**RESEARCH ARTICLE**

## Collaboration to Build Resilient Farmers' Human Resources: Digital Literacy Program in Agriculture as a Joint Education Effort

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*Abstract*

*This article aims to examine the importance of the role of government and society in collaborating, especially in improving society's capabilities in the agricultural sector. In this case, development communication has an important role, especially in the form of participatory development communication and community empowerment. However, technological aspects cannot be separated from development communication. Electronic agriculture (e-Agriculture) has become something that farmers need to do to improve the quality of their agriculture. Since the penetration of information and communication technology, the use of this technology has become increasingly massive, especially in searching for information. This encourages the active role of government and society in providing facilities to support the development of human resources for farmers. In this case, digital literacy skills are very important for farmers to have, starting from searching for information, managing information resources, forming digital collaborations, to efforts to increase digital participation. These skills need to be built wisely so that the use of technology in the agricultural realm can be carried out well.*
**Keywords:** e-Agriculture, collaboration, digital literacy, farmers, technology

## I. Introduction

The development of a country cannot be separated from concern related to the fulfillment of basic needs. This is inseparable from the development of the agricultural sector which has become a national issue in Indonesia, especially related to current food needs (Jaya, 2018, p. 197). For Indonesia itself, agricultural issues have become an important issue and are considered by the government. Moreover, Indonesia is a country that has vast agricultural land (Vintarno, Sugandi, & Adiwisastra, 2019, p. 90). Based on data published in the report of the Agricultural Data Center and Information System (2020), it is explained that in 2019 the non-rice field agricultural land in Indonesia was 29,353,138 Ha and the rice field area was 7,463,948 Ha. This data also shows that basically Indonesia as an agricultural country already has the capital to continue producing the basic needs of the entire community.

Even though the area of agricultural land, both rice fields and non-rice fields, is quite extensive, Indonesia is also experiencing a crisis of young farmers. This is shown based on data published on dataindonesia.id (2022) where in 2018 there were 885,077 farmers aged under 25 years. Meanwhile, there tend to be more farmers over that age. even for those aged 35-44 years it reaches more than 9 million farmers. This data shows that the younger generation's interest in becoming farmers is very low, especially for the millennial generation and generation Z. The tendency to work as farmers is still dominated by the younger generation. The tendency to work as farmers is still dominated by the generation above. Of course, this cannot be separated from the problems of the times and industrial

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developments which have made the younger generation abandon the choice of working as farmers.

The issue of the farmer crisis is indeed an important issue because it can have an impact on the issue of food sovereignty in Indonesia. Especially when you consider that farmers have a very important role in fulfilling food needs for a country (Sidharta, Tambunan, Azwar, & Ghaniyyu, 2021, p. 229). Not only farmers who harvest rice or vegetables in the fields. Farmers also have a very important role in fulfilling food needs. Like chicken or duck farmers, where the results of their livestock are used to fulfill nutritional needs. Even the existence of several MSMEs also depends on the life and agricultural products in Indonesia.

Although from this data, the interest of the younger generation to become farmers is still low. However, the agricultural sector has proven to be the most resilient sector to survive the monetary crisis experienced by Indonesia (Situmeang, 2014, p. 126). The strength of the agricultural sector that continues to survive cannot be separated from the development of the times. Especially in the issue of the development of information and communication technology. If we look at the geographical side of where farmers live, they certainly live in rural areas where knowledge of various information cannot be fulfilled (Burhan, 2018, p. 234-235). Whereas the use of information and communication technology is not only limited to sending messages, reading news, or playing games. Instead, users can add insight and knowledge through a variety of content created by each user. Especially knowledge related to agricultural development and product sales.

The use of this technology can help farmers and breeders in creating direct selling value from the results they get (Burhan, 2018,

p. 235). Whether increasing knowledge or efforts to get the selling value of agricultural products, this happens because the technology is able to present electronic agriculture (e-agriculture). E-agriculture is a field that focuses on improving agricultural and rural development through improving communication and information processes (Cangara, 2020, p. 512). This is now important and has an impact on the lives of farmers because the use of this technology can be the basis for fulfilling farmers' needs for information.

In addition, Cangara (2020, p. 513) also explained that in a survey conducted by the Human Resources Research and Development Agency of the Ministry of Communication and Information Technology in ten provinces involving 800 respondents, it showed that the level of information and communication technology literacy, both for farmers and fishermen, was still low. In fact, in order to develop business, both in terms of quality and business results, it is necessary to understand the use of technology. This is a problem faced by Indonesia today, regardless of the low interest of the younger generation to become farmers or the vast land that can be utilized by the community.

In order to build resilient human resources, including raising awareness for the younger generation to engage in agriculture, media literacy activities are needed as a form of development communication practice. Media literacy here refers to a broad set of competencies around the use of digital media resulting from the emergence of today's internet-based technologies (Leaning, 2019, p.4). Adjustment through media literacy in this area is inevitable, because the development of information and communication technology has led to a new revolution or digital revolution that is able to re-engineer the way a person

lives (Reddy, Sharma, & Chaudhary, 2020, p. 66). This also aims to support the agricultural sector to increase food production for social and environmental purposes, especially in supporting the Sustainable Development Goals (SDGs) program (Waldron et al., 2017, p. 1).

The use of digital media to support the agricultural sector is inseparable from the sharing facilities offered through new media. This makes the collaboration of everyone very important, especially in realizing the practice of development communication in the agricultural sector. Thus, this article aims to explain the role of information and communication technology as an effort to strengthen the agricultural sector in the perspective of development communication. Thus, The practice of community collaboration in this sector through new media is an important thing to pay attention to. In this case, the role of media literacy is important as a practice for society, especially farmers, in utilizing the technology they have to improve their standard of living. Because with information technology mediated by the internet, farmers can search for the information they need to solve their problems. This also serves as a means of agricultural extension known as cyber extension.

## II. Literature Review

Development communication can be seen as a reciprocal message exchange activity between all parties involved in a development effort (Situmeang, 2014, p. 127). Development communication can be done in the form of agricultural extension to achieve the mission of increasing food production and community development in agriculture (Sadono, 2008, p. 65). Extension is basically a very important activity when talking about the development communication process. This is because in the development communication process, the

main target to be achieved is to improve the quality of human resources. In particular, to make the audience more resilient in their efforts to improve their economy.

Development communication in agriculture is one of the important national issues because there are several factors that make agricultural development in Indonesia weak (Jaya, 2018, p. 197). These factors include post-harvest, facilities and infrastructure, farmers' attitudes and mentality, level of knowledge, mastery of technology, access to capital, land ownership, and skill level. Based on the factors that make agricultural development weak, some can be overcome through agricultural development communication strategies. It aims to increase farmers' knowledge and abilities in various ways, especially in mastering technology to support agriculture.

In an effort to carry out effective agricultural development, participation activities between various parties need to be carried out. In this participation process, communication becomes the main thing because there is a motive to realize a message conveyed (Sidharta et al., 2021, p. 231). One of the message motives built in the communication process in agricultural development is related to the process of change that occurs in individuals and communities in this field (Vintarno et al., 2019, p. 92). Currently, the process of individual and community change does not only occur through the effects of the environment. Rather, the use of technology has played a very important role in the process of community development.

Regarding various agricultural development research findings, one thing that can be taken into consideration is the use of information and communication technology

for agricultural economic development. Basically, the use of this technology is not only able to develop the economy, but in several developing countries it is also used to alleviate poverty (Burhan, 2018, p.236). Thus, the use of information and communication technology has the potential to strengthen agricultural development communication activities, not only on a development scale. But to improve the standard of living of farmers. This can be seen from the development of digitalization. Where farmers have the opportunity to develop e-commerce according to the products they have. They can even increase their knowledge in the realm of raw material production. This can be done by every farmer to increase the selling value of their products, so that economic improvement can be achieved in accordance with the wishes of the farmers.

## III. Methodology

This research uses a qualitative approach. The method used was a literature study. The researcher collected data sources related to the topic of digital literacy and agricultural development in Indonesia. These data were used to understand the role of digital literacy in the context of agricultural development communication.

Articles were collected by searching databases through available literature sources. Research was carried out by analyzing journals and making summaries to build arguments based on previous research results. Article searches were used via Google Scholar and reference books related to development communication.

The considerations in selecting the research data used are filtering according to the topic being written. Researchers focus on data sources for articles related to agriculture and

digitalization, including the topic of cyber extension. This is because digitalization is seen as having the potential to encourage the growth of farmer interest in society. Apart from that, digitalization is also able to develop human resources for farmers to achieve a better standard of living.

## IV. Discussion

### a. Digital Literacy and Farmer Development

In the digital era, one of the requirements of a resilient society is to have good digital skills. Digital literacy is a mandatory requirement that must be possessed so that technological advances can be utilized properly. This also applies to farmers. In general, farmers spend a lot of time in the field to carry out agricultural, plantation or livestock activities. However, farmers still have to participate in the development of technological advances to remain resilient in facing competition in the digital era. Farmers must have the skills and fulfill the aspects of good media literacy.

Various educational institutions, governments, and communities have formulated components of media literacy indicators. According to Monggilo, Kurnia, & Wirawanda (2021), individuals who have digital media skills are considered capable of knowing, understanding, using hardware and software in the digital landscape. Then, individuals are also able to use information search engines and social media conversation applications, digital wallet applications, marketplaces, and digital transactions. The National Cyber and Crypto Agency (BSSN) offers five digital literacy competencies including information data management, communication and collaboration, content creation, digital security, and participation and

action (Monggilo, Kurnia, & Banyumurti, 2020).

Managing information data is the ability to access and evaluate data and information carefully and wisely. Communication and collaboration are the ability to communicate and collaborate ethically with other citizens. Content creation is the ability to edit and produce digital content for good purposes. Digital safety is the ability to protect one's privacy and security from various digital threats. Participation and action are the ability to utilize digital media to be empowered and more valuable together (Monggilo et al., 2021, p. 7).

Digital literacy skills of farmers can be interpreted as the ability of farmers to keep up with the development of information and communication technology and utilize the media to find and use farming information (Yulida, Rosmita, Kurnia, Andriani, & Restuhadi, 2020, p. 309). The digital literacy skills that farmers need to have are, first, having the ability to access and evaluate information data related to agriculture properly. New media allows everyone to create and disseminate various information. A lot of information and knowledge can be accessed easily on digital media. This information will be very useful if it can be processed and utilized in farming. Information and communication technology using the internet is needed in the agricultural sector to increase the productivity of agricultural businesses.

The ability to access and evaluate information is the first requirement that farmers must have. Currently, technological developments in the world of extension are growing. There are technologies that provide unlimited accessibility of information in cyberspace (Farida, Sumardjo, Anna, & Prabowo, 2023). The inability to access information will make farmers disconnected with the advancement of digital media. New media platforms encompass diverse search engines like Google, Yahoo, Baidu, Microsoft Bing, and others. Search engines can make it easier for farmers to get the information they need.

Second, communication and collaboration. New media makes it easy for users to connect and network with each other. Media users can communicate across time and space. So this convenience will be very useful if it can be optimized by farmers. They can connect and network with each other through various media conversation applications such as Whatsapp, Facebook, Instagram, and others. Success in the digital era cannot be separated from collaboration. Resilient farmers in the digital era cannot just rely on their own abilities. There needs to be collaboration between fellow farmers, government, communities, and others. Collaboration will increase the opportunity for farmers to sell their products to a wider target market than the conventional model. Farmers are expected to use smartphones for farming purposes such as sharing information on social media groups either on Facebook or WhatsApp. Joining farmers in groups that discuss palm oil news can add insights that can be applied by farmers related to their farms (Darmayanti, Yulida, & Arifudin, 2023).

Third, content creation. This skill is useful for creating good and useful content for farmers. Content is the spirit of digital media. Farmers can not only be consumers. They can create content that is useful for the wider community. The information and knowledge that farmers have will be very useful if it can be created well. Content creation can change the bad stigma that has been brewing about the farming profession.

Fourth, digital security. This ability is very important to survive in the digital era. Digital media is not completely safe. There are still loopholes for criminals. For this reason, farmers must be vigilant when in the digital space. Starting from protecting personal information, being smart in understanding and criticizing false information, to being careful of all forms of crime in the form of fraud that often occurs in the digital space.

Fifth, participation and action. Sitting still, observing, and enjoying the convenience provided by the digital space is not the right attitude. Farmers must have the ability to utilize digital media for data and value. Participation and action are important. Farmers can actively participate in the digital space. Participation and action are the ability to utilize digital media to be empowered and more valuable together. Digital wallet applications, marketplaces, and digital transactions are features that will make it easier for farmers to make better contributions.

*b. Digital Literacy as a Farmer Education Program*

Digital literacy is very important, because the ability to master information technology is an important element in the process of cultural, economic, political and social change (Nurhayati & Falah, 2020, p. 349). Efforts to educate the public are made by all elements of society, government, formal education institutions, and so on. Good digital literacy skills can be taught both individually and in groups.

Digital literacy education must start at various levels of society, from early childhood, adolescence, to adulthood. So far, the use of the internet and digital technology is still mostly used to find entertainment and communicate through social media. People get more negative impacts from using internet access. Many people already know the sophistication of digital technology, but they do not realize that the internet can also be used to improve their welfare. The lack of knowledge and ability of the community regarding digital literacy can cause problems because the community has not been able to use and utilize the internet and digital technology properly and wisely, especially in an effort to increase community economic empowerment (Nurhayati & Falah, 2020). The farming community must be able to utilize the internet and digital technology wisely and well. That way, they can increase economic empowerment in the community from the farming side.

Based on the results of Nurhayati and Falah's research (2020, p. 357), digital literacy workshop activities can increase knowledge and understanding of digital literacy. This knowledge can make a positive contribution to improving the community's economy, namely increasing entrepreneurial skills. Digital literacy education programs can not only be carried out by the government constitutionally. Digital literacy education programs can also be conducted among fellow communities. Digital literacy education programs for farmers can be in the form of training seminars and workshops. Digital literacy skills that can be useful for business actors are the ability to access information in digital media, strategies for running online businesses, techniques for creating marketing content.

Practically, farmers can access information regarding ways to increase crop yields. There is a lot of information floating around on the internet that helps farmers increase their product yields. Internet also provides information about online strategies to sell crop yields.

*c. Collaboration, Use and Utilization of E-agriculture with a Development Communication Perspective*

The role of development communication basically aims to contribute to the development process, especially to accelerate the process of innovation diffusion. The demands of modernization can be met through the diffusion of innovation in development. The new paradigm of development communication is characterized by the realization that the communication process in development must be guided by the community's ability to plan, implement, and evaluate development. The community is not the object of development, but the subject of development, therefore community participation is a very important factor. Communication is carried out convergently and communication interaction is carried out in a more democratic and participatory manner (Setyowati, 2019, p. 188). Farmers must actively participate in becoming the subject of development. Farmers cannot just wait but must pick up the ball for opportunities to contribute and be empowered.

During this time, community involvement is only seen in a narrow context, the community is only considered as a recipient of development innovations, without being involved in planning and decision-making and not developed creative power from within themselves and must accept decisions that have been taken by outsiders. As a result, the community is dependent on other parties, not empowered and independent (Setyowati, 2019: p.p. 189). During this time, farmers still often depend on the extension mode provided by the government to improve agricultural yields. Farmers can also be agents who are the subject of education for fellow farmers. So that the diffusion of innovation can run quickly in accordance with the new development communication paradigm.

One of the strategic and important roles of agricultural extesion activities is to improve the welfare of rural communities So far, the level of farmer satisfaction with extension activities is still low due to less than optimal interaction with extension workers (Farida et al., 2023, p. 197). The presence of digital media makes extension activities need to be improved not only about the usual farmer info. Extension workers must be involved in educating the community regarding digital literacy skills.

Extension activities can also be carried out through an online system so that it does not have to be done face-to-face or in the field. Exchange of information and problems between farmers can be done even though an extension agent is not in the field. The extension system that has become a new internet-based paradigm is cyber extension. This system can break the boundaries of distance, space, and time. The literacy skills of an extension worker towards cyber extension is very important because the availability of good extension data and information can support agricultural extension activities. Extension workers are expected to filter information based on the needs of farmers (Farida et al., 2023, p. 197). There are many conveniences offered by information and communication technology to educate and help maximize farming potential.

E-Agriculture is an information and communication technology service concept developed with the aim of improving information and communication processes in the agricultural sector. E-Agriculture involves the conceptualization, design, development, evaluation, and implementation of several innovative ways to use ICT in rural areas. This

e-Agriculture development initiative is part of one of the development focuses of the Food and Agriculture Organization (FAO). E-Agriculture.org is an internet platform to enhance the sustainable development of the agricultural sector in order to improve world food security developed by FAO (Santoso, Rachmat, Delima, & Wibowo, 2020, p. 41). The basic concept of E-agriculture presents a new paradigm in decision-making and information dissemination related to quotas and commodity products produced every certain period of time. Data representing the "real world" can be stored processed in such a way that it can be presented in a simpler form as needed (Rosita, 2007, p. 7).

E-Agriculture will help farmers in improving the quality and quantity of agricultural products. Information technology can be utilized to support the process of mapping agricultural land. Web Mapping System (WMS) is one of the web-based software systems that can assist in mapping land areas. The application of WMS as one of the implementation areas of information technology is needed (Santoso et al., 2020, p. 40). There are many types of web applications that provide secondary agricultural data in Indonesia. Some of them are Ina-Geoportal (tanahair.indonesia.go.id), sigap (sigap.menlhk.go.id) and others.

The government and the community must collaborate together so that E-agriculture can be used and utilized properly. In accordance with the development communication paradigm, the obligation to educate is not only imposed from the government to the community. However, collaboration between the government and the community, as well as collaboration between fellow communities is needed. In order for the community to utilize the existing digital media.

One form of collaboration in utilizing e-agriculture is cooperation in dividing roles between the government and farmers. The government is not a controlling component, but the government is a facilitator who helps farmers in utilizing e-agriculture. Meanwhile, farmers can be subjects who provide input to the government. Apart from that, this collaboration can also be carried out from the first moment starting from technology-based land data processing. Where farmers and the government carry out this program together.

## VI. Conclusion

Digital literacy skills that farmers should have include information data management, communication and collaboration, content creation, digital security, and participation and action. Farmers must be able to utilize the internet and digital technology wisely and well. That way, they can increase economic empowerment in the community from the farming side.

Digital literacy education programs can not only be carried out by the government constitutionally. Digital literacy education can also be carried out by fellow communities. Digital literacy education programs for farmers can be in the form of training seminars and workshops. Digital literacy skills that can be useful for business people are the ability to access information in digital media, strategies for running online businesses, techniques for creating marketing content.

Based on the perspective of development communication, farmers must actively participate in becoming the subject of development. Farmers cannot just wait but must pick up the opportunity to contribute and be empowered. There are many conveniences offered by information and communication

technology to educate and help maximize the potential of farming, one of which is E-Agriculture. E-Agriculture will help farmers improve the quality and quantity of agricultural products. There are currently many types of web applications that provide secondary agricultural data in Indonesia. Lastly, collaboration among the government, the community, and fellow communities is needed. In order for the community to utilize the existing digital media.

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