المؤتمر الثامن عشر للجمعية العلمية للإرشاد الزراعي
"الخدمة الإرشادية المعاصرة في ضوء التغيرات العالمية والإقليمية"
مركز التنمية المستدامة لموارد مطروح، مركز بحوث الصحراء، محافظة مطروح، مصر
18 – 19 نوفمبر 2024

Egyptian Digital Agricultural Platforms: Are We Heading in the Right Direction?

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Summary

This paper studies the current situation of digital agricultural platforms in Egypt, highlighting the importance of digital transformation in the agricultural sector and the role these platforms play in enhancing agricultural productivity and achieving resource sustainability. The paper emphasizes the significance of these platforms as tools for supporting farmers, connecting them with markets, providing agricultural advisory services, data analysis, and improving resource management effectively.

The paper reviews prominent examples of digital platforms in Egypt, such as the "Vercon Network," which aims to link farmers with research and agricultural extension institutions, the "Hodhod Application," which provides agricultural consultations powered by artificial intelligence, and "Agri Misr," a comprehensive e-marketplace for agricultural products. Additionally, it discusses the challenges facing the adoption of these platforms, including the weak internet infrastructure in rural areas, limited awareness among farmers of the benefits of agricultural technology, and certain socio-economic challenges. These issues underscore the urgent need to improve infrastructure, offer financial incentives, and strengthen collaboration between the public and private sectors.

The findings conclude that the success of digital agricultural platforms in Egypt depends on their alignment with sustainable development standards, such as improving agricultural productivity, reducing rural poverty, and enhancing food security, with an emphasis on providing innovative and eco-friendly agricultural solutions. The paper recommends the development of government policies that support digital innovation in agriculture and the removal of technical and social barriers to achieve the desired objectives, recognizing these platforms as promising tools for achieving sustainable agricultural development in Egypt.

Introduction:

The agricultural digital revolution has led to the development of various information and communication technologies with diverse applications throughout the agricultural supply chain, supporting the resilience and sustainability of all its elements. These applications include cloud computing tools, big data analytics, artificial intelligence, machine Learning,

digital communication technologies, digital platforms such as e-commerce and agricultural advisory applications, and precision agriculture technologies like sensors and agricultural robots, in addition to advanced imaging technologies such as satellite images and drones (**Hashem et al., 2021**). In recent decades, the global agricultural sector has witnessed a significant shift towards digitization, where digital technologies have become key tools in enhancing productivity, improving resource efficiency, and achieving agricultural sustainability. Agricultural platforms that integrate internet technology with farming have evolved significantly over the past few years (**Zhou & Hua, 2022**). In this context, Egypt has begun adopting digital agricultural platforms as part of its strategies to develop the agricultural sector, a vital economic pillar and essential foundation for achieving food security.

Digital agricultural platforms provide a range of advanced solutions, with agricultural extension services being a key component. These platforms contribute by offering farmers accurate and reliable information and advice on best agricultural practices, helping to improve productivity and resource sustainability. In addition to extension services, these platforms offer integrated solutions for supply chain management, agricultural data analysis, and irrigation system optimization, enabling farmers to access markets and technical information more effectively. However, the question remains: **Is Egypt on the right path regarding the adoption of these platforms? And can these technologies achieve the desired long-term goals?**

This paper aims to review and assess the current state of digital agricultural platforms in Egypt and evaluate their success in meeting farmers' needs and achieving sustainable development. It also discusses the challenges facing this digital transformation and the necessary actions to ensure a positive impact through several key areas:

First: Digital Platforms and Their Role in Agricultural Development

Definition of Digital Agricultural Platforms

Digital agricultural platforms are online platforms that utilize modern technologies to connect farmers with a wide range of resources and services, such as technical information, agricultural management solutions, market access, and advanced irrigation methods. These platforms rely on the internet and mobile applications to provide the data and knowledge needed to improve agricultural productivity, reduce waste, and increase resource use efficiency. They also facilitate the exchange of information between farmers and agricultural experts, offering services such as remote agricultural consultations and e-commerce for buying and selling agricultural products (**Miao et al., 2024**).

Services of Digital Agricultural Platforms:

Digital agricultural platforms offer a variety of services, including:

1. Provision of Agricultural Data and Information: Platforms provide data on weather, soil, and water conditions, helping farmers make informed decisions about crops and optimal planting times.

2. Technical Extension and Consultation: These platforms offer agricultural technical advice from specialists on best practices to increase productivity and reduce waste.

3. Supply Chain Management: Platforms facilitate the connection between farmers and markets or buyers, making it easier to market crops and access new markets.

4. Financial and Insurance Services: Some platforms provide financial services such as agricultural loans and crop insurance, enabling farmers to improve productivity while minimizing risks.

5. Training and Education: Digital platforms offer online training content on modern farming techniques, production technology, and land and water management.

6. Agricultural Operations Management: Platforms provide tools for farm management, including smart irrigation systems, resource control, and monitoring crop growth and resources.

The Role of Agricultural Platforms in Agricultural Development:

Digital agricultural platforms play a vital role in enhancing agricultural development by improving productivity, empowering farmers, and managing resources efficiently. These platforms provide essential information on best agricultural practices and modern technologies, helping farmers improve crop management and reduce risks associated with farming, such as drought and pests (**Zhang & Bao, 2022**). Additionally, enabling farmers to access markets directly through these platforms reduces reliance on intermediaries, increasing their profits and improving their ability to negotiate prices and monitor market trends (**Gangane et al., 2024**).

Furthermore, technologies like the Internet of Things (IoT) and big data analytics contribute to better management of water, soil, and nutrients, leading to more efficient resource use and reduced waste (**Oliveira-Jr et al., 2020**). These platforms also support data-driven decision-making related to climate, soil quality, and production forecasts, enhancing farmers' decisions on crop planting, irrigation, and harvest timing (**Sheikh & Berényi, 2023**). Moreover, the platforms help minimize environmental impacts by promoting sustainable agricultural practices, such as improved natural resource management and reduced soil and water pollution (**Nabulongo et al., 2023**).

Finally, agricultural platforms facilitate access to financial solutions, such as loans and crop insurance, helping small and medium-scale farmers manage financial risks (Pakkan et al., 2021). Overall, these platforms enhance agricultural development by improving efficiency, promoting transparency, and facilitating access to information and financial resources.

Second: The Role of Government and the Private Sector in Supporting Digital Platforms

1. The Role of Agricultural Policies in Supporting Digital Platforms

Government and agricultural policies play a critical role in either supporting or hindering digital agricultural platforms through various aspects. Supporting these platforms requires investments in developing digital infrastructure in rural areas and providing financial incentives for farmers to acquire the necessary technologies. Supportive legislation and streamlined regulations facilitate the operation of these platforms, while coordination among relevant ministries improves the integration of agricultural and technological policies. Additionally, oversight mechanisms, evaluation processes, and incentive programs are crucial factors for ensuring the platforms' performance and fostering innovation within the sector.

2. Partnerships with the Private Sector and Local and International Cooperatives

Partnerships with the private sector, local cooperatives, and international organizations play a pivotal role in enhancing and improving the performance of agricultural platforms. Through collaborations with the private sector, joint investments with tech companies can be made to develop agricultural platforms, along with the exchange of knowledge and technical expertise to improve the quality of services provided. Local cooperatives work to promote the use of these platforms among farmers through agricultural associations and implement awareness programs aimed at increasing understanding of the benefits these platforms offer.

On the international level, partnerships with foreign organizations and companies bring modern technology and global expertise to improve the technologies being used. Joint projects are implemented to expand the usage of platforms, and research and development are supported through funding for research and cooperation with international research centers, enabling knowledge exchange and access to the latest developments in the agricultural field.

Third: Why Do We Care About Evaluating the Performance of Digital Agricultural Platforms?

Evaluating the performance of digital agricultural platforms is crucial for several reasons, as it determines their ability to achieve national goals in improving agricultural productivity, enhancing food security, and supporting environmental sustainability. The success of these platforms can lead to increased crop productivity, improved social and economic equity among farmers, and reduced environmental impacts through optimal resource use (**Runck et al., 2021**). Conversely, failure of these platforms may result in wasted financial resources and investments in digital transformation, increased technological gaps among farmers, and diminished trust in technology within the agricultural sector. This, in turn, could exacerbate environmental pressures due to poor resource management. Thus, monitoring and evaluating these platforms is a strategic necessity to ensure that desired goals are met and sustainable development is supported in Egypt for the following reasons:

1. Guiding Agricultural Policies: Evaluating the performance of agricultural platforms aids in steering national agricultural policies toward continuous improvement. When the effectiveness of these platforms is assessed based on specific criteria such as productivity, efficiency, and resource provision, governments and agricultural institutions can adjust their investment plans and allocate resources to the most impactful solutions.

2. Improving Farmer Efficiency: Performance evaluation helps determine how well platforms provide the information and data that farmers need to make informed decisions, thereby increasing their efficiency in managing daily agricultural operations.

3. Enhancing Agricultural Productivity: Through performance evaluation, the success of platforms in increasing productivity and improving crop quality can be identified. If these platforms effectively contribute to agricultural output, it signifies enhanced food security and reduced agricultural loss, which is crucial for addressing growing population challenges.

4. Achieving Sustainable Development: Evaluating the performance of agricultural platforms leads to a better understanding of how they impact the sustainability of natural resources. Successful use of these digital tools means better management of water, soil, and other natural resources, minimizing negative environmental impacts and ensuring the continuity of agriculture for future generations.

5. Promoting Financial and Agricultural Inclusion: The performance assessment of these platforms determines their effectiveness in empowering farmers, especially smallholders, to access financing, markets, and financial services such as crop insurance. If platforms operate effectively, they enhance financial inclusion opportunities and help farmers strengthen their market competitiveness.

6. Measuring Impact on Farmers and Rural Communities: Evaluation helps measure the impact of platforms on improving farmers' lives and their income levels, determining whether these platforms achieve the desired social and economic goals.

7. Encouraging Innovation and Digitization: Evaluating the performance of platforms provides deeper insights into the role of technology and innovation in enhancing the agricultural sector. If these platforms succeed in bringing about positive changes, it will encourage further innovation in digital agriculture and the adoption of advanced solutions like artificial intelligence and the Internet of Things.

In summary, evaluating the performance of digital agricultural platforms is vital for several fundamental reasons related to the development of the agricultural sector and the achievement of sustainable development goals. The success or failure of these platforms has far-reaching implications for the economy, society, and the environment.

Fourth: Major Digital Agricultural Platforms in the Arab Republic of Egypt

In recognition of the importance of utilizing information and communication technology (ICT) as a fundamental pillar for advancing the national economy and achieving comprehensive development, the government has supported various sectors with modern ICT tools. Currently, several initiatives and digital platforms have been launched to support the agricultural sector in Egypt, aiming to enhance agricultural productivity and improve communication between farmers and markets. Some of these platforms focus on providing technical services to farmers, such as agricultural consultations, while others facilitate e-commerce between farmers and buyers.

In this context, the Ministry of Agriculture and Land Reclamation, in collaboration with the Food and Agriculture Organization (FAO), has initiated numerous projects aimed at employing ICT to serve research and advisory work in the Arab Republic of Egypt. These efforts are designed to support the agricultural sector and ensure a rapid flow of agricultural information while streamlining decision-making processes. Below is a brief overview of the most important ICT application projects in Egypt.

Major Agricultural Platforms in Egypt

1. Virtual Research and Extension Network (Vercon) (2000-2002)

The Food and Agriculture Organization (FAO) defines the Research and Extension Communication Network as a model that employs internet-based information and communication technology to strengthen linkages among agricultural policy levels, research institutions, and individuals (FAO, 2014).

The Virtual Agricultural Research and Extension Network project in Egypt began in 2000 as the first application of computer-based information and communication technology in the extension field. This initiative was part of the FAO's technical cooperation program, aiming to enhance the advisory services provided to Egyptian farmers, particularly smallholders with limited resources. The network facilitates improved connections and communications between research and extension services and farmers while establishing geographical links among their various locations. It also seeks to aggregate a substantial amount of diverse information and disseminate it rapidly (**Kora & Kassem, 2010**).

The Vercon network was designed and built by the Central Laboratory for Agricultural Expert Systems in collaboration with the Agricultural Extension Research Institute for Rural Development. The network covers a broad audience, with 96 advisory centers from 18 governorates participating as of July 1, 2007. The agriculture directorates in these governorates are linked to 30 specialized research stations for field, horticultural, and livestock production. At the central level, it is connected to the Central Administration for Agricultural Extension, the Central Administration for Research Stations and Trials, the Economic Affairs Sector, and other specialized institutes.

The Vercon initiative started in 2001 in Kafr El-Sheikh Governorate as a pilot site for the network in the villages of Arimon and Khadimiyya. By 2003, the network had expanded to seven additional villages in Kafr El-Sheikh and five villages in Asyut through the advisory centers. By 2006, eight governorates were involved in the network: Asyut, Kafr El-Sheikh, Beheira, Ismailia, Sharqia, Gharbia, Faiyum, and Beni Suef, in addition to the Nubariya region.

Rationale for Establishing the Network: The Vercon network was created to establish and strengthen linkages among human elements and institutional entities involved in agricultural research and extension. Vercon aims to support two-way communication, create links among geographically dispersed parties, disseminate large amounts of information in various forms, and improve the quality of advisory services provided to Egyptian farmers, especially the poor, to enhance agricultural production. The idea for Vercon emerged from collaborative efforts between the Research, Extension, and Training Department (SDR) and the Global Agricultural Information Network (WISENT) affiliated with the FAO.

Funding Sources: The Vercon project began as one of the technical cooperation support projects funded by the FAO, which contributed $236,000 over 18 months (later extended to 24 months from August 2000 to July 2002). The Egyptian government also contributed $69,000. After this period, the network continued operations for an additional 20 months (from August 2002 to March 2004), relying solely on government funding, which totaled $118,000.

Participating Entities: The project involves the FAO, the Central Laboratory for Agricultural Expert Systems, the Economic Affairs Sector, the Agricultural Extension Research Institute for Rural Development, and various research institutes focusing on field crops, horticulture, plant protection, plant diseases, and livestock production. It also includes the Rice Research and Training Center in Sakha, the Institute for Land, Water, and Environment Research, the Central Administration for Agricultural Extension, the Central Administration for Agricultural Research Stations and Trials, and the agriculture directorates (**Kora & Kassem, 2010**).

National Agricultural Research Information Management System in Egypt (2004-2006)

The National Agricultural Research Information Management System (NARIMS) is a comprehensive bilingual (Arabic/English) web-based system. It aims to collect and disseminate information related to research institutes, the researchers working within them, publications produced by researchers, and projects that have been completed or are ongoing, as well as the national agricultural and veterinary research agenda in Egypt. This system was developed for the Agricultural Research Center by the Central Laboratory for Agricultural Expert Systems, utilizing available FAO tools and methodologies in collaboration with its personnel.

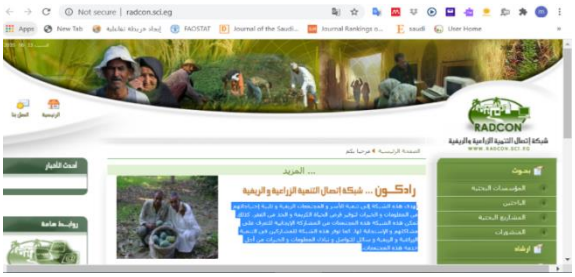
Rationale for Establishing the System: The Agricultural Research Center operates under the Ministry of Agriculture and Land Reclamation, serving as the primary body responsible for generating and transferring technology for Egyptian agriculture. The center manages 18 national agricultural research programs that are multidisciplinary and interlinked across implementation entities. A significant weakness hindering the national agricultural research system has been the lack of proper management of information and communication among researchers across various research sectors, which has impeded the appropriate handling of agricultural development topics.

The overarching goal of the project is to enhance the Agricultural Research Center's capacity to manage information related to agricultural development policies and food security. The specific objectives included developing an integrated agricultural research information management system on the web, featuring modules for research institutes, personnel in the research field, projects, publications, and the five-year research plan, all accessible through the Agricultural Research Center's website. Additionally, it aimed to establish a national center for agricultural research information to provide consultancy and extension on information management topics, serve as a central contact point for network users, maintain the system/database, and train technical staff, decision-makers, researchers, and extension agents in the fundamentals of information technology and the use of NARIMS.

Funding Sources: The NARIMS project was supported from July 2004 to July 2006 as part of a FAO-sponsored support program, with a budget of $217,000 (http://www.arc.sci.eg/).

Agricultural and Rural Development Communication Network (RADCON) (2004-2008)

The RADCON network aims to develop rural households and communities by meeting their information and expertise needs to ensure a decent quality of life and reduce poverty. It empowers these communities to engage positively in identifying and responding to their issues. Additionally, RADCON provides participants in agricultural and rural development with means to communicate and share information and experiences to better serve these communities (http://www.radcon.sci.eg/).



Subsystems of RADCON:

1. Marketing Information System:

This system facilitates the flow of accurate and timely marketing information, supporting small farmers, producers, and exporters with vital data. It helps researchers, experts, and decision-makers in planning and managing effective marketing strategies. The marketing information contributes to market transparency and reduces price volatility. Various stakeholders benefit in distinct ways:

- Farmers/Producers can access information about exporters and their contact details through the directory of subscribers, understand market opportunities for buying (local and international markets), and learn from successful cases of income generation through the success stories list.

- Exporters can find information on farmers and producers through the subscribers' directory, discover marketing opportunities for buying and selling, and understand market requirements to sell at higher prices through the marketing opportunities list. They can also access reports on market prices via the market guide.
- Researchers/Experts/Decision-Makers can monitor trends in external marketing opportunities and requirements for agricultural production through the marketing opportunities list, aiding in formulating sound agricultural policies.

2. Non-Governmental Organizations (NGO) System:

This system supports NGOs in encouraging participation among working groups at the village level and increasing engagement with individuals and groups for development. It includes:

- A directory of NGOs in targeted areas, their objectives, activities, and engagement criteria.
- A directory of loan and grant funding sources and the activities they support.
- Success stories of self-funded projects in villages in collaboration with NGOs.

3. Women's System:

This system aims to assist women in caring for their families and guiding them in enhancing the living standards of impoverished rural households. It increases women's nutritional awareness by providing information on food preparation methods, healthful cooking practices, preservation techniques, and associations for women's participation in activities.

4. Youth Information System:

The Youth Information System helps young people find job opportunities by establishing small projects. It includes:

- Information on small projects, including technical and economic studies, feasibility studies, and suitable projects based on available resources.
- Lending institutions that provide information on funding small projects, including loan amounts and contact information.
- A product exhibition where youth can display products produced through their small projects, along with pricing and contact details for potential buyers.

5. Towards a Clean Environment System:

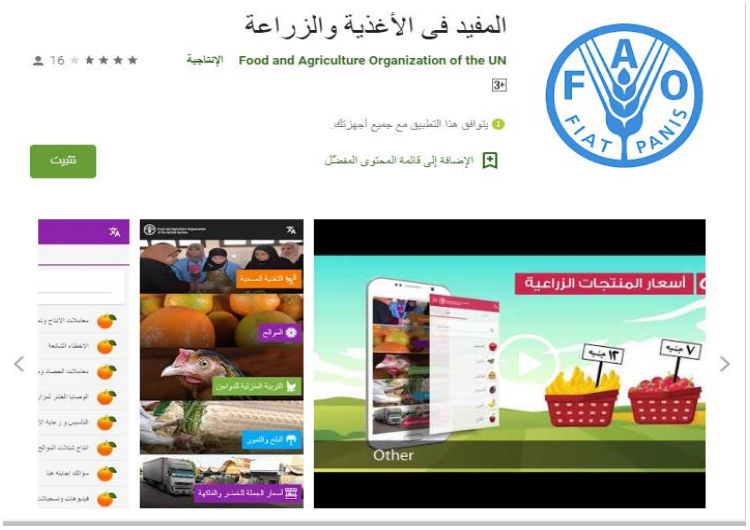
This system assists rural communities in protecting and maintaining their environment, addressing pollution and its associated health risks. It promotes safe agricultural practices, responsible disposal of waste, and a balanced ecosystem.

Sustainability of the Network:

The main financial constraints faced by the network relate to human resources (including participant salaries) and information and communication technology components (internet connection costs, devices, and software).

Digital Agricultural Extension and Communication Services Project (FAO App)

The Digital Agricultural Extension and Communication Services Project (**almofeed**)aims to enhance the effectiveness and accessibility of agricultural extension services in rural Egypt. This need arises from the insufficient number and low efficiency of agricultural extension agents. By utilizing appropriate information and communication technology (ICT) applications and other media, the project seeks to facilitate the flow of information and access to extension services for targeted farmer groups. The FAO has implemented a digital agriculture model in several African countries and has responded to Egypt's interest in digital agricultural extension services by providing a digital model to improve existing services.



[FAO App on Google Play]
(https://play.google.com/store/apps/details?id=com.fao.digitalafrica)

Objectives:
The Ministry of Agriculture and Land Reclamation and the Food and Agriculture Organization (FAO) in Egypt have initiated efforts to develop a digital agricultural extension model to enhance national capacities for information exchange and technology transfer, aiming to boost agricultural productivity. This initiative falls under a national framework agreement signed between the FAO and the Egyptian government for the period from 2018 to 2022. The primary goal is to deliver high-quality digital content for rural extension services by strengthening local institutional and technical capacities.

Key Activities:
- Development of a Mobile Application: The main activity involves creating a mobile app that provides digital extension in various agricultural sectors, including citrus and date production, backyard poultry farming, and healthy nutrition.

Supporting Activities:
- Training of Trainers: Implementing programs to train agricultural extension agents.
- Awareness Seminars: Conducting workshops to educate farmers and rural women on how to use the FAO agricultural extension app.
- Digital Animation Production: Creating animated advertisements to promote the app.
- Social Media Campaign: Running promotional campaigns on social media platforms, particularly focusing on Facebook.

Stakeholders:
The project targets rural women, citrus and date farmers, and all members of Egyptian families.

Despite its promising objectives, the program did not achieve widespread adoption, potentially due to the project's limited duration (March - December 2019) and the lack of guaranteed funding sustainability, a recurring issue in international projects.

Hudhud App (Smart Assistant for Farmers)

The Hudhud app is an intelligent assistant program designed for Egyptian farmers, available on mobile phones. It utilizes artificial intelligence (AI) through chat (text or voice) to establish an interactive communication channel between the Ministry of Agriculture and farmers, as well as among geographically dispersed farmers. The primary goal of the app is to provide digital advisory content on a variety of topics relevant to smallholder farmers, thereby empowering them in their agricultural practices.

The project was implemented in collaboration between the Ministry of Communications and Information Technology and the Ministry of Agriculture to promote digital transformation in the agricultural sector (MCIT, 2021).

Agri Egypt Platform

Agri Egypt is the first integrated digital agricultural platform in Egypt, established by "eMarkets Egypt," a subsidiary of the "eFinance" group for financial and digital investments, in collaboration with the Ministry of Agriculture, the Ministry of Planning, the Central Bank, and the Agricultural Bank.

The primary goal of the Agri Egypt platform is to become the focal point of the agricultural system by serving as a mediator among all stakeholders. It provides a comprehensive electronic marketplace that allows for the display, marketing, and trading of various agricultural products.

Agri Egypt aims to facilitate the processes for producers, farmers, business owners, and manufacturers by offering value-added services, supply, financing, marketing, and education at all levels, utilizing the latest e-commerce practices.

Additionally, the Agri Egypt platform focuses on providing the best products, such as fertilizers and soil conditioners, seeds and seedlings, agricultural pesticides, and high-quality agricultural machinery from leading agricultural input companies. It encompasses various agricultural activities, including crop production, livestock, poultry, aquaculture, and sectors related to supply, trade, packaging, and agricultural manufacturing, within a comprehensive framework of Egypt's first digital agricultural network.

https://agrimisr.com/

Bashaier Platform

The "Bashaier" platform is a digital initiative supported by the Knowledge Economy Foundation, a non-governmental organization aimed at supporting the agricultural community in Egypt. The platform provides integrated services, including agricultural extension, marketing, and technical support. Its mission is to empower farmers by disseminating knowledge about best smart agricultural practices and offering solutions for marketing local and international products, as well as facilitating access to production inputs and agricultural financing.

Additionally, the Bashaier platform enables access to market information and data analysis to support agricultural decision-making, thereby enhancing the value chains for agricultural crops and fish. It operates within the framework of sustainable development strategies and the knowledge economy, with the goal of enabling farmers and entrepreneurs to improve productivity and increase their profits.

The Fundamental Question

After all these efforts, **are the digital agricultural platforms in Egypt heading in the right direction?** To answer this question, we must establish a benchmark against which to measure progress, and we propose that the Sustainable Development Goals (SDGs) serve as this reference point. When we refer to "the right direction" in the context of the SDGs, we are indicating the extent to which certain initiatives and efforts align with the globally agreed-upon goals for sustainable development across environmental, economic, and social dimensions.

In the context of Egyptian digital agricultural platforms, this concerns the extent to which these platforms align with the SDGs established by the United Nations, particularly those related to agriculture, poverty alleviation, and food security. Furthermore, it is essential to

assess how these platforms contribute to the following goals in a tangible and sustainable manner:

1. Increasing Agricultural Productivity (Goal 2: Zero Hunger)
- The right direction here involves enhancing agricultural production sustainably to improve efficiency and resource use. This can be achieved through the advanced agricultural technologies provided by digital platforms. These platforms should contribute to increasing productivity without harming the environment or overexploiting natural resources.

2. Reducing Rural Poverty (Goal 1: No Poverty)
- This includes enhancing the livelihoods of small and medium farmers and creating new economic opportunities by enabling access to markets, improving incomes, and increasing competitiveness. Digital agriculture platforms should help reduce the economic gap among farmers and provide financial and advisory services to support marginalized groups.

3. Improving Food Security (Goal 2: Zero Hunger)
- In this context, the right direction means ensuring sustainable and safe access to food by improving productivity, reducing waste, and enhancing agricultural supply chains. Digital platforms should support the availability and distribution of agricultural products in sufficient quality and quantity to meet the growing needs of the population, particularly in impoverished rural areas.

4. Achieving Environmental Sustainability (Goal 13: Climate Action, Goal 15: Life on Land)
- The right direction here involves adopting sustainable agricultural practices that preserve biodiversity, reduce greenhouse gas emissions, and mitigate environmental degradation. Agricultural platforms should promote effective resource management, such as water, land, and energy, and offer technologies that help address climate change challenges.

5. Improving Access to Technology and Innovation (Goal 9: Industry, Innovation, and Infrastructure)
- The right direction here means facilitating farmers' access to advanced technology and innovation in agricultural processes. Agricultural platforms should contribute to developing farmers' capabilities to use technology effectively to enhance productivity and sustainability.

6. Promoting Partnerships and Collaboration (Goal 17: Partnerships for the Goals)
- Achieving this goal requires strengthening partnerships among governments, the private sector, and agricultural communities to enable farmers to use digital platforms effectively. This collaboration involves exchanging knowledge and experiences, as well as providing financial and technical support to ensure the success of agricultural initiatives.

In the context of the Sustainable Development Goals, we can assert that digital agricultural platforms are in the "right direction" if they contribute to providing innovative and sustainable technological solutions that help improve productivity, eradicate rural poverty, and enhance food security while considering environmental sustainability and effective partnerships. This direction is reflected in improved economic and social conditions for farmers and the provision of high-quality food without negatively impacting the environment.

To achieve the "right direction" concerning the Sustainable Development Goals, Egyptian agricultural platforms need to overcome existing challenges and develop innovative solutions that contribute to increasing agricultural productivity, reducing rural poverty, and improving food security. Continuous evaluation of how successful these platforms are in meeting farmers' needs and providing practical solutions to agricultural problems will be a crucial indicator of their ability to achieve these goals.

Proposed Criteria for Evaluating the Performance of Digital Agricultural Platforms in Egypt

To effectively measure the success of digital agricultural platforms and assess their performance, a set of quantitative and qualitative criteria can be utilized. The following are the key proposed criteria for evaluating the success or failure of agricultural platforms:

1. **Number of Beneficiary Farmers:**
   - Definition: Refers to the total number of farmers who regularly use the platform and benefit from its services.
   - Indicator of Success: An increase in the number of farmers joining the platform reflects its appeal and usefulness, indicating widespread adoption and impact within the agricultural community.
   - How to Measure: Measured through statistics related to platform registration, usage frequency, and the number of active farmers.

2. **Increase in Agricultural Productivity:**
   - Definition: Indicates the platform's ability to improve crop productivity in terms of quantity or quality due to the information and services provided.
   - Indicator of Success: If the platform contributes to increased productivity for farmers, it achieves one of its key objectives of improving agricultural efficiency, thereby enhancing food security.
   - How to Measure: By comparing productivity before and after using the platform, through farmer surveys, or crop production data, estimating the efficiency gained from techniques like irrigation management or pest control.

3. **Level of Interaction between Farmers and the Platform:**
   - Definition: Measures the extent of farmers' engagement with the tools and features provided by the platform, such as participation in training activities, using digital markets, or obtaining technical advice.
   - Indicator of Success: High interaction indicates that the platform not only provides information but actively engages farmers in learning, development, and improving farming practices.
   - How to Measure: Measured through platform usage analytics, such as login rates, number of technical inquiries, and the use of support tools and data provided by the platform.

4. **Improved Market Access:**

- Definition: Refers to the platform's ability to connect farmers with markets, whether local or global, facilitating buying and selling through digital interfaces.
- Indicator of Success: If the platform facilitates farmers' access to new markets or improves the pricing of their agricultural products, it achieves the goal of reducing reliance on intermediaries and increasing profitability.
- How to Measure: Measured by tracking the number of trade transactions occurring through the platform and the value of products sold or purchased.

5. Effective Agricultural Resource Management:

- Definition: Measures the platform's ability to improve the use of agricultural resources such as water and fertilizers by providing tailored recommendations or analytical tools based on data.
- Indicator of Success: Improved resource management indicates reduced waste and increased production efficiency, a strong indicator of the platform's success in achieving environmental sustainability.
- How to Measure: Measured by comparing resource consumption before and after using the platform, such as reduced water or fertilizer usage without affecting productivity.

6. Effectiveness of Services Provided:

- Definition: Measures the diversity and quality of services offered by the platform to support farmers in managing their agricultural businesses efficiently.
- Indicator of Success: If the platform can provide comprehensive services such as agricultural consultations, soil analysis tools, and weather forecasting services with high quality and accurate information, this reflects its ability to meet farmers' needs integratively and enhance their trust.
- How to Measure: Measured by the number of services available, their usage by farmers, and reviews regarding the accuracy and timeliness of the information provided.

7. Farmer Satisfaction:

- Definition: Reflects the level of satisfaction of the end users (farmers) with the services offered by the platform, such as technical support, ease of use, and availability of useful information.
- Indicator of Success: Farmer satisfaction is a key indicator of the platform's success on both personal and operational levels, as user satisfaction indicates that the platform meets their needs and provides added value.
- How to Measure: Measured through surveys and feedback from farmers, as well as reviewing comments and observations related to user experience and benefit from the platform.

8. Innovation and Continuous Development:

- Definition: Refers to the platform's ability to offer new tools and services based on innovation and modern technology, such as artificial intelligence techniques or the use of big data to improve agriculture.
- Indicator of Success: If the platform can adapt to challenges and provide innovative solutions over time, this is evidence of its sustainability and ability to evolve with farmers' needs.

- How to Measure: Measured through analysis of updates made by the platform and the number of new tools or services introduced.

9. Empowerment of Small Farmers:

- Definition: Measures the platform's success in providing solutions for small farmers who often lack the technical or financial resources to benefit from digital agriculture.
- Indicator of Success: If the platform empowers small farmers by providing fair and appropriate opportunities to develop their agricultural businesses, this reflects its success in achieving social and agricultural justice.
- How to Measure: Measured by the number of small farmers benefiting from the platform's services and the extent of improvements in their productivity or market access.

10. Environmental Sustainability:

- Definition: Measures the platform's ability to support sustainable agricultural practices, such as reducing pollution and using environmentally friendly technologies.
- Indicator of Success: If the platform helps to reduce the environmental impact of agriculture and improve resource sustainability, this is a strong indicator of its success in achieving environmental goals.
- How to Measure: Measured by comparing the consumption of environmental resources (such as water and energy) and the impact of agricultural practices on the environment before and after using the platform.

From the above, it is clear that agricultural platforms' success can be measured through a combination of quantitative and qualitative criteria that reflect farmers' benefits and the achievement of sustainable development. Measuring the number of beneficiary farmers, improving productivity, and the level of interaction with the platform, in addition to enhancing market access and effectively managing resources, are critical indicators of the platforms' success in achieving their goals. These criteria can be relied upon, developed, and expanded to enhance the evaluation process.

The Main Challenges Facing Platforms in Achieving Agricultural Development Goals

Many digital agricultural platforms face various challenges that hinder their success in reaching farmers and providing benefits. These challenges arise from several factors, including technological, economic, social, and governmental issues.

1. Technological Factors:

- Weak Internet Infrastructure in Rural Areas:
- One of the biggest technological challenges facing agricultural platforms is the lack or weakness of communication and internet infrastructure in rural areas. In many cases, these areas suffer from inadequate broadband internet services or poor communication networks, making it difficult for farmers to use digital platforms or their applications.
- Result: Inability to access vital agricultural information and consultations provided by the platforms.

- Lack of Technological Awareness and Training:

- Some farmers lack the necessary technological skills to use the platforms, as they may have limited experience with smart devices or internet applications. This leads to an inability to comprehend the benefits of these platforms or fully exploit their potential.
- Result: Farmers do not adopt agricultural technology due to a lack of training or technical support.
- Mismatch Between Services Offered and Farmers' Needs:
- The services provided may not align with the actual needs of farmers if the platforms do not rely on thorough studies of local farmers' needs. For example, a platform might offer information or services that do not correspond to the types of crops or agricultural challenges faced by farmers in specific areas.

2. Economic Factors:

- Cost of Technological Devices:
- Accessing agricultural platforms often requires the use of smartphones or computers, which can be expensive for many farmers, especially smallholders who may face financial challenges preventing them from investing in these technologies.
- Result: Farmers' inability to purchase the necessary technological devices for using platforms, thus remaining outside the digital transformation framework.
- Weak Internet Connectivity Affordability:
- Even if internet services are available in some rural areas, farmers may be unable to afford regular connectivity costs. Data prices or internet packages in some countries may be high compared to farmers' income.
- Result: Weak usage of platforms due to the high cost of internet connectivity.
- Lack of Financial Incentives:
- Farmers may not see the direct economic benefit of using agricultural platforms in the short term, leading to a lack of motivation to invest in these digital tools, especially if there are no direct financial incentives to encourage technology adoption.
- Result: Absence of economic motivation to adopt digital platforms.

3. Social Factors:

- Cultural and Traditional Attitudes:
- In some rural communities, traditional or cultural attitudes towards technology may cause farmers to hesitate in adopting digital solutions. There may be a preference for relying on traditional methods or fear of change.
- Result: Refusal or reluctance to adopt technology due to the belief that digital agriculture is unnecessary or complicated.
- Generational Gap:
- The generational gap is often an important factor, with older individuals hesitating to learn new technologies and relying more on traditional experience, while younger individuals tend to adopt technology more quickly.
- Result: Significant differences in technology adoption between generations, affecting the overall success of agricultural platforms in the community.
- Technological Illiteracy:
- In rural areas, a significant percentage of farmers may be uneducated or have a low level of education, making it an additional challenge to understand and use technology.
- Result: Difficulty in using platforms due to technological illiteracy.
- Lack of Awareness of Technological Benefits:

- There may be a lack of awareness among farmers about how to use agricultural platforms and their benefits. Without awareness campaigns and clear guidance, farmers may not seek to use these platforms, believing they are unnecessary or complicated.

4. Content-Related Factors:

- Mismatch Between Services Offered and Farmers' Needs:

- Providing inappropriate services: Some agricultural platforms may offer services or information that do not align with farmers' actual needs. For instance, they may focus on advanced technical information when farmers need practical daily support regarding basic farming practices or local conditions.

- Limited ecosystem and solution competing each other: Each platform will try to compete with other to attract more users. There is a fragmentation of the ecosystem with usually no interoperability between platforms and, most importantly, no sharing of data between platforms.

- Lack of Flexibility:If platforms do not provide flexible solutions that cater to varying farmers' needs based on agricultural regions, climate, and crop types, they may fail to deliver real value.

5. Governmental Factors:

- Absence of Clear National Plans:

- The lack of comprehensive national plans for digital transformation in the agricultural sector can lead to scattered efforts and a lack of coordination among stakeholders, hindering the success of platforms in effectively reaching farmers.

- Insufficient Government Support:

- In some cases, governments may be unable to provide adequate support for developing digital infrastructure in rural areas. This may include a lack of investment in internet networks or weak legislation to encourage digital innovation in the agricultural sector.

- Result: Farmers remain in a digital isolation due to the lack of government support for agricultural platforms or weak funding directed towards digital development in the agricultural sector.

- Absence of Appropriate Legislation:

- Some legislation may hinder the development of digital platforms, such as regulations that impose restrictions on electronic transactions or lack legal protections for farmers relying on e-commerce to sell their crops.

- Result: Disruption of agricultural platform operations or failure to fully benefit from e-commerce due to an unencouraging legislative environment.

- Lack of Government Awareness Initiatives:

- In some cases, there may be a gap between what governments propose in initiatives and what farmers receive. The absence of awareness campaigns and training programs targeting farmers may lead to a lack of knowledge about the existence of platforms or how to benefit from them.

- Result: Weak dissemination of agricultural platforms due to a lack of effective communication between the government and farmers.

- Lack of Integration Between Platforms and Government Entities:

- This includes a lack of coordination between agricultural platforms and government entities involved in agriculture, whether regarding data sharing or supporting farmers in

adopting these technologies. The lack of integration leads to disruptions or weak utilization of these platforms, and governmental policies may not align with the digital services offered.

- Absence of Performance Evaluation Mechanisms:

- This pertains to the lack of effective mechanisms by governments or the platforms themselves to assess and continuously improve platform performance. The absence of ongoing evaluation leads to the platforms failing to meet farmers' needs or improve services based on feedback and experiences.

6- Lack of Focus on the End User in the Design of Digital Agricultural Platforms

One of the key challenges facing digital agricultural platforms in achieving agricultural development goals is the insufficient focus on designing services according to the needs and capacities of the end users, particularly farmers. These platforms are often developed without adequate involvement of the end users in the design process, which leads to low adoption rates or ineffective use of the services provided.

Proposal: Adopting a User-Centered Design Approach

To ensure that Egypt's digital agricultural platforms are moving in the right direction and achieving agricultural development goals, it is essential to adopt a user-centered design (UCD) approach, which emphasizes involving the end users (farmers) in all stages of platform design and development. Below is an expansion of the solutions that contribute to improving the effectiveness of digital agricultural platforms:

Testing the mAgri Service Idea Using Low-Fidelity Prototypes:

- **Purpose**: The goal of using low-fidelity prototypes is to understand the farmers' needs and interact directly with them to identify the most important features and services.

- **Application**: By presenting prototypes, farmers can explore the interface and experience the platform's key features, allowing the collection of valuable, real-time feedback on design and usability. Based on this information, the platform can be adjusted and developed to better meet the actual expectations and needs of users.

Ecosystem Mapping:

- **Purpose**: Ecosystem mapping helps analyze all the stakeholders in the integrated ecosystem, including farmers, distributors, partners, and government entities.

- **Application**: By analyzing these factors, it becomes possible to identify how all stakeholders interact with the platform and develop strategies to enhance the distribution of agricultural information and services. This could include forming strategic partnerships with private companies and government institutions to ensure wider adoption of digital services.

User Validation Plan:

- **Purpose**: Ensuring that the platform delivers real value to farmers through direct engagement and understanding of their experiences and challenges.

- **Application**: This plan involves conducting in-depth interviews with farmers to gather insights into their needs and the challenges they face in using the platform. Additionally, studying the customer journey allows for an understanding of the steps users take from their

initial interaction with the platform to full engagement. This can lead to modifications of the platform's interface and services to ensure a seamless user experience.

Content Planning and Agent Training:

- **Purpose**: To provide relevant and engaging content for farmers and increase their ability to use the platform effectively through trained agents.

- **Application**: Content planning involves preparing important agricultural information in a way that is easy to understand and addresses farmers' daily challenges. Additionally, platform agents are trained to provide technical and service support to farmers on how to use the platform and maximize its benefits. This continuous interaction between the platform and farmers will enhance the platform's effectiveness.

Go-to-Market Strategy:

- **Purpose**: To ensure wider adoption of the platform through the development of an effective market entry strategy.

- **Application**: Based on the feedback gathered from direct user interaction, a comprehensive strategy is developed, which includes identifying the target audience, marketing tools, and methods for disseminating the platform. The most suitable channels for reaching farmers, such as agricultural associations, local radio stations, and agricultural broadcasts, will be identified, thereby facilitating wider adoption of the platform and achieving the desired objectives.

From the above we can say thatadopting a user-centered design approach provides farmers with tools and services that match their daily needs and enhance their ability to engage with digital agricultural platforms. This approach is not only a step toward improving user experience but also a means of increasing the chances of success in achieving sustainable agricultural development.

Key Factors for the Success of Digital Platforms

In addition to the aforementioned challenges, three critical factors contribute to the success of any digital platform, and the absence of any one of these represents a significant challenge:

Sustainability: The current reality of the aforementioned experiences indicates that the impact of projects based on information and communication technology has fallen short of expectations, as is often the case with most projects that do not take into account the achievement of financial sustainability. In the absence of a sustainable financial recovery mechanism, activities cannot be continued after the project's funding ends, leaving the project and its achievements as mere memories for those involved and the beneficiaries. Therefore, any developmental project must strive for sustainability by providing the necessary material and human resources to continue activities after official funding ceases. Additionally, there should be a serious effort in planning these projects to offer a successful business model where the service costs are covered through revenues, whether from user payments, third-

party fees (such as advertising), or contributions from the private sector and civil society organizations. Reliance on government support should not be emphasized in this regard.

Interactivity: The second factor contributing to the discontinuation of previous projects is the lack of interaction between the service provider and the target audience. Despite the efforts invested in these projects, they predominantly offer a readable service to a community where illiteracy is prevalent, preventing beneficiaries from directly communicating with experts or specialists. This has created a barrier that hinders effective guidance.

Promotion: Despite the substantial budgets allocated for previous projects, they have not reached the target audience of beneficiaries or a significant number of researchers or agricultural advisors. Therefore, any future project in this field must prioritize funding for advertising campaigns across various platforms to promote the project, ensuring it reaches the largest number of beneficiaries in the shortest time possible.

It can be concluded from the above thatthe failure of some agricultural platforms to reach farmers can be attributed to a complex interplay of factors, including technological challenges such as weak internet infrastructure, economic barriers preventing farmers from affording technology, social factors related to cultural attitudes and technological illiteracy, and finally, governmental shortcomings in providing adequate support or appropriate legislation. Addressing these challenges requires comprehensive cooperation between the public and private sectors to develop suitable infrastructure, increase awareness, and provide financial solutions that encourage farmers to adopt these platforms.

Suggestions and Recommendation:

To enhance the effectiveness of Egyptian agricultural platforms and ensure the achievement of agricultural development goals, a set of practical proposals and solutions addressing existing issues must be implemented. Below are some proposed solutions for each of the main challenges:

1. **Improving Technological Infrastructure:**
   - Expanding Internet Coverage in Rural Areas: The government, in collaboration with telecommunications companies, can extend internet coverage in rural areas by investing in wireless technologies such as satellite internet or 4G and 5G networks.
   - Government or International Funding for Infrastructure Projects: Securing funding for projects aimed at improving digital infrastructure in rural areas, in partnership with international funding institutions, could help reduce the technological gap.
   - Reducing Internet Costs: Providing financial support or discounts on internet prices for rural farmers could improve their access to digital agricultural platforms.
2. **Providing Incentives for Farmers:**
   - Financial Incentives: Grants or tax reductions can be offered to farmers who effectively utilize digital platforms. Additionally, interest-free loans or low-interest loans can enable them to purchase technological devices.
   - Awards and Recognition: Organizing competitions and recognition programs for farmers who benefit the most from agricultural platforms and encourage innovation in digital agriculture can serve as a strong motivator for technology adoption.

- Offering Free or Discounted Services: Providing free trial periods for platform usage or discounts on subscription prices may encourage farmers to try out these platforms and discover their benefits.

3. Developing Training Programs:

- Comprehensive Training Programs: Establishing regular training programs for farmers focused on how to use agricultural platforms, with educational content that is simple and suitable for various educational levels. Training can be delivered through in-person workshops or online courses.
- Collaboration with Universities and Research Centers: Partnering with agricultural universities and colleges to develop educational materials tailored to farmers and hosting awareness training programs on the importance of agricultural technology and the use of digital platforms.

4. Enhancing Cooperation Between the Public and Private Sectors:

- Strategic Partnerships: Encouraging partnerships between the government and private companies operating in the agricultural technology sector. For instance, companies can provide advanced technologies to the government to support platform development, while the government can facilitate farmers' access through awareness campaigns.
- Engaging the Private Sector in Platform Funding: Inviting private companies to invest in improving technological infrastructure and developing training programs while ensuring they receive economic incentives from the government in return for their support of digital agricultural development.
- Joint Initiatives to Support Innovation: Organizing competitions or incubator programs for startups that provide innovative technological solutions for farmers, supported by government assistance and funding from private companies.

5. Promoting Interoperability and Cooperation Between Platforms:

- Promoting interoperability: Platforms can use well defined, standardized data format and data management protocols in order to increase interoperability level. Open specifications can also provide possibility to develop software connectors to further increase the interoperability level.
- Sharing, exchange and integration of third-party data in platforms: Platforms can provide open Application Programming Interface (API) with well identified end-point enabling the integration of data from other platforms, thus increasing the size of the ecosystem, moving from a competion model to a cooperation model.

6. Developing Continuous Evaluation Mechanisms:

- Performance Evaluation Based on Data: Establishing a system for collecting and analyzing data from agricultural platforms to continuously evaluate performance. This system could include analyzing platform usage rates, farmer satisfaction, and agricultural productivity increases.
- Involving Farmers in the Evaluation Process: Regularly collecting feedback from farmers using the platforms to assess their effectiveness. Based on their observations, continuous improvements can be made to the design and services.

- Developing Performance Measurement Indicators: Establishing key performance indicators (KPIs) to measure the impact of agricultural platforms on productivity and agricultural development. These indicators might include increases in agricultural productivity, improvements in crop quality, and the expansion of the user base among farmers.

Conclusion: Enhancing the effectiveness of agricultural platforms in Egypt requires improving technological infrastructure, providing incentives for farmers, developing comprehensive training programs, and strengthening cooperation between the government and private companies. Additionally, establishing a continuous evaluation system based on data and feedback from farmers is essential to ensure ongoing improvements and the development of platforms that meet their needs.

Future Vision: The future prospects for agricultural platforms in Egypt indicate significant potential for achieving agricultural development if the aforementioned challenges are overcome and the proposed solutions are implemented. With ongoing improvements to digital infrastructure, appropriate incentives, and intensified awareness and training campaigns, these platforms can become effective tools for improving agricultural productivity, enhancing marketing efficiency, and providing timely, accurate information to farmers. To achieve agricultural development goals, stakeholders must adopt a long-term strategic vision based on modern technology and integration across various sectors. Agricultural platforms can play a crucial role in building a more competitive and sustainable agricultural sector if adequately supported.

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المنصات الرقمية الزراعية المصرية: هل نسير فى الاتجاه الصحيح؟

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ملخص

تناولت هذه الورقة البحثية واقع المنصات الرقمية الزراعية في مصر، وأهمية التحول الرقمي في القطاع الزراعي، وكذلك دور هذه المنصات في تعزيز الإنتاجية الزراعية وتحقيق استدامة الموارد. وركزت الورقة البحثية على أهمية هذه المنصات كوسيلة لدعم المزارعين وربطهم بالأسواق، وتقديم خدمات الإرشاد الزراعي، وتحليل البيانات، وتحسين إدارة الموارد الزراعية بشكل فعّال.

استعرضت الورقة بعض النماذج من المنصات الرقمية الرائدة في مصر مثل "شبكة الفيركون" التي تهدف إلى الربط بين المزارعين ومؤسسات البحث والإرشاد الزراعي، و"تطبيق هدهد" الذي يوفر استشارات زراعية مدعومة بتقنيات الذكاء الاصطناعي، بالإضافة إلى منصة "أجرى مصر" والتي تسهم في تقديم سوق إلكتروني متكامل للمنتجات الزراعية.

كما ناقشت الورقة التحديات التي تواجه تبني هذه المنصات، والتي تشمل ضعف البنية التحتية للإنترنت في المناطق الريفية، وقلة وعي المزارعين بفوائد التكنولوجيا الزراعية، إلى جانب بعض التحديات الاجتماعية والاقتصادية، مما يجعل الحاجة ملحة لتحسين البنية التحتية وتقديم حوافز مالية وتعزيز التعاون بين القطاعين العام والخاص.

وأخيرا فقد خلصت النتائج إلى أن نجاح المنصات الزراعية الرقمية في مصر يعتمد على مدى توافقها مع معايير التنمية المستدامة، مثل تحسين الإنتاجية الزراعية، الحد من الفقر الريفي، وتعزيز الأمن الغذائي، مع التركيز على تقديم حلول زراعية مبتكرة وصديقة للبيئة. وأوصت الورقة البحثية بضرورة تطوير سياسات حكومية داعمة للابتكار الرقمي في الزراعة، وتذليل العقبات التقنية والاجتماعية للوصول إلى الأهداف المرجوة، معتبرةً أن هذه المنصات تمثل أداة واعدة لتحقيق التنمية الزراعية المستدامة في مصر.