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Digitalization of the Agricultural Sector to Reduce Farmer Poverty in Indonesia: A Systematic Literature Review

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ABSTRACT

This study aims to describe efforts that can be made so that the agricultural sector is able to utilize technology and agricultural digitalization offered by the Industrial Revolution 4.0, so as to reduce farmer poverty in Indonesia. This research method uses a quantitative approach. The data used are secondary data, sourced from books, journals, documentation or publications from the Central Statistics Agency (BPS), the Ministry of Agriculture, and publications from other institutions relevant to this study. The data analysis used is a systematic literature review. The results of this study indicate that the use of technology in the agricultural sector is still minimal. Furthermore, by utilizing the industrial revolution, there are several steps that can be taken to prepare farmers to welcome Indonesia Emas 2045, including: improving the linkage between farmer groups and agro-industry; increasing incentives for research and development activities in the agricultural sector; developing agricultural products that focus on superior commodities; resolving fertilizer issues; building synergy with banks and other financial institutions; encouraging the use of mobile phones or smartphones in agricultural production; and intensifying the performance of technology and information service providers.

Keywords: Agricultural, Digitalization, Farmer, Golden Indonesian Vision 2045, Poverty, SLR

INTRODUCTION

In 2045, Indonesia aspires to become a country that can escape the middle income trap. The government has a target of 2045 for Indonesia's per capita income to be US$ 23,199. The figure that the government is touting is indeed very large because it means

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an increase of almost five times. Of course, it is not easy to achieve it. There are many things that need to be improved, especially productivity and technology (Noerhadi, 2022).

The ideal of Golden Indonesia 2045 is very noble. Therefore, it must be appreciated, understood and become a common goal of all components of the nation. This ideal means that all children of the nation, working in any sector, wherever they are in 2045 when this Republic is a century old, then the per capita income will reach US$ 23,199 per year. A very high figure.

Observing the existing facts, one common thread can be drawn that this target is a big challenge for the agricultural sector workforce. This can be seen from the wage side, the agricultural sector is indeed far behind when compared to other sectors. In 2019, the average monthly wage gap between agricultural and industrial workers was almost 72 percent. This means that the processing industry has much higher welfare than workers in the agricultural sector (Heriqbaldi & Rahman, 2020).

In addition, the most fundamental issue today, and must be part of the national agricultural policy, is the welfare of farmers. During the 2009-2019 period, the number of workers in the agricultural sector decreased by more than 7 million people. There are many aspects that can be conveyed related to the decline in the number of workers. On the one hand, this decline is positive because workers are shifting to other sectors such as industry and services. However, on the other hand, the decline in the number of workers also signals that this sector is not so attractive as a source of livelihood. Choosing to become a farmer means saying goodbye to welfare.

Not only recording the negative side, the agricultural sector also displays a positive portrait. When various other sectors that form GDP experienced negative growth during the Covid 19 pandemic, the agricultural sector actually recorded positive growth. An achievement that must be appreciated (Ilyas, 2022). The contribution of the agricultural category to Gross Domestic Product (GDP) at Current Prices in 2020 was 13.70% or an increase of 0.99% compared to the previous year. The order of the largest contributions to GDP in 2020 in the agricultural subcategory is plantation crops (3.63%), food crops (3.07%), fisheries (2.80%), livestock (1.69%), horticultural crops (1.62%) forestry (0.70%), agricultural and hunting services (0.20%) (BPS, 2021).

Meanwhile, according to the World Food Programme report, one in every nine people on earth, or 805 million people, lacks food for a healthy and active life. With population growth expected to exceed 9 billion people in the next 30 years, the amount of food production must be increased by another 70 percent. Otherwise, the world's population will become even hungrier (Ross, 2018).

The basic question is, is it possible to increase food production according to the needs of the population of this country? Including what efforts must be made to achieve

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these goals? The answer to the first question is that with a spirit of optimism, this country is able to increase agricultural production according to the needs of all citizens. Meanwhile, the answer to the second question, efforts to increase agricultural production are to digitize agriculture. Utilizing the latest technology, as a product of the industrial revolution 4.0 such as Artificial Intelligence (AI), Internet For Everything (IOT), robotics and others in the development of the agricultural sector. However, there are less pleasant notes regarding the use of technology in managing the agricultural sector.

According to the release of the 2018 BPS (BPS, 2019) Inter-Census Agricultural Survey (SUTAS), it was found that farmers were still predominantly not using the internet, the percentage was around 86.56 percent or the same as 28,986,391 people. For Southeast Sulawesi Province, the number of farmers who had not used the internet was 315,566 people or 85.63 percent. Not to mention if you look at the level of education of farmers, the majority of whom were still low, only elementary and junior high school graduates. This reality is a big challenge for this republic in its efforts to achieve the target of Golden Indonesia in 2045. Therefore, it is considered very necessary to prepare farmers in this case by equipping farmers with the knowledge, abilities, and technological skills needed in this era of the 4.0 revolution, so that they can improve the welfare of farmers, which in the end the achievement of Golden Indonesia 2045 can be realized.

LITERATURE REVIEW

1. Vision of Golden Indonesia 2045

Vision of Indonesia 2045 is a concept of aspirations of the Indonesian nation and state in accelerating development goals towards 100 years of Indonesian independence. With an emphasis on human development, mastery of science and technology, and utilization of economic resources in a sustainable and equitable manner. The Indonesian economy is estimated to become a high-income country with a per capita income of US$ 23,199 and the fifth largest economy in 2045 (Prijambodo, 2018).

Indonesia is able to be self-sufficient or even become an exporter or world food barn. Therefore, agricultural and food development is directed to make Indonesia a world food barn in stages. The first priority is to realize food self-sufficiency, especially rice, as the main pillar of national food security. In 2045 Indonesia has a vision of becoming a world food barn (Sulaiman et al., 2018).

2. Industrial Revolution

Human life has entered a new era, namely the Industrial Revolution 4.0. According to Shwab (2019) the world has experienced four stages of revolution, namely: 1) Industrial Revolution 1.0 occurred in the 18th century through the discovery of the steam engine, 2) Revolution 2.0 occurred in the 19th-20th centuries through the discovery of electricity,

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3. Industrial Revolution 3.0 occurred around the 1970s through the use of computers and 4) Industrial Revolution 4.0 occurred around the 2010s through internet engineering. The Industrial Revolution 4.0 fundamentally changed the way humans live and relate to each other. This era disrupts various human activities in various fields, not only in the field of technology but also others such as economics, social and politics (Prasetyo & Trisyanti, 2018).

Technological developments have challenges and opportunities (Doris & Naisbitt, 2018). In agriculture, digital technology can be utilized during the on-farm and off-farm processes. Mobile technology can also be used for agricultural innovation. This aims to increase opportunities for farmers to access information about agricultural commodities through information services about agricultural commodities. the information can be about commodities, such as seed prices and fertilizer availability, commodity prices in the market, area of commodity crops, predicted harvest times and facilities for gathering farmers (Puspitasari, 2020).

3. Agriculture and Economic

Development Agriculture is a business activity that includes the cultivation of food crops, horticulture, plantations, livestock, fisheries, and forestry (BPS, 2021). The contribution of the agricultural sector to economic development lies in: (i) providing an increasing food surplus to the growing population, (ii) increasing demand for industrial products and thus encouraging the need to expand the secondary and tertiary sectors, (iii) providing additional foreign exchange income for imports of capital goods for development through continuous exports of agricultural products, (iv) increasing village income to be mobilized by the Government, and (v) improving the welfare of rural people (Jhingan, 2008).

The Agricultural sector and farmer play a crucial role in providing food, creating employment opportunities, contributing to economic growth, and aiding in proverty alleviation (Pangondo, et al, 2024). The contribution of the agricultural category to Gross Domestic Product (GDP) at Current Prices in 2020 was 13.70% or an increase of 0.99% compared to the previous year. The order of the largest contributions to GDP in 2020 in the agricultural subcategory is plantation crops (3.63%), food crops (3.07%), fisheries (2.80%), livestock (1.69%), horticulture (1.62%) forestry (0.70%), agricultural services and hunting (0.20%).

The agricultural production index in 2020 increased by 5.12 points compared to 2019, namely from 162.43 (fixed figure) in 2019 to 167.55 (provisional figure) in 2020. This was due to an increase in the livestock, horticulture, plantation, and livestock production index. The farmer exchange rate in 2020 was 105.83 with the farmer price index (It) of 107.46 and the farmer price index (Ib) of 104.23. The farmer business exchange rate in 2020 was 105.18.

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METHODS

This research method uses a quantitative approach. The data used are secondary data, sourced from documentation or publications from the Central Statistics Agency (BPS), the Ministry of Agriculture, and publications from other institutions relevant to this research. The data required are data on the number of farmers, farmer income, agricultural production, and the number of farmers who use and do not use the internet. The data analysis used is a Systematic Literature Review (SLR). The stages of data analysis include: data collection, data tabulation, data reduction and analysis and data interpretation.

SLR is a method in this observation by reviewing certain discussion topics that focus on specific problems that have been identified and classified in a structured manner, assessed, concluded and selected based on previously determined benchmarks based on evidence and facts from quality research that is relevant to the research question (Latifah & Ritonga, 2020)

RESULTS

In underdeveloped or developing countries, such as Indonesia, food production dominates the agricultural sector. If output increases due to increased productivity, then farmers' income will increase. Increased farmer income as a result of agricultural surplus tends to improve the welfare of rural areas (Jhingan, 2008).

The UNDP development concept emphasizes the human development approach with four pillars of development: empowerment; equity, productivity and sustainability. The empowerment aspect is interpreted as an effort to dynamize community groups that have productive capacity but lack opportunities for access to the environment and modern businesses without having to become victims of foreign value and institutional transplantation. Then the aspect of equality or justice means the availability of equal, balanced and fair opportunities in the use of their resources to improve their standard of living. While the productivity aspect is interpreted as an effort to increase economic growth that must be friendly to the workforce (Marsuki, 2005).

DISCUSSION

History provides ample evidence of the crucial meaning of large-scale cooperation. Victory almost always falls to those who work well together (Harari, 2019). The conclusion conveyed by Harari, if internalized in the agricultural sector, is that to achieve victory, success, all stakeholders must build cooperation, establish synergy and have the same vision and mission.

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Effectiveness in the agricultural sector refers to government programs with an ill ustration of how much the agricultural sector contributes to providing food and industri al raw materials, earning foreign exchange, absorbing labor, the main source of income f or rural households, and playing a role in efforts to provide food (Marhaen, et al, 2024).

Starting from the farmers themselves, entrepreneurs or investors, financial institutions or banks, Research and Development (R&D) Institutions, Telecommunications Service Providers, and the Government - both central and regional - as regulators and facilitators of agricultural development.

The first step that can be taken is to improve the linkage between farmer groups and the agro-industry, so that price certainty is more guaranteed. And what is more certain is that production can be guaranteed. Considering that so far, what has been very often experienced when there is a big harvest, the price of agricultural commodities has plummeted. Increasing agricultural productivity actually reduces the level of farmer welfare.

Furthermore, the second step on the supply side, incentives for research and development activities in the agricultural sector must be increased to encourage research-based agriculture and the use of technology. It is no longer a public secret that countries that are advanced in the agricultural sector are countries that focus on Research and Development (R&D). The latest available data shows that Indonesia's R&D cost proportion to GDP is 0.085 percent. This figure is far compared to Malaysia which is at 1.2 percent and Thailand 0.44 percent (Heriqbaldi & Rahman, 2020). With the establishment of BRIN as the national research center, optimization of R&D in the agricultural sector can be implemented. Products based on R&D certainly have advantages over agricultural products without research. Both in terms of quantity and quality are very different.

The third step is the development of agricultural products that focus on superior commodities, export-oriented and have added value. This step is important to take considering the government's fiscal limitations. If there are too many commodities to be developed, the budget requirements will certainly be high, while currently sharing policies or programs is always constrained by the problem of budget limitations. In addition, agricultural development that focuses on products that are comparative advantages will provide maximum benefits and make it easier to win global competition. For example, for the fisheries sub-sector, it focuses on grouper, seaweed and sea cucumber commodities. For the plantation sub-sector, it focuses on cloves, nutmeg and pepper. Meanwhile, the food subsector focuses on rice and tubers. This policy can also be internalized in each province. In Southeast Sulawesi, it can focus on developing cashew nuts, cloves, seaweed and others. In accordance with their comparative advantages.

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The fourth step is to resolve the fertilizer problem. This problem includes the high cost and scarcity of fertilizer. In fact, everyone knows that fertilizer is a basic component that greatly influences agricultural productivity. The subsidized fertilizer policy does not provide a solution so that prices become cheap and supplies are easy to obtain, in fact the opposite happens. During the planting season, when plants need fertilizer, it turns out that fertilizer becomes scarce, even if there is any, the price is definitely expensive. A classic dilemma that farmers have always experienced, until now and has not been resolved. Therefore, it is necessary to change the strategy for providing commodity subsidies, in this case fertilizer subsidies. This policy aims to reduce the occurrence of misuse of subsidized fertilizer distribution. Commodity subsidies always provide loopholes for the mafia to enrich themselves and impoverish farmers. There are no more fertilizer subsidies, but farmers receive assistance. For example, Non-Cash Food Assistance (BPNT). This policy will be successful if farmer data is improved and validated. If the government can create the Healthy Indonesia Card (KIS), Smart Indonesia Card (KIP), then it is not difficult to create the Indonesian Farmer Card (KPI). Or whatever it is called, what is certain is that with this card farmers can buy their agricultural needs in an easy way. With this card, it will close the opportunity for the fertilizer mafia to carry out their actions.

The fifth step is to build synergy with banks and other financial institutions. Specifically for banking, the government can focus more on its intermediation activities to finance agricultural sectors that have been prioritized for agricultural development in the regions. It might also be possible to think in the future whether it is necessary to create a special bank for the agricultural sector or at least have a special channel for financing the development of commodities that have been selected for the development of the agricultural sector in a region. This idea is not too difficult. If there is a bank that can focus on providing housing loans - and that is profitable - then it is very possible that there will be a bank that focuses on agricultural loans.

The sixth step is to encourage the use of mobile phones or smartphones in agricultural production. With mobile phones, they can be used as a means of education, socialization and sharing information for farmers. As a means of sharing information, related parties can provide information that is very much needed by farmers. For example, information about planting times, information about the weather, commodity prices and markets that can be accessed by farmers. With the guarantee of this information, farmers will no longer experience crop failure due to weather factors, or prices will plummet due to farmers' ignorance of market information. The industrial revolution 4.0 which provides AI and IOT platforms makes it possible for this to be implemented. Of course, in an easy way, at a low price with a high level of accuracy. It remains to be seen how the agricultural sector utilizes this.

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The Seventh Step is to intensify the performance of technology and information service providers. As explained in the introduction, the number of farmers who have not used the internet is still very high. Therefore, this problem must be resolved because the use of technology in the industrial revolution 4.0 will not be possible without optimal support from telecommunications service providers. Various challenges in the use of digital-based agriculture include uneven digital infrastructure, minimal Human Resources (HR) in the digital sector, there are still people who do not have the means to access the internet and so on.

It is undeniable that there are still many areas where the quality of the internet network is still not good. Especially in Indonesia, which consists of many islands. So how can people access digital services if the digital infrastructure is inadequate or even not available at all.

Another factor is that even though the majority of people already have devices to access internet services, in fact there are still people who do not have them. Economic conditions are certainly the main cause. Therefore, this is where the government's role is, to identify those who do not have the access tools and formulate practical solutions that can be done to reduce the problem. The steps that can be taken are for residents who do not have the means to access the internet, then they are prioritized to be assisted and served at the village office where they live.

CONCLUSION

Some conclusions found in this study are:

1. The majority of farmers who have not used the internet confirms that the use of technology in the agricultural sector is still minimal.
2. The level of education of farmers who are still predominantly elementary school and junior high school graduates is a strong signal that the level of education of the workforce in the agricultural sector is still low.
3. The agricultural sector has very good prospects. Its growth is still on a positive trend.

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