

## Application of digital Agricultural Tools in Indonesia: From Creativity towards Rural Community Innovation

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### Abstract

*After understanding the research questions, we directed the search for data electronically to writing a collection of journal publications, books, and websites. We cannot conclude reports of untested, substantiated review findings on the use of innovations in agriculture without first attempting to analyze the various kinds of literature that incorporate, among other things, coding frameworks, in-depth assessments, and concluding. We carried out this study with a phenomenological approach, which is a methodology that seeks to obtain the most extensive data and then for us to study and gain understanding and become valid and convincing findings. The reason is that this review uses discretionary data from various sources. Subjective data whose sources of information we take from various data published between 2010 and 2021. We use the Google Search application to search for information using keywords such as digital applications, modern horticulture, innovation, and progress in compiling agribusiness. Based on these data, we can report that the use of trend-setting innovation applications in the agricultural sector is a consequence of innovations from both public authorities and the regions themselves, thus giving birth to new advances where agribusiness currently cannot be separated from electronics. This is an innovation that makes efficient use of services in the office.*

### Keywords

digital application; agribusiness; innovation; progress; rural agriculture



## I. Introduction

The corona pandemic (Covid-19) has proven to increase the use of digital technology for various activities by the people of Indonesia. However, this is not the case in the agricultural sector (Purwanto et al., 2020). In fact, in the National Labor Force Survey conducted by the Central Statistics Agency, 20.62% of Indonesian youth worked in the agricultural sector in August 2020, up from 18.43%. In the previous period (Demombynes & Testaverde, 2018). An increase of youth in the agricultural sector during this pandemic can expand it. As many as 85.62% of them are internet users and have the opportunity to become early adopters of digital technology in the agricultural sector. *Digital agricultural technology* can be defined as applying information and communication technology through devices, networks, services, and applications. The purpose of its use is to assist agricultural sector actors in making decisions and utilizing resources (Goldfrank, 2020).

According to reports from MercyCorps and Rabobank, there are 55 agricultural digital technologies in Indonesia (Makini et al., 2020). On average, digital technology is still in its early stages. MercyCorps and Rabobank report also states that 60% of agricultural digital technologies target digital information such as market information or

prices. Another 40% focus on market access, and almost a third target the supply chain and data management area (Kim et al., 2020). The rest goes to financial services and precision agriculture, such as satellites, sensors, and agricultural mechanization. Agricultural digital technology has also emerged from public and private partnership schemes. Through the Indonesia-Japan Horticulture Public-Private Partnership Project, smallholders can connect to loan programs through blockchain technology. Blockchain allows farmer data to be stored digitally. The use of digital agricultural technology can provide positive changes for farmers (Nutrition, 2018).

Dwivedi et al. (2009) estimate that the use of modern technology in the agricultural sector can increase economic output by up to US\$ 6.6 billion per year. The presence of digital agricultural technology such as TaniHub that connects farmers directly to consumers can shorten supply chains. Farmers can also reduce their dependence on intermediaries. So far, farmers mainly sell agricultural products in large quantities to intermediaries. This causes farmers not to have strong bargaining power to determine producer prices (Suhaimie et al., 2015). In addition, farmers also have access to accurate and transparent information on commodity prices in the market. A strong understanding of the dynamics of agricultural commodity prices can help farmers determine selling prices at the producer level in a more measurable manner. Agricultural digital technology that focuses on financial services opens up more access to suitable funding sources. Currently, small farmers have enjoyed the People's Business Credit (KUR) as funding for agricultural activities. However, the low maximum loan amount means that farmers cannot rely on KUR for agricultural activities that require significant investments, such as aquaculture (Purwatiningsih, 2015).

Digital financial services specifically for agriculture can be a solution for this. In addition, agricultural productivity is also one of the potential benefits of digital agricultural technology (Deichmann et al., 2016). The presence of digital technology can increase farmers' technical knowledge; enable the calculation of the use of fertilizers, seeds, or other agricultural inputs more efficiently; and improve farmer decision-making through information on weather, crop management, market conditions, or livestock data (Capalbo et al., 2017). Unfortunately, only a handful of farmers can enjoy these benefits. Most digital agricultural technologies have fewer than 10,000 users. This means that millions of farmers still do not have access to digital agricultural technology. Many fundamental challenges prevent farmers from using the latest digital agricultural technology.

### **Challenges and Solutions**

The first fundamental challenge is that the government has not prioritized the adoption of digital technology in the agricultural sector (Subaru et al., 2015). This can be seen from the Strategic Plan of the Ministry of Agriculture 2020-2024, which has not explicitly outlined a strategy for digital technology adoption (Sipangkar & Sihaloho, 2020). As a result, government support for these programs is still limited and uneven. The Ministry of Agriculture and other relevant ministries need to immediately draw up a national project to introduce digital agricultural technology to overcome this. The Ministry of Agriculture has collaborated with Bank BTPN in the farmer and MSME loan program. The Ministry of Agriculture can expand the scope of cooperation with the private sector for penetration in other areas (Tambunan, 2015).

Second, the low digital literacy of farmers. Most Indonesian farmers are elementary school graduates with an average age of more than 45 years (Medhi-Thies et al., 2015). This situation makes it difficult for farmers to adapt to new technologies. However, the increasing number of youth in the agricultural sector hopes to increase digital literacy

among farmers. This can be integrated into agricultural extension programs. The role of agricultural extension by the private sector also needs to be increased, considering that agricultural extension workers from the government are often unable to reach (Benson & Jafry, 2013). The adoption of digital technology in agriculture can also be done by increasing investment in the agricultural sector. Domestic and foreign investment can enable technology transfer and human resource training.

However, digital infrastructure in Indonesia is still weak and uneven. A report from Speedtest states that internet speed in Indonesia is ranked 121 out of 139 countries (Priyadharma, 2022). This will certainly be a barrier for farmers, especially those who live in remote areas, to take advantage of digital agricultural technology. Improvement of digital infrastructure can be made by ensuring that regulations regarding telecommunications are stable and predictable.

The outbreak of this virus has an impact of a nation and Globally (Ningrum *et al*, 2020). The presence of Covid-19 as a pandemic certainly has an economic, social and psychological impact on society (Saleh and Mujahiddin, 2020). Covid 19 pandemic caused all efforts not to be as maximal as expected (Sihombing and Nasib, 2020).

The government also needs to provide incentives to the private sector so that they are willing to build digital infrastructure in remote areas (Greenstein, 2019). The government can provide subsidies or tax breaks for willing private parties. The government needs to continue encouraging digital agricultural technology with the private sector. Because the agricultural sector has proven to be the focus during the corona pandemic, including for young people, digital technology innovation in the agricultural sector should be supported to improve the quality of the Indonesian agricultural sector (Rokhmana, 2015).

## II. Research Method

This method and material section will explain how our study is carried out, from the formulation of study problems to reporting results (Sarcheshmeh *et al.*, 2018). For the first time, we describe this study to get a map of Yemen, understanding digital agricultural applications in Indonesia from creativity to agricultural innovation. After understanding the next question, we conducted an electronic search for data in the literature database of book publications and websites (Ozdogan *et al.*, 2017). We will not be able to conclude the story of the study findings as evidenced by scientific studies on the application of technology in agriculture without first trying to examine the various literature which, among other things, involve in-depth evaluation coding systems and concluding (Zewge & Dittrich, 2017). We carried out this study using a phenomenological approach, which is an approach that tries to obtain the broadest possible information and then for us to study and gain understanding and become valid findings (Niknejad *et al.*, 2021). Because this study uses secondary data from various sources, we have reported it in a qualitative data study design whose data sources we took from several publications between 2010 and 2021. In searching the data, we used the Google Search application on Google scholar. Such as digital applications, agriculture in digital, creativity, and innovation in typing agriculture (Bing, 2016, October).

### III. Results and Discussion

#### 3.1 Digital Technological Innovation in Agriculture

Urbanization is a worldwide pattern, and the extent of the world's metropolitan populace expanded from 33% in 1960 to 54% in 2016. Nonetheless, the decrease in provincial administrators is barely referenced, a worldwide issue of the augmenting country metropolitan hole. It influences the maintainable turn of events, like neediness, helpless land the executives, absence of instructive offices, underdevelopment of framework, and even wrongdoing (World Health Organization, 2016). This is combined with the COVID-19 pandemic, which started when the Indonesian President reported it in March 2020. This continuous test requires earnest provincial rejuvenation steps to advance reasonable country thriving alongside urbanization because both rustic just as city inhabitants ought to appreciate assets, public administrations, and colonial government assistance similarly. The world has seen that Indonesia, a commonplace illustration of an emerging nation with the fourth-biggest populace that is expanding each year, has issues: urbanization and destitution easing (Trapp & Hess, 2020).

In Indonesia, demographically, normal populace development in metropolitan regions contributes 33% of the complete metropolitan populace (Fariah, 2020). Movement and renaming (change in status from provincial limitation to metropolitan confinement) are the fundamental elements in expanding the metropolitan populace in Indonesia. The population's expansion in modern habitats or enormous urban communities should be visible from the expanding trouble of open land for settlement. The most outstanding model is DKI Jakarta, where the majority of the Indonesian populace is urbanizing to the megapolitan region to take a stab at the brutality of life in a worldwide time. Private land is challenging to come by, the development of the Rusunawa keeps on being completed, the thickness in the riverbank regions, the railroad tracks, and the tumultuous plan of private land (Jurriens & Tapsell, 2017).

Urbanization is set off by contrasts in development or imbalance in offices from improvement, particularly among country and metropolitan regions (Gleeson et al., 2012). Thus, metropolitan regions become alluring magnets for urbanites to seek gainful employment. In any case, challenges remain, including an uncompetitive rural area, drowsy improvement in country regions, low wages of ranchers, low strength of provincial turn of events, and the urgent requirement for rural development and total rejuvenation. Other issues identified with the development and advancement of abandoned kids, rural regions are abandoned, and defilement is yet being looked at in Indonesia (McGraw, 2013). Additionally, peculiarities like natural contamination, metropolitan rustic advancement variations, and the absence of provincial aggregate activity need more help for logical and mechanical development and change of country administration frameworks (Akhtar al., 2018).

The principal objective of the United Nations Sustainable Development Goals (SDGs) is neediness easing (Wong & van der Heijden, 2019). Nonetheless, there can be no modernization without the open country's modernization. The answer for Indonesia's economic advancement comes from provincial renewal and accomplishing this significant progress in expanding country development capacities by building solid rustic development frameworks (Whitcraft et al., 2019). Along these lines, Indonesia can accomplish rustic rejuvenation, destitution mitigation and work on individuals' government assistance for practical events. Concerning contest, Indonesia additionally faces exceptional rivalry and practical difficulties. At the Innovation Indonesia Expo (I2E) 2020

plan, President Jokowi referenced the significance of development for the autonomy and greatness of the country (Yan, 2021).

A helpful environment is essential for introducing creative works of the country's youngsters, particularly when confronting the Covid-19 pandemic, the criticalness of development in different fields (Hart, 2013). In the meantime, Indonesia as a rural nation is a glaring difference to rural development, which is a long way behind contrasted with other agrarian nations like Thailand, the Philippines, Brazil, China, and Vietnam. Indonesia ought to investigate numerous effective models of horticultural advancement to utilize them to address the local metropolitan hole and advance rustic rejuvenation (Davies et al., 2013). For instance, put intensely in horticultural science and innovation, and walk the way of effective asset strengthening through the agrarian turn of events. Reinforcing horticultural science and innovation advancement is another bearing of improvement, and the foundation of a rural science and innovation advancement framework that is as per general conditions ought to be the establishment of present-day rural advancement in Indonesia (Lakitan, 2013).

The fundamental capacity of the rustic advancement framework is to encourage an environment for local networks to make new specialized, administrative, and institutional information, send and execute new advances and plans of action to advance improvement assets, and acknowledge collaborations with metropolitan development frameworks through mediators and organizations like the Internet (Palli & Deb, 2020). Metropolitan advancement framework advancement and innovation dispersion are used to speed up the environmental turn of events and make the rustic development framework worth making. In particular, through re-assessment of advancement arrangements, improvement of advancement assets, rustic development frameworks add to the advancement of country foundation, monetary frameworks, and social climate (Sun, 2021). Moreover, it will work with strategy making and dispersion processes, cultivate business venture in provincial regions, empower the use of new information in country advancement frameworks, increment the extent of science and innovation commitments in rustic turn of events, lastly accomplish supportable enhancements in agrarian industry, the climate and personal satisfaction in rustic regions (Thompson, 2010).

### **3.2 Technology Creates Food Security**

This activity provides an understanding of the importance of farmers, business actors, and horticultural stakeholders using digital technology (Ye et al., 213). During this Covid 19 pandemic, business activities utilize digital technology far more. Today, we are doing Tani on Stage, introducing agricultural digitization, including online or digital marketing of Indonesian horticultural products. A series of events were held, including signing a cooperation contract to ornamental export plants. In addition, BNI also handed over KUR to debtors and gave ornamental plant seeds to plasma farmers (Armanda et al., 2019). We are participating in this series of activities, a soft launch of Horti Mart and refrigerated cars as a mode of transportation for farmers and horticulture business actors.

The export of ornamental plants worth IDR 2.1 trillion is no joke because we have tremendous potential (Briggs, 2018). Dias & Ortiz Rios (2014) said the government would continue encouraging business actors in the agricultural sector, especially floriculture, to touch the export market. According to Mukherjee (2019), the export value by Indonesia this time is tremendous. This proves that the opportunity to export ornamental plants from Indonesia is increasingly open along with its biodiversity. In detail, these exports consist of 3 million plants to Germany, 362,000 plants to England, 500 thousand plants to Cyprus, 1 million plants to South Korea, 4 million plants to the United States and 1.2 million plants

to Canada (Rifin, 2020). The high demand for ornamental plants in Indonesia, continued Syahrul, reflects the significant world demand for floriculture products. The government appreciates the efforts of ornamental plant farmers who have been continuously cultivating various plants so that the global market can recognize them. According to him, this is an alternative business sector during the challenges of the Covid-19 pandemic. Syahrul also encouraged the use of People's Business Credit (KUR) by farmers in meeting their business needs in the ornamental plant sector (Ardiana et al., 2018).

Meanwhile, said the export contract will last for the next two years. BNI also provided KUR facilitation of up to IDR 50 million per debtor to support this activity. "Minaqu Indonesia has already exported, but it is on a large scale this time. We will support the development of smallholder plasmads (Sofjan, 2017). One thousand plasmads will be facilitated here with packages in tissue culture developed by CV Minaqu, production facilities, and protected houses. Hortimart is a show window for horticultural products by importing directly from the farmers' land. The Farmers' Market Association oversees the product content in Hortimart (Shona et al., 2019). The role of Pasar Tani in delivering horticultural products is quite commendable. Outlets in the form of stalls have entered the mall area of the Jabodetabek, Bandung, Kalimantan, and Jogja areas. "The existence of a pandemic is recognized as not a problem for Pasar Tani. Sales of vegetables and fruit can run well both offline and online. Our online sales are also running well and optimally.

Online and offline sales in malls are also in high demand. "In the past, at the beginning of our struggle to penetrate the mall, it was extraordinary, now it is the other way around (Teufel & Zimmermann, 2015). We flooded orders from the mall to display at their place. For information, Pasar Tani is an association of farmers under the guidance of the Directorate General of Horticulture. Established in 2021 and currently in 50 locations. The target this year is to increase to 1000 locations. "Farmers' market is to bring farmers closer to market players so that the profits received are by the farmer's market. Not middle man. Pasar Tani Goes to Mall is held in malls so that the middle class knows that our local products have competitive quality. So we can compare it with imported products. This is an important message (Reinartz et al., 2019).

### **3.3 The Youth Version of Agriculture**

The participation of young people is good and environmentally friendly agricultural cultivation, and increasing agricultural productivity can also continue to be sustainable (Reganold & Wachter, 2016). Young people have enormous potential to adopt new technologies and innovations that can increase production and provide added value in the agricultural sector. Rikolto seeks to encourage youth participation with programs that can strengthen their growth capacity. Spielman et al. (2010) added that Rikolto is a non-governmental organization from Belgium, with more than 40 years of work experience in improving the welfare of farmers through sustainable cultivation, in partnership with the Independent Agribusiness Partner Cocoa Cooperative located in Polewali Mandar, to introduce and develop the capacity of MAM youth in integrating digital technology into cocoa farming and business. Hassani conveyed the same opinion (Wijaya et al., 2018).

According to Dhawan (2020), it is essential to invite young people to adopt technology to adapt to the digital era 4.0. The reason is that several problems in the agricultural sector are easier to overcome through technology. The government needs to encourage millennials to manage all aspects of agriculture, such as cocoa, in a modern way (Yunus et al., 2021). Young people need to be introduced so that technology can solve agricultural problems. Many hope that young people who have attended training from

Rikolto can share inspiration and examples in the community, both as farmers or business people, and take advantage of technology (Allen & Clawson, 2018).

A total of 10 young people from the Mandiri Agribusiness Partner Cooperative were selected to participate in the intensive Training of Trainers (ToT) on October 11-22 to develop digital technology that can improve efficiency, productivity, and quality cocoa beans (Wijaya et al., 2018). Each of the ten selected cadres will then train four other young people, resulting in 50 young farmers with an entrepreneurial spirit, creativity, and basic knowledge of digital agriculture. The involvement of women is also something that Rikolto and the ASEAN Foundation continue to encourage (Darmastuti, 2018). Therefore, out of 50 young farmers, 20 are female participants. The cocoa produced by the MAM Cooperative has received much attention from artisan chocolate producers. The taste and quality are considered to meet the quality of premium chocolate. However, the current challenge is maintaining the consistency of the fermented products. The technology currently being developed can be a solution to increase the efficiency and productivity of our cocoa.

Meanwhile, Brugere et al. (2019) said this activity is part of a series of activities for the Empowering Youth Across ASEAN (EYAA) program. This is a collaboration program. ASEAN Foundation and Maybank Foundation aim to support the younger generation in Asia to bring innovative solutions to social and environmental issues facing communities in the region.

#### IV. Conclusion

In this final section, we reiterate the purpose of this study, which is to gain a deeper understanding of digital applications in agriculture, an effort towards creating rural farming communities, which is a technological innovation in agriculture. Through a review of several publications discussing technology and its effectiveness in using agriculture in rural areas, this study has answered several research questions with scientific evidence hoping that this kingdom will help develop studies. The following essential components that we describe include digital technology innovations in agriculture.

As it has been understood that this organization cannot be avoided anymore, living in rural areas is not much different from that in urban areas, this is innovative progress for a country to balance life in cities and villages. In other words, the ability of technological innovation will make life easier so that more and more young people want to live in the agricultural sector. It must be admitted that democracy in Indonesia is a city community that dominates the competition and the economy for various reasons that the city is a place to find a new life. However, when technology can be appropriately developed to solve problems, agriculture is managed traditionally. However, it uses the latest technology to give birth to no less essential innovations than people in big cities.

So what is needed here is the cooperation of various sectors, the interests of the private government, as well as individuals from the wider community, which can drive the agricultural economy by integrating it into application technology which is now in the world's spotlight where its effects can be used in all areas of business life. The second point here is that we explain that technology can improve food security. This has been proven by many countries that bring technology owned by sophisticated industries and provide food security. The food production centers in Indonesia come from villages in rural areas but with good transportation so that the farmers can use technology infrastructure to integrate the business.

The next point is that by involving the application of digital technology and agriculture, it is believed that the younger generation has seen farmers reopening the last province. However, youth in Indonesia will make the agricultural sector a mainstay sector where agricultural operations are no longer carried out conventionally but are equipped with infrastructure, namely integrating digital technology into various agricultural and business sources. It is clear, with beautiful evidence, where we have proven various findings. Previous experts have adapted to how important digital technology is in all business sectors of life, including the agricultural sector in rural areas. We realize that this finding has limitations and shortcomings. Therefore we want constructive input and criticism so that only what can be developed is more exciting and more progressive.

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