IMPLEMENTATION OF AGRICULTURAL DIGITALIZATION ON FARMERS WELFARE IN 5.0 ERA

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Abstract

Digitalization of agriculture is a change in the agriculture system from conventional to modern ways by utilizing advances in science and technology. With the digitalization of agriculture, it is expected to improve the welfare of farmers and their families in the 5.0 era. However this is inversely proportional to the condition of farmers in Indonesia, who are mostly elderly so that they experience a very significant learning seatback and affect the process of adopting agricultural innovations. Based on records from the Central Statistics Agency (BPS) in 2019 the number of farmers in Indonesia reached 33.4 million people, with the number of young farmers aged 20 -39 years as much as 8% or equivalent to 2.7 million people, while around 30.4 million people or 91% were over 40 years old, with the majority aged close 50-60 years. The involvement of the role of agricultural instructors as facilitators in the farmer's learning process is very necessary because digital technology is not simple in practice. In addition, the regeneration of young farmers is very much needed so that the application of digital technology can be realized in Indonesia. If farmers do not adopt agricultural technology, they will be left behind in both their ability and agricultural production. The finding of this study describes the effect of digitalization on farmer's welfare, the characteristics of farmers aged 50 – 60 years, as well as the role of extension workers in delivering digital innovations to increase agricultural productivity.

Keywords: agricultural digitalization, farmer's welfare, agricultural innovation, the role of extensions workers.

1 INTRODUCTION

Indonesia is an agricultural country with most of the population working as farmers. According to the 2018 Central Statistics Agency, the number of agricultural households reached 27.68 million which was divided into several agribusiness sub-sectors [1]. The largest and most important sector of the agribusiness sector is the cultivation sector or on farm. In the cultivation sector, sources of raw materials or finished materials are produced, for example rice, vegetables, fruit, tubers, coconut, and so on. One of the things that can influence why the cultivation sector is the largest sector in Indonesia in agricultural households is because of the gift of Allah SWT who has given two of them in Indonesia, namely the dry season and the rainy season. In each of these seasons, almost all types of plants can grow well in Indonesia, so that Indonesian farmers do not have to struggle to adjust the environment, so that plant cultivation activities can be carried out throughout the plant period without any obstacles or seasons.

According to the Central Bureau of Statistics, in mid-2022, Indonesia's population reached 275,773.8 million, which increased from 272,682.5 million in the previous year [2]. With the increase in population, it will affect the amount of demand for basic necessities which is increasing. Meanwhile, the amount of land for cultivation is decreasing. Various strategies are implemented by the government so that the Indonesian agricultural sector can increase food production which will then have an impact on the welfare of farmers, namely the provision of People's Business Credit services, the Triple Export Movement program, and the establishment of the Agricultural Development Strategy Command. "The three of them must be interrelated in order to realize the welfare of farmers," said Minister of Agriculture Syahrul Yasin Limpo [3]. In addition, during the new order era, the Indonesian government also had various strategies in an effort to increase agricultural production, namely through the Green Revolution

program. The form of the success of the Indonesian government in efforts to increase productivity through the Green Revolution was the success of Indonesia for self-sufficiency in agricultural rice in 1984, but because the Green Revolution had various negative impacts, the Green Revolution program was stopped. In August 2022, Indonesia managed to get an award from the International Rice Research Institute because Indonesia has succeeded in having a good food security system and succeeded in being self-sufficient in rice in the 2019-2021 period [4].

The agricultural sector is the largest sector in terms of employment [5]. According to the Central Bureau of Statistics, in 2020 the number of Indonesians working in the agricultural sector reached 38.23 million workers or around 29.76% of the 128.45 million people who work [5]. This means that the agricultural sector in general still requires a lot of manpower, both on farm and off farm. In addition, the agricultural sector is one of the largest contributors to the distribution of Gross Domestic Growth, whose value reaches 12.98% with a growth of 1.37% [6]. Based on the level of welfare, Indonesia belongs to the group of Developing Countries. When viewed from the level of income per capita, Developing Countries are generally included in low-income countries with per capita incomes of less than 770 dollars, while in developed countries the per capita income is more than 9,000 dollars. According to these criteria, Indonesia is included in a middle-income country with a per capita income of 880 dollars, even reaching 1,000 dollars [9]. Developing countries have the characteristics of (1) low living standards, (2) low productivity, (3) population growth rates and high dependency burdens, (4) high rates of unemployment and underemployment accompanied by a scarcity of jobs, (5) the level of dependence on agricultural production and exports of primary products, and (6) the dominance of dependence.

The agricultural sector for developing countries has a very large role in the country's economic development efforts and also contributes to its economic activities. In 1998 Indonesia experienced an economic crisis, but the agricultural sector was able to make a very important

contribution in efforts to save the Indonesian economy. In addition, during the Corona Virus (Covid -19) pandemic that hit the world, the agricultural sector was one of the sectors that grew positively [7]. In economic development, the agricultural sector plays a role as (1) food supply provider; clothing; and boards, (2) suppliers of raw materials in the industrial sector, (3) potential labor providers for the non-agricultural sector, (4) producers of additional capital for new investments, (5) as an additional source of income for the state through taxes, (6) increasing agricultural production accompanied by an increase in population income which has the potential for industrial products, and (7) as a source of foreign exchange from agricultural export commodities [8].

The importance of the agricultural sector for developing countries in terms of the country's economic development is not directly proportional to the welfare of the farmers themselves, as can be seen in the number of smallholders who as subjects of agricultural households mostly only control land of less than 0.5 ha, in addition to the number of workers or farm laborers is also still large. According to the 2018 Central Statistics Agency, the majority of farmers belonging to the smallholder group reached 58.73%. Meanwhile, for villagers, the area of land tenure is an indicator of their level of social status, and most of the farmers live in rural areas [9]. In addition, one of the indicators measuring the level of farmers' welfare in the form of the Farmer's Exchange Rate explains that if the farmer's exchange rate is low, the farmer cannot meet the needs of his life and his family properly, but if the farmer's exchange rate is high, the farmer will experience prosperity [10]. Thus, the farmer's exchange rate ratio can be used as an indicator of farmer welfare, but it is not entirely correct, because the welfare of farmers and their families is qualitative, while the farmer's exchange rate is quantitative [11].

Agricultural digitalization is an innovation of appropriate agricultural technology that can be adopted by farmers. Within this digitization, there are various technologies such as: sensors, robots, digital communication tools, blockchain, computational decision and analysis

tools, and big data and cloud-based technologies [12]. The use of digitalization technology has proven to be able to assist farmers in making smart decisions and actions in an effort to increase efficiency in agricultural practices [13].The goal with the presence of digitalization in agricultural agriculture, farmers are expected to produce production and farmer welfare, besides that farmers are expected to be able to adopt renewable innovations that can be profitable for and so that they can be independent. Therefore, referring to the background and formulation of the problem above, this research aims to see the effect of implementing agricultural digitalization innovations on the welfare of farmers in era 5.0.

2 METHODOLOGY

This article was made using the literature study method by collecting secondary data from the library and reading and recording the information that was felt to be needed in this paper. The source of the library used in this paper comes from data from the Central Statistics Agency, modules, journals, previous news and updated news, the Ministry of Agriculture website. This article is used to find the relationship between the implementation of agricultural digitization and the level of farmers' welfare.

3 RESULTS

Digitization is a breakthrough innovation in the sector in which there is artificial intelligence which is expected to help work and or provide information needed for farmers in their agricultural activities. So that farmers do not need to spend a lot of energy in their cultivation activities, then what should be done can use modern technology designed with artificial intelligence. In addition, with the digitalization of agriculture, they can reach or access information or news that they have never received before. From time to time, the government tries to make the technologies used by farmers to support and facilitate activities in their cultivation more advanced, either through general research or adopting the results of university research. So that

previously farmers still used conventional methods in their cultivation activities, now there are many choices of ways to help farmers work through agricultural digitization. Just like when farmers want to plow their fields, they need the help of animal power such as cows and buffalo, but in this traditional way there are many weaknesses, then comes technology in the form of a hand tractor machine. The tractor machine tool is used more efficiently so that the traditional method is increasingly being abandoned. However, due to the need to be able to produce more quickly and more then a more modern tractor engine emerged, the four-wheel tractor. In addition, the government also focuses on developing platforms, innovations, financial assistance, insurance, to support and facilitate agricultural activities which are then expected to realize the digitalization of agriculture in Indonesia and the level of farmer welfare can increase.

Agricultural platforms are digital innovations that can be accessed by farmers in order to obtain information related to agriculture. The agricultural platform can be accessed by farmers using a smartphone or computer connected via the internet. In the platform, there is a variety of information that can be obtained by farmers, for example related to fertilizer doses, market opportunities, weather forecasts, recommendations for eradicating pests and diseases in plants, and much more. Farmer-accessible farming platforms include Agree, iTani, Plantix, TaniHub and others. In the use of digital platforms, it is necessary to have an intermediary media, namely smartphones and internet networks. In Indonesia itself, it is not easy to put a smartphone in the hands of farmers, because to get it, farmers have to spend quite a lot of money, because the smartphone is a sophisticated innovation technology, so the price is relatively expensive. In fact, most Indonesian farmers only have land tenure of less than 0.5 ha or status as small farmers or farm laborers which will then have an impact on their income or profits. From his income, he can only provide for his living expenses and his family. If a farmer wants to have a smartphone, he must save first. This has a negative correlation, that is, farmers who do not have other jobs or side jobs, the income obtained from farming

cannot meet their daily needs [14]. In addition, internet access in Indonesia is not evenly distributed, especially in remote areas, while most Indonesian farmers live in rural areas. On the other hand, the use of digital technology has not yet become a priority for the government. This can be seen in the Strategic Plan of the Ministry of Agriculture of the Republic of Indonesia from 2020 to 2024 which has not specifically outlined strategies for adopting digital technology. Meanwhile, the number of Indonesian agricultural households that use the internet is only 4.5 million out of 27.6 million agricultural households domiciled in Java, while farmers with land ownership of more than two hectares are dominated outside Java.

The low awareness of farmers to adopt digital technology is also a problem in the realization of agricultural digitization. Meanwhile, whether or not someone quickly adopts an innovation can be influenced by the level of education [15]. In Indonesia, the level of education of farmers is still dominated by the level of education in elementary and junior high schools. Meanwhile, for college graduates and diplomas, only 0.57%. The beginning of the innovation adoption process came from non-formal education activities in the form of agricultural extension activities. Extension workers offer agricultural innovations to influence changes in the behaviour of farmers and their families. There are five stages in the innovation adoption process, namely; awareness, interest, evaluation, trial, and adoption. From each stage of the adoption process, the extension worker must be able to give attention and awareness to the target, instil confidence in the farmer, provide consideration for the target, provide technical data that can convince the target, and continue to accompany or guide the target [16].

Regarding the innovation adoption process, the target first goes through the learning process. In this regard, in the learning process, the age of the student becomes one of the psychological factors that affect the learning process [17). By default, a person's average learning ability will increase along with the increase in the work function of the muscles of the senses of hearing, sight, smell, taste,

and touch which will be the stimulus for the entry of stimuli in a person. At the age of 25 years is a peak and will decrease slowly until the age of 60 years. Then the average learning ability of a person will decrease drastically after the age of 60 years. According to the 2018 BPS, the age of farmers in Indonesia is dominated by the age range of 45 - 54 years with a total of 7.8 million farmers, while those aged less than 25 years are only 274 thousand farmers and the age range of 25 - 34 years is 2.95 million farmers. Therefore, to be able to realize the digitalization of agriculture in Indonesia, it is necessary to regenerate farmers and have intensive assistance from agricultural extension workers and support from the government. With the implementation of agricultural digitalization in Indonesia, it is expected that there will be an increase in agricultural productivity which will then realize food self-sufficiency. Then it will also have an impact on increasing farmers' income, which is expected to increase the welfare of farmers as well. Indicators that can be used to measure farmers' welfare are: (1) income structure development, (2) food expenditure development, and (3) Farmer's Exchange Rate. But in this paper, the author will only discuss the three points, namely the exchange rate of farmers.

Farmer's Exchange Rate is the ratio between the price index received by farmers and the price index paid by farmers. If the farmer has a farmer's exchange rate of more than one hundred, then the price received by the farmer is greater than the price index paid by the farmer. Meanwhile, if the farmer's exchange rate is equal to one hundred, then the relationship between the level of commodity prices sold by farmers and the prices of goods purchased by farmers is the same. And if the farmer's exchange rate is less than one hundred, then the price received by the farmer is smaller than the price index paid by the farmer. The price index received by farmers is a price index that shows the price of farmers' production, while the price index paid by farmers is a price index that shows the price of needs (for consumption and for the production process) of farmer households [18]. The higher the farmer's exchange rate, the better the farmers' purchasing power for consumption products and inputs and means that they are

relatively more prosperous. Farmer exchange rates can vary from region to region and often fluctuate over time. This farmer's exchange rate has a very strong relationship with poverty in rural areas, because most of the farmers live in rural areas, so that even though the exchange rate of farmers has increased, rural poverty will also increase, this is due to the human resource factor. inadequate so that farmers who are not familiar with agricultural technological innovations are growing rapidly.

To improve the welfare of farmers, the government has three strategic programs, namely: (1) Provision of People's Business Credit Services, (2) the three-time export movement program, and (3) the establishment of a strategic command for agricultural development. People's business credit services as assistance in agricultural financing can be provided or lent by the government to farmers after the farmers meet the applicable terms and conditions. People's Business Credit has a low interest rate of 6% per year. With the existence of people's business loans, farmers can be helped in terms of financing from planting to harvesting so that farmers' productivity is expected to increase. In addition, with the existence of this people's business credit, farmers can improve their standard of living and are free from the entanglement of middlemen and the financing of people's business credit is in accordance with the needs of farmers in the form of a payment system after harvest [19]. Meanwhile, in the three-time export program, the government believes that by using technology, innovation, networks and strong cooperation, access to information related to the potential of export commodities in each region will be wide open and have export destinations that can be accessed through the application of maps of export potential and Indonesia. Maps of Agriculture Commodities Export. Meanwhile, the development strategy command program will function as a reinforcement of the extension function as the spearhead in monitoring field conditions in each sub-district (Ministry of Agriculture).

With the innovation of agricultural digitalization that is growing, it is hoped that its implementation can help and facilitate the work of

farmers and can access related information in the outside world, so that farmers can adopt innovations that can be useful in their farming activities which can then make their farms experience an increase in the amount of production. and get the right selling price for himself and the market. In addition, the importance of using digital technology also affects the development process, especially agricultural development which will then have an impact on the development of other sectors.

4 CONCLUSIONS

Agricultural digitalization is one of the innovative technologies in agriculture whose use can significantly help or ease the workload of farmers. The agricultural sector is the most important sector for developing countries, so development in the agricultural sector is one of the strategies that can be used in the country's development process. The government gives more attention to the agricultural sector is one thing that will have a positive impact on the country. One of the positive impacts is the increase in the number of welfare in the community, which is known to be the majority of those who work in agricultural households. However, the implementation of agricultural digitalization at the present time will be difficult to implement, because one of the subjects in agriculture, namely farmers who play an important role in agriculture towards the linkage to innovation adoption is still low. 54 years old who are known to be in the learning process have psychological limitations, so farmers with this age range must have more special attention from agricultural extension workers who play an important role in facilitating their learning. In addition, the number of farmers with the age of less than 25 years is far less than the 45-54 year age range, so instilling motivation and awareness of farmers at that age is very important. Therefore, it is very important to have agricultural regeneration in Indonesia.

Digitization of agriculture is one of the means to realize the welfare of farmers. The farmer's welfare indicator that has a lot of attention is the farmer's exchange rate. The percentage of the farmer's exchange rate shows the level of welfare of the farmer himself, but the farmer's

exchange rate is quantitative, while the farmer's welfare is qualitative. This article is an article sourced from a literature study, so its validity or truth is still uncertain, so further research needs to be done regarding the relationship between the existence of agricultural digitization and the welfare of farmers by using samples and primary populations in order to prove the truth.

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