Dhanaraju et al., 2022; Mandal et al., 2024). These advances have improved productivity, resource efficiency, climate resilience, and profitability in a wide range of agricultural systems worldwide (Subeesh & Mehta, 2021).

Despite these developments, the agricultural sector faces a challenge regarded as the digital divide. In agriculture, the digital divide refers to the disparity between farmers who have access to and can effectively use current digital technology and those who do not have such access owing to economic, infrastructure, technological, or policy constraints (Khanal et al., 2021). The digital divide in agriculture is most visible when comparing developed economies like the United States with developing regions such as Africa. In the United States, large-scale commercial farms utilize AI-powered decision support systems, automated machinery, satellite imagery, and smart irrigation systems to maximize productivity (Talaviya et al., 2020). Therefore, these farms benefit from reliable internet connectivity, strong financial support, and well-established agricultural research institutions.

Particularly, in many African countries, smallholder farmers, accounting for the vast majority of food producers, face severe impediments to digital technology adoption.

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Limited internet connectivity, high expenses of smart agricultural technologies, insufficient digital literacy, and inadequate infrastructure all contribute to the slow adoption of smart agriculture solutions (Izuogu et al., 2023). This discrepancy has the potential to exacerbate current inequities in agricultural production, food security, and economic prospects between the Global North and the Global South (Ogwu et al., 2024; Opitz et al., 2015).

Bridging the digital divide in agriculture is critical for guaranteeing global food security, increasing smallholder farmers' livelihoods, and promoting sustainable agricultural growth. While smart farming has the potential to transform agriculture globally, its implementation must be inclusive and accessible to all farmers, regardless of geography or financial capacity (Choruma et al., 2024). Therefore, Abate et al., (2023) highlighted that considering Africa's distinct agricultural challenges and potential necessitates context-specific digital solutions, such as mobile-based advice services, digital banking platforms, and community-led smart farming programs, the observations from the United States' success in digital agriculture can provide useful insights into effective policies, investment methods, and technical advances that can be applied in Africa.

As reported by the Food and Agriculture Organization (Trendov et al., 2019), the ongoing digital divide in agriculture threatens to deepen the economic gap between technologically proficient and digitally disadvantaged rural areas. As such, if unaddressed, the disparity in smart farming adoption may result in a growing gap in agricultural productivity between developed and developing countries, continued reliance on outdated farming techniques in regions that require the most innovation, reduced competitiveness of smallholder farmers in global markets, and increased vulnerability to climate change and food security (Liu, 2024). Therefore, the implementation of smart farming technology is crucial for tackling food security issues, climate change, and resource efficiency in global agriculture. Smart farming uses digital advances to improve agricultural operations, allowing farmers to make data-driven decisions, optimize resource usage, and boost production (Javaid et al., 2022). Despite these benefits, smart farming adoption is still uneven, with many smallholder farmers unable to access the technologies. Hence, bridging the digital divide is therefore critical for ensuring that the benefits of digital agriculture are widely and equitably spread. The purpose of this review is to examine the benefits and impact of smart farming adoption on agricultural productivity, as well as to identify the potential benefits of cross-regional knowledge sharing in the United States and Africa.

II. CONCEPT OF THE DIGITAL DIVIDE

The digital divide in agriculture refers to the gap between farmers who have access to and can effectively use modern digital technology and those who lack such access, owing to infrastructural, economic, educational, or technological constraints (Raja. & Raja 2024). This disparity has far-reaching implications for global agricultural productivity, food security, and economic development, as farmers who have access to smart farming tools, precision agriculture, and real-time data analytics can achieve more efficiency and sustainability than those utilizing conventional methods (Chen et al., 2023).

In general, the impact of the digital divide is most apparent when comparing technologically advanced agricultural systems, such as those in the United States, to farming systems in underdeveloped countries like Africa. Farmers in the United States benefit from automated machinery, AI-driven decision-making tools, and other advanced technologies, along with government-supported digital farming programmes, which enable them to optimize operations and reduce losses (Addison et al., 2024). In contrast, many African farmers, particularly smallholder farmers, face significant hurdles such as poor internet connectivity, high costs of smart farming technologies, and limited digital literacy, preventing them from implementing data-driven and automated agricultural approaches (Abdulai et al., 2023). Therefore, this technical gap exacerbates economic inequities in global agriculture, as digitally equipped farmers gain a competitive advantage in terms of output, market access, and profitability.

The digital gap is caused by legislative decisions, economic institutions, and infrastructural limits, rather than just technological progress. In industrialized economies, government-supported investments, research-driven agri-tech innovation, and public-private collaborations have made digital agriculture solutions more widely available. In contrast, in many impoverished countries, insufficient investment in digital infrastructure, a lack of institutional support, and low financial resources prohibit farmers from taking advantage of digital transformation (Javaid et al., 2022). Bridging this gap requires a holistic approach that addresses the socioeconomic and technological challenges to smart farming adoption.

In addition, agriculture has progressed through many technological revolutions, beginning with mechanization in the early twentieth century and ending with the Green Revolution, which introduced high-yield crops and modern fertilizers (Eliazer Nelson et al., 2019). The current transition, Agriculture 4.0, is driven by digitalization, automation, and real-time data-driven decision-making. However, while some farmers have adopted this transformation, many others are still excluded due to economic, infrastructure, and knowledge constraints. This inequality is also exacerbated by geographical differences, such that farmers can more easily integrate digital farming solutions in urban and peri-urban settings, where internet connection is more reliable and digital services are more readily available (Dibbern et al., 2024; Rose & Chilvers, 2018). On the other hand, rural farmers, particularly those in distant areas, may face restricted connectivity, fewer technology providers, and higher acquisition prices, making it difficult to maintain the pace of agricultural digitalization (Raja & Raja 2024). Bridging this gap therefore necessitates specific policy initiatives, financial incentives, instructional programs, and infrastructure development required to ensure

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that all farmers, regardless of geography or financial standing, may effectively adopt and profit from smart farming technologies.

A. Factors Contributing to the Digital Divide in Agriculture

Several interconnected factors contribute to the digital divide in agriculture, making it difficult for farmers in some areas to adopt smart agricultural technologies. One of the most important issues is infrastructural development. Internet connectivity, stable electricity, and mobile network access are critical components of digital agriculture (Smidt, 2021; Mhlanga & Ndhlovu, 2023). In industrialized countries such as the United States and Europe, governments have invested in rural broadband development and digital infrastructure, ensuring that even outlying farms have internet access. However, many rural areas in Africa lack reliable energy, broadband networks, and mobile internet connectivity, making it difficult for farmers to deploy AI-powered precision farming instruments or cloud-based agricultural platforms (Ehimuan et al., 2024).

Another important consideration is the price of smart farming technologies. IoT-powered sensors, AI-driven crop monitoring systems, GPS-guided tractors, and blockchain-based supply chain management platforms are all examples of high-cost digital agricultural technologies (Kumar et al., 2024). While large commercial farms in developed nations may afford to invest in these developments, smallholder farmers in developing regions face financial restraints (Balana & Oyeyemi, 2022). The high initial cost of smart farming equipment, as well as maintenance costs and digital service subscription fees, make it difficult for them to adopt new technology. Unlike in the United States, where farm subsidies, financial grants, and insurance programs promote technology adoption, many African farmers do not have access to inexpensive loans, government subsidies, or financial incentives that would allow them to participate in smart agriculture (Choruma et al., 2024).

In addition, digital literacy and education also contribute significantly to the digital divide. Even when smart farming instruments are available, many farmers lack the expertise and skills to use them properly. Farmers in industrialized countries can use agricultural extension programs, digital literacy training, and technological advisory services to assist them manage the complexity of modern agri-tech (Cheng et al., 2024). Conversely, many agricultural education systems in developing countries do not yet incorporate digital literacy training, leaving farmers unprepared to engage with smart farming platforms. Without adequate training, farmers may struggle with the adoption, maintenance, and optimization of digital tools, thereby diminishing their overall impact (Magesa et al., 2023).

Economic policies and political backing are also important considerations. Adoption of smart farming is higher in regions where government policies actively promote digital agriculture. The United States, for example, has adopted federal initiatives and subsidies to help agri-tech firms, promote rural broadband expansion, and encourage farmers to practice precision agriculture (Cui & Wang, 2023; Wakweya, 2023). Meanwhile, in many underdeveloped nations, there is a dearth of formal legislation to encourage digital agricultural adoption. Without clear regulatory frameworks, investment-friendly policies, and significant government support, digital agriculture remains underdeveloped and inaccessible to the majority of farmers (Gumbi et al., 2023; Ayim et al., 2022).

Furthermore, the digital divide is influenced by both the private sector and the innovation ecosystem. In the United States, large agri-tech corporations, research institutions, and technology startups work together to develop innovative digital farming solutions, creating an atmosphere that promotes constant technical improvement (Abiri et al., 2023). However, in regions where agri-tech firms face financial, market penetration, and technological challenges, the availability of locally adapted smart agricultural solutions is limited (Wakweya, 2023). Therefore, farmers in these areas may not benefit from technical advancements in digital agriculture because they lack an active innovation ecosystem.

The digital divide in agriculture remains a socioeconomic issue such that farmers in low-income areas frequently prioritize urgent survival above long-term technical investment, making it more challenging to implement smart farming solutions. For many smallholder farmers, the cost of essential agricultural inputs like seeds, fertilizers, and manpower is already prohibitively expensive, enabling limited investments in digital farming technologies (Rotz et al., 2019). In this regard, cultural opposition to change is also a factor. Many farmers, particularly in rural farming communities, are used to manual methods and may be hesitant to adopt digital instruments. Without concerted efforts to create awareness about the advantages of smart farming, opposition to new technologies can delay adoption rates (Oyebamiji 2023). Addressing these challenges will require a multifaceted approach that includes financial incentives, digital education programs, infrastructure investment, and equitable regulatory frameworks to ensure digital agriculture becomes a global reality.

B. Smart Farming and Digital Agriculture

Smart farming and digital agriculture are critical for tackling global issues such as climate change, food security, and resource scarcity. Existing farming methods can result in inefficient resource utilization, high production costs, and susceptibility to unexpected environmental circumstances (Dibbern et al., 2024). Whereas, digital agriculture offers precision-based technologies that enable farmers to monitor soil health, observe weather patterns, regulate irrigation systems, and manage animals remotely (Kushwaha et al., 2024). Farmers may boost yields, reduce waste, and lessen their reliance on chemical inputs by incorporating smart technologies, all of which contribute to sustainable agricultural development (Abiri et al., 2023). Furthermore, digital agriculture improves market access and supply chain management since farmers can track produce from farm to fork using blockchain and cloud-based systems, ensuring transparency, food safety, and traceability.

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In the United States, smart farming has spread rapidly due to effective technological infrastructure, legislative support, and private-sector investment. Farmers in these regions benefit from automated machinery, AI-powered analytics, and government-funded digital farming programs that increase productivity and efficiency (O'Shaughnessy et al., 2021). However, developing regions such as Africa, confront major challenges to agricultural digital transformation, such as limited internet connectivity, a lack of digital literacy, and budgetary constraints. Despite this, innovative methods such as mobile advice services, satellite imagery for remote sensing, and the utilization of low-cost smart agricultural technologies are increasingly contributing to bridging the gap (Dibbern et al., 2024).

Despite its numerous advantages, smart farming adoption is inadequate, with technological, economic, and educational constraints preventing widespread implementation. While large-scale commercial farms have the resources to use advanced precision agriculture instruments, smallholder farmers, particularly those in developing countries, frequently struggle to buy and access these technologies (Gamage et al., 2024; Smidt, 2021). This highlights the importance of inclusive policies, financial support, and targeted technology solutions to guarantee that digital agriculture benefits all farming communities. Therefore, bridging the digital divide in agriculture would necessitate joint efforts from governments, private sector players, research institutions, and farmers to ensure accessibility, affordability, and practicability of smart farming for varied agricultural environments (Samadder et al., 2023).

C. Overview of Smart Farming Technologies

Smart farming refers to a wide range of digital technology used to optimize farming processes, eliminate resource waste, and increase production. Several of the most effective smart agricultural technologies include AI-based solutions, IoT-enabled sensors, AI-powered analytics, automated machinery, blockchain-based food tracking systems, and precision agriculture which entails utilizing data insights to optimize planting, irrigation, fertilization, and harvesting (Rajak et al., 2023). GPS-enabled tractors, soil sensors, and drone-based photography enable farmers to precisely manage their fields, lowering costs, increasing yields, and mitigating the negative consequences of over-farming and soil degradation (Inoue, 2020).

The IoT and smart sensors play an important role in digital agriculture by connecting various farming components via automated data collecting and remote monitoring. Farmers may monitor immediate agricultural conditions using IoT-based equipment such as soil moisture sensors, climate stations, and animal monitoring systems (Dhanaraju et al., 2022). In this regard, smart irrigation systems employ IoT sensors to detect soil moisture levels and automatically regulate water usage, minimizing both water waste and crop dry stress. Similarly, cattle farmers can utilize Radio Frequency Identification (RFID)-enabled tracking devices to monitor animal health, detect illnesses early, and optimize feeding regimens, resulting in improved animal welfare and increased productivity (Choudhary et al., 2025).

AI and machine learning are transforming agriculture by providing predictive analytics and automated decision-making tools. AI-powered systems analyze historical climate patterns, soil data, and pest activity trends to predict crop diseases, optimize planting schedules, and improve supply chain management (Aijaz et al., 2025). For example, AI-powered crop monitoring software can employ computer vision technology to detect disease or pest infestations early on, allowing farmers to take preventive measures before substantial output losses occur. Additionally, AI-powered farm management software provides advice on seed selection, appropriate fertilization techniques, and market price forecasts, resulting in increased profitability and efficiency (Mussa, 2024)

Automation and robotics are transforming large-scale agriculture by replacing manual labour-intensive operations with highly efficient, self-sufficient robots. Automated harvesters, robotic weeders, and self-driving tractors contribute to lower labour costs and increased operational efficiency (Nagaraja et al., 2024). These technologies are especially valuable in locations with labour shortages and rising agricultural wages. Furthermore, drones equipped with multispectral imaging cameras are commonly utilized for crop health assessment, field mapping, and precision spraying, which improves farm management efficiency. Another new technology in smart farming is blockchain, which improves food supply chain transparency and traceability (Guebsi et al., 2024). Blockchain-based solutions enable farmers, suppliers, and consumers to track agricultural products from farm to fork ensuring food safety, fair pricing, and lower post-harvest losses (Prashar et al., 2020). This technology is especially valuable in worldwide markets, where traceability and quality assurance are critical when exporting agricultural products.

III. SMART FARMING ADOPTION

According to previous research by Bhooshan et al., (2024), the United States has been among the leading competitors in agricultural digitalization, propelled by advances in mechanization, precision farming, and data-driven technologies. Smart agriculture in the United States began in the mid-20th century with GPS-enabled tractors, automated irrigation systems, and computer-controlled machinery. Precision agriculture in the 1990s improved the monitoring of soil health and resource consumption. IoT, remote sensing, and big data analytics transformed farming operations in the early 2000s (Abiri et al., 2023). Currently, the United States continues to lead in Agriculture 4.0, where robotics, blockchain for traceability, and machine learning algorithms are influencing the future of sustainable and lucrative agriculture (Javaid et al., 2022).

In addition, the success of smart farming in the United States has been largely facilitated by government policies and financial incentives aimed at encouraging technology adoption, research, and infrastructure development. Agency, including the United States Department of Agriculture (USDA), has been instrumental in funding and promoting digital agriculture initiatives (McFadden et al., 2023; Geng et al., 2024).

Smart farming adoption in Africa is still in its early stages, with limited infrastructure, budgetary constraints, and digital literacy issues impeding progress. While nations such as South Africa, Kenya, and Nigeria have achieved significant advances in precision agriculture, mobile advice services, and sensor-driven farming, many smallholder farmers continue to use conventional methods with little technological assistance (Choruma et al., 2024). Despite these barriers, there is considerable interest in digital agriculture, with African companies and international organizations investing in AI-powered weather forecasting, soil research tools, and blockchain-based supply chain tracking (Mhlanga, 2024). However, the usage of mobile-based agricultural extension services in Nigeria and Kenya has enhanced farmer access to digital tools, funding, and market knowledge, paving the door for more smart farming adoption (Kolapo & Didunyemi, 2024; Kieti et al., 2022). The challenges to smart agricultural implementation in Africa are presented in *Table 1.*

Table 1. Challenges Preventing Widespread Digital Agriculture Adoption in Africa

Challenges	Specifics	References
High cost of technology	Smart farming technology such as drones, precision irrigation systems, and AI-powered sensors continue to be prohibitively expensive for smallholder farmers with limited capital.	Kumar et al., 2024; Agrawal & Arafat, 2024
Financial constraints	Inadequate finance impedes small-scale farmers from investing in smart farming instruments and technologies.	Dougill et al., 2017; Balana & Oyeyemi, 2022; Khan et al., 2024
Limited access to digital infrastructure	Many rural areas lack high-speed internet and electricity, limiting farmers from utilizing cloud-based farm management systems and IoT-powered technology.	Tyagi & Sreenath, 2021; Kamilaris et al., 2019
Insufficient policy coherence and institutional support	Unlike the United States, many African governments have yet to implement complete policies that encourage smart agricultural adoption through subsidies, research funding, and infrastructure development.	Lima, 2014; Negera et al., 2022; Musafiri et al., 2022
Low digital literacy	Many farmers lack the technical knowledge required to use sensor-based irrigation systems, farm management software, and automated machinery.	Rajak et al., 2023; Cheng et al., 2024

A. Trends in Digital Agriculture in the United States and Africa

Digital agriculture is revolutionizing farming practices around the world, with both the United States and Africa progressively incorporating technology into their agricultural sectors. While these regions vary in terms of economic growth, infrastructure, and regulatory assistance, certain common themes in smart farming adoption are evident (Choruma et al., 2024). These developments demonstrate the broad benefits of digital transformation in agriculture, such as increased efficiency, production, and sustainability.

Firstly, precision agriculture techniques are becoming increasingly popular in both the United States and Africa. Precision agriculture has become widespread in the United States, with GPS-guided tractors, drone-assisted crop monitoring, and sensor-based soil analysis (Padhiary et al., 2024). Large commercial farms optimize input consumption, improve output estimates, and reduce resource waste by utilizing real-time data analytics, AI-driven predictive models, and IoT-enabled farm management systems. Farmers may precisely quantify the amount of water, fertilizer, and pesticides required for specific sections of their fields, resulting in financial savings and environmental sustainability (Liang & Shah, 2023). Similarly, precision farming is becoming popular across Africa, although at a gradual rate. While smallholder farmers frequently lack the financial resources to invest in high-end GPS machinery or AI-powered analytics, less expensive alternatives are developing (Javaid et al., 2022). Developed low-cost soil testing kits and mobile-based consulting services to assist farmers in making data-driven decisions enabling African farmers to use fertilizer and water more efficiently, reducing waste and increasing output. The increasing use of satellite-based weather forecasts and smartphone-enabled pest management technologies exemplifies Africa's slow transition to precision agriculture (Toromade & Chiekezie, 2024).

In addition, the usage of IoT devices and sensor technology is another popular trend in digital agriculture in the United States and Africa. In the United States, sensor-equipped irrigation systems, automated greenhouse monitoring, and RFID-based animal tracking are frequently employed to improve farm management (Kumar et al., 2024). For example, farmers employ soil moisture sensors to regulate irrigation, ensuring that water is used efficiently while avoiding abuse. Wearable sensors in livestock monitor animal health, mobility, and eating patterns, which improves disease identification and herd management (Kumar et al., 2024). However, adoption of IoT-based agriculture is in its early phases, but rapidly increasing in Africa. Many African agricultural technology businesses are creating low-cost sensor solutions for smallholder farmers. In line with this, solar-powered irrigation systems equipped with IoT-enabled sensors autonomously manage water distribution based on real-time soil moisture levels in Africa (Tangorra et al., 2024). These technologies assist African farmers in conserving water, which is a valuable resource in drought-prone regions.

Furthermore, a common trend in all regions is an increased emphasis on sustainability and climate-smart agriculture. Climate change poses serious threats to food security, and digital technologies are being leveraged to reduce environmental impact and increase resilience. Precision irrigation, no-till farming, and regenerative agriculture are popular smart farming strategies in the United States because they protect soil health, minimize greenhouse gas emissions, and enhance water-use efficiency (Sahoo et al., 2024). Many farmers use solar-powered irrigation systems, cover crops, and carbon sequestration strategies to improve long-term sustainability. Whereas, climate-smart agriculture is becoming increasingly important in Africa, particularly in drought-prone areas. To address climate change, many farmers are turning to drought-resistant crop types, agroforestry, and conservation agriculture (Mbanasor et al., 2024). Similarly, digital tools are used to enhance sustainable livestock management, increase pasture utilization, and help early warning systems for climatic disasters.

IV. ADVANTAGES OF CROSS-REGIONAL KNOWLEDGE SHARING

The exchange of agricultural information and technical breakthroughs between the United States and Africa has the potential to improve global food security, sustainability, and productivity (Gamage et al., 2024; Muhie, 2022). This mutually beneficial exchange could promote innovation, boost food production, and create sustainable farming systems worldwide, leveraging the assets of both regions.

The United States' expertise in advanced agricultural technologies, such as precision farming and digital farm management, can significantly improve productivity in Africa. This can be achieved through AI-powered predictive analytics, drone technology, and smart irrigation systems, enhancing water conservation and crop development. Another area in which Africa can gain is agricultural mechanization (Said Mohamed et al., 2021). Owing to this, it can be recommended that low-cost, solar-powered machinery and automated irrigation systems can reduce labour intensity and address labour shortages. The United States agricultural knowledge-sharing ecosystem can be used to improve training programs, digital extension services, and agribusiness incubators.

➢ *Lessons*

The United States can learn from Africa's innovative, low-cost, and climate-resilient agricultural practices, which emphasize smallholder farming, diverse cropping patterns, and sustainable agriculture, to improve sustainability in its current farming systems amid climate change concerns.

Africa's agroecological methods, such as intercropping, crop rotation, and drought-resistant crops, offer sustainable alternatives to chemical-intensive farming. These practices can help the United States transition towards regenerative agriculture, improving soil health, reducing synthetic inputs, and increasing farm biodiversity.

Furthermore, Africa's cooperative farming model, involving shared mechanization services and local seed banking, can serve as a model for the United States smallholder agricultural sector, addressing financial vulnerability in rural American farmers due to corporate consolidation and rising input costs.

V. CONCLUSION

The digital divide in agriculture creates both obstacles and opportunities for global food systems, with the United States and Africa providing separate but complementary experiences in smart farming adoption. While the United States has achieved tremendous advances in precision agriculture, AI-powered farm management, and large-scale mechanization, Africa has created resource-efficient, climate-resilient, and community-based agricultural innovations. By examining the parallels and differences in their approaches, this review has highlighted the achievements, challenges, and lessons that may be shared across the two regions.

One crucial outcome is that both regions recognize digital agriculture's transformative potential, but confront distinct challenges to widespread implementation. In the United States, hurdles include the expensive cost of advanced technology, concerns about data privacy, and the influence of corporate farming on smallholders, whereas in Africa, limited access to digital infrastructure, budgetary constraints, and a lack of technical experience impede growth. Despite their differences, both regions have common aims, such as increasing production, strengthening climate resilience, and maintaining food security, making cross-regional collaboration extremely valuable. In this regard, the potential benefits of knowledge exchange and technology transfer between the United States and Africa are significant. Africa can use the USA's breakthroughs in AI-powered farm analytics, IoT-based precision farming, and agricultural mechanization, while the USA can benefit from Africa's low-cost agri-tech solutions, sustainable farming approaches, and cooperative farming models. By building international collaborations, cooperative research projects, and policy partnerships, both regions may expedite digital agriculture transformation while tackling their particular concerns.

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