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AGRICULTURAL DIGITALIZATION: STRATEGIES FOR IMPROVING HARVEST QUALITY AND FARMER WELFARE IN INDONESIA

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Abstract

This research aims to determine (1) the potential for agricultural digitalization in Indonesia; and (2) strategies to improve harvest quality and farmer welfare in Indonesia through agricultural digitalization. This research is qualitative-descriptive research. The results of this research show that (1) Agricultural digitalization has the potential to change farmers' mindsets in order to maximize and utilize the digital era so that it can encourage farmer independence. The government needs to prepare superior human resources in utilizing agricultural digitalization supported by Indonesia's abundant diversity of agricultural products; and (2) agricultural digitalization strategies to improve harvest quality and farmer welfare in Indonesia, including the SO strategy through promoting agricultural digitalization to improve harvest quality and farmer welfare, the WO strategy by developing the concept of agricultural digitalization (digitalization of agricultural processing and marketing), the ST strategy through work cooperation between the government and agricultural stakeholders supports agricultural digitalization, and WT's strategy is to educate agricultural product business actors to utilize agricultural digitalization.

Keywords: *Agricultural digitalization, harvest quality, farmer welfare*

INTRODUCTION

The agricultural sector plays an important role in the Indonesian economy, both as a contributor to national economic growth and as a provider of employment opportunities. The agricultural sector also generates foreign exchange due to export activities from various subsectors such as plantations, horticulture, animal husbandry, fisheries, and others (Irham, 2016). Along with technological developments, the

agricultural sector is also experiencing conceptual changes by using the latest technology so that various activities in the agricultural sector can be carried out more effectively and efficiently. The increasingly rapid development of the times certainly encourages the agricultural sector to develop existing technological innovations (Rufaidah, 2023).

Agricultural digitalization can simply be interpreted as changing the way things are done in all aspects of agriculture, for example from processing to marketing (Pratiwi, 2022). Increasing the use of IT in the world of agriculture can actually help farmers and provide opportunities for them to understand their agricultural systems. Digitalization has had a major impact on farmers in changing agricultural culture from experience-based to a data-based management approach (Mumtaz, 2021).

Considering that the world trade competition system is very tight, it is very important to prepare for the introduction of a modern trade system by paying attention to product quality and satisfying consumers in the market optimally so that farmers can compete with imported products (Ilyas, 2022; Sonief, 2019). Willingness to face the era of globalization requires farmers to be independent in terms of competitiveness. This is related to the ability of farmers to run farming to ensure product quality and agricultural sustainability (Nugroho, 2021).

The aim of agricultural digitalization is expected to improve the ineffectiveness of marketing channels that have existed so far where farmers do not get the largest percentage of profits, in fact the biggest profits are obtained by traders while the biggest profits for farmers are obtained if farmers sell their products to consumers directly (Sudaryanto, 2022) . Agricultural digitalization also aims to provide farmers with more knowledge and transparency regarding information regarding prices of agricultural products, market conditions, raw materials and market or agricultural developments so that farmers can be more efficient and realize farmer independence (Aziz, 2023).

Based on the explanation above, this research aims to determine (1) the potential of digitizing agricultural processing in improving harvest quality and the potential of digitizing agricultural marketing in improving the welfare of farmers in Indonesia; and (2) strategies to improve harvest quality and farmer welfare in Indonesia through agricultural digitalization.

METHODS

This research is qualitative-descriptive research. Descriptive qualitative research is a research method that aims to explore and understand the meaning of social or humanitarian problems in the form of descriptions (Kusumastuti, 2019). This is in line with the research objective to describe the potential for agricultural digitalization in Indonesia and strategies for improving harvest quality and farmer welfare in Indonesia through agricultural digitalization.

The data source for this research is a literature study relevant to the digitalization of agriculture in Indonesia. The data collection technique in this research is a reading technique by reading sources relevant to the research discussion and then determining the appropriate data. The data analysis technique in this research uses SWOT analysis related to strategies for improving harvest quality and farmer welfare in Indonesia through agricultural digitalization.

RESULT AND DISCUSSION

Potential of Agricultural Digitalization in Indonesia

Agricultural digitalization is a relatively new concept in Indonesia. This concept allows Indonesian agriculture to be further developed using the latest technology in the Industrial Revolution era so that the production process is more efficient. Not only is it economically beneficial to overcome the food crisis, but agricultural digitalization can also have an impact on society. For example, giving birth to the next generation who are ready to move into the field of modern agriculture to create new jobs. Agricultural digitalization is a necessity in developing agriculture today because the need for food is increasing while agricultural land is shrinking.

The low level of farmer independence is due to the low welfare of farmers. However, considering the competitive world trade system, it is very important to prepare farmers to face the modern trade system by paying attention to the quality of their products and optimally satisfying consumers in the market. Willingness to face the era of globalization requires farmers to be independent in terms of competitiveness. Agricultural digitalization has the potential to change farmers' mindsets in order to maximize and utilize this digital era as best as possible, so as to encourage farmer independence.

The development of technology and information has presented a new method for carrying out trading activities, namely through e-commerce. The practice of buying and selling activities using e-commerce has been widely practiced by many countries. Along with the increase in the number of internet users. This condition illustrates that Indonesia is a potential market in the current digital era. The government should not only make Indonesia a consumer, but prepare human resources that are superior in entrepreneurship. Supported by Indonesia's abundant diversity of agricultural products, Indonesia should excel in food security and even be able to expand economic activity through exports. When digital infrastructure such as the internet is available, it is time for the government to develop programs that can make Indonesia capable of producing reliable entrepreneurs who supply goods and services, especially in the agricultural sector, for the global community.

The use of e-commerce in agribusiness activities creates many opportunities, thus contributing positively to the entrepreneurial ecosystem in Indonesia and can help reduce national poverty levels, especially in rural areas. The use of e-commerce for

agricultural products for developing countries like Indonesia requires a lot of support from various parties, such as developing infrastructure that helps smooth logistics distribution. Indonesia as a country with biodiversity potential should benefit from the existence of e-commerce because it creates opportunities to compete in the global market through comparative advantages.

Strategy to Improve Harvest Quality and Farmer Welfare in Indonesia Through Agricultural Digitalization

Table 1.1 SWOT Analysis of Agricultural Digitalization
Source: data processed (2023)

SW / OT	**STRENGTHS** 1. The massive development of the internet and technology supports the digitalization of agriculture 2. Agricultural digitalization offers improvements in harvest quality and farmer welfare in Indonesia	**WEAKNESS** 1. The agricultural digitalization system does not attract public attention 2. Lack of public understanding of agricultural digitalization
OPPORTUNITY 1. Taking advantage of the rapid development of communication and information technology 2. Changing trends in agricultural systems towards digital 3. Government programs improve the welfare of farmers 4. Awareness to develop a more advanced agricultural system	**SO STRATEGY** Promotion of agricultural digitalization to improve harvest quality and farmer welfare	**WO STRATEGY** Developing a concept for agricultural digitalization

THREAT	ST STRATEGY	WT STRATEGY
1. Low knowledge of farmers and agricultural business actors utilizing agricultural digitalization 2. The agricultural digitalization program has not yet become a priority for the relevant Department, so digital utilization is not optimal 3. Uneven advances in technology and internet networks	Cooperation between government and agricultural stakeholders supports agricultural digitalization	Educate agricultural product business actors to utilize agricultural digitalization

SO Strategy: Promotion of agricultural digitalization to improve harvest quality and farmer welfare

As the global economy increasingly moves towards a digital world, the availability of reliable internet infrastructure has become a very crucial prerequisite in the developing agricultural sector. Apart from adopting agricultural digitalization technology, the government is required to be able to encourage promotion and support the spread of internet use. The government has a big role in promoting agricultural digitalization to related parties in order to create a more effective and efficient agricultural system. Increasing the use of IT in the world of agriculture can actually help farmers and provide opportunities for them to understand their agricultural systems so that the quality of the harvest and the welfare of farmers can increase. Digitalization has had a major impact on farmers in changing agricultural culture from experience-based to a data-based management approach.

WO Strategy: Develop a concept for agricultural digitalization

The Concept of Digitalizing Agricultural Processing in Improving Harvest Quality in Indonesia

Efforts to digitize agriculture will certainly not be achieved well if it is not supported by internet infrastructure that is adequate, evenly distributed and can be accessed easily and cheaply by farmers. Digitalization which includes the Internet of Things (IoT), big data, automation and others is very dependent on the availability of internet infrastructure itself. With technology, farmers who have difficulty reading are

taught via video how to increase productivity. The application of precision agricultural technology means that agricultural land will be surrounded by rows of sensors that provide dozens of data to the cloud. This data will be combined with data from GPS and weather patterns. Once the information is collected and evaluated, the algorithm will generate instructions for farmers about what they should do, when and where). Agricultural management with digitalization like this can increase the effectiveness and efficiency of farmers' work. Avoid losses due to crop failure caused by natural factors such as drought or flood and so on. Ultimately, crop yields can increase due to the use of seeds that are appropriate to land conditions, the availability of sufficient water, the use of fertilizer in accordance with the dosage required by the plants, and the use of pesticides that are not excessive.

The Concept of Digitalizing Agricultural Marketing in Improving Farmer Welfare in Indonesia

Currently, the development of the internet and technology is running very massively. This condition influences the development of e-commerce which has helped many businesses in the agricultural sector. In general, agricultural product entrepreneurs use e-commerce to market or purchase agricultural inputs. Social media is one type of e-commerce used by agricultural entrepreneurs to market their products. Currently, social media such as Instagram and Facebook provide special features for entrepreneurs. This facility is in the form of a special account for online shops and has other features that make it easier to reach potential consumers. Apart from that, websites are also often used by agricultural entrepreneurs to improve the company's image as well as marketing.

Currently, online marketing through marketplaces such as Tokopedia, Shopee, Lazada, has also been used by agricultural entrepreneurs. By using this marketplace, potential buyers can find out the company's reputation through the volume of products sold and rating attributes from other consumers. Through the marketplace, you can also minimize cases of fraud that often occur between sellers and buyers. The increasingly massive development of ICT has also encouraged the formation of a marketplace specifically for agricultural products. Of course, marketplaces specifically for agricultural products have several advantages that marketplaces for products in general don't have. These advantages lie, among other things, in more diverse and quality products, more competitive prices, faster delivery, and other added values that consumers can enjoy.

Utilization of ICT through company websites can make it easier for sellers to market their products more effectively and efficiently. Through the use of logistics companies which are currently developing rapidly, entrepreneurs can expand the distribution reach of their products. This condition shows that e-commerce plays an important role in improving the welfare of business actors, especially agricultural

products. Although in general not many farmers are technologically literate, many marketing actors in the agricultural product value chain have utilized e-commerce. Indirectly, the strategies implemented by these marketing actors can benefit farmers as producers of agricultural commodities.

ST Strategy: Cooperation between government and agricultural stakeholders to support agricultural digitalization

Designing an agricultural digitalization model can be done by developing existing systems. This development is by integrating upstream subsystems with downstream subsystems. Where in this development of course farmers cannot create their own system, so they can consider collaborating with existing platforms to support agricultural marketing in Indonesia. The more optimal role of extension workers by providing technological guidance to farmers is of course very beneficial for farmers' awareness regarding existing technology, especially technology for developing agricultural activities in encouraging farmer digitalization. This optimization requires the involvement of all parties and can be carried out through cooperation from various stakeholders, such as central and regional governments, academics and researchers, as well as related agribusiness actors.

WT Strategy: Educate agricultural product business actors to utilize agricultural digitalization

Increasing the capability of human resources involved in the agricultural sector needs to be improved through training in the use of technology both upstream of agriculture such as technology for watering, fertilizing, eradicating pests and plant diseases, etc. as well as technology in downstream agriculture such as the use of smartphones and the internet for easy access to markets. Natural resource management is carried out to obtain new commodities and superior varieties while maintaining ecosystem sustainability. Research development and dissemination of new technology are used to answer agricultural problems through the novelty of e-commerce. The creation of an inclusive financial system is necessary for agricultural sustainability from an economic dimension, while markets need to increase efficiency and effectiveness through cutting the agricultural product value chain. An important factor to consider to increase farmers' independence in making decisions for farming success is actively seeking information related to farming and interacting with extension workers.

CONCLUSION

Based on the results and discussion, the conclusions of this research show that agricultural digitalization has the potential to change farmers' mindsets in order to maximize and utilize the digital era so that it can encourage farmer independence. The government needs to prepare superior human resources to utilize agricultural digitalization, supported by Indonesia's abundant diversity of agricultural products. The agricultural digitalization strategy to improve the quality of harvests and the welfare of farmers in Indonesia is through the SO strategy through the promotion of agricultural digitalization to improve the quality of the harvest and the welfare of farmers, the WO strategy by developing the concept of agricultural digitalization (digitalization of agricultural processing and marketing), the ST strategy through inter-governmental cooperation with agricultural stakeholders supporting agricultural digitalization, and WT's strategy by educating agricultural product business actors to utilize agricultural digitalization.

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