Analysis Of Megatrend Variables For The Future Of Agriculture In Encouraged Green Economic Sustainability

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Abstract: In this journal, an analysis of future megatrend variables in agriculture is conducted and then correlated with green economy. The results of this research indicate that the key variable in future megatrends for agriculture that influences the green economy is technological advancement, serving as agricultural innovation to facilitate the realization of sustainable farming. Climate change is identified as a supportive variable in the future megatrends of agriculture, as farmers will analyze climate based on their knowledge. Environmental integrity is a variable to be considered in agricultural production, with one of the policies being ESG (Environmental, Social, and Governance) with the assistance of the banking sector to achieve a green economy. Labor force is a driving factor in realizing future megatrends because agriculture requires a workforce. Lastly, the most crucial variable is the education of farmers to achieve future megatrends. Using the Sustainable Development Goals (SDGs) approach will assist in completing this research, with six goals employed to establish the correlation between future megatrends in agriculture and a sustainable green economy.

Keyword: Sustainable agriculture, green economy, SDGs.

Introduction

The Indonesian government has prepared a new capital, Nusantara, located in East Kalimantan, with various sustainable goals and programs, including in the agricultural sector. Indonesia has prepared 24.7 hectares of agricultural land in IKN as a foundational effort to build food security in IKN. Besides supporting food resilience, the Future Megatrend in agriculture also helps address global inflation. Agriculture is a highly prioritized sector in centralized national development (Ufira and Rita, 2016).

The Future Megatrend encompasses all human capabilities needed to advance technology while considering the environment in the future, including developments in IoT, climate change, urbanization and mobility, employment, and education. If correlated with agriculture, it will create agricultural stability in the future, especially in 2045, which is Indonesia's golden year when Generation Z will become the main stakeholders in Indonesian agriculture. Sustainable agriculture includes various production and distribution methods with environmentally friendly technology. According to Salikin (2003), sustainable agriculture can be implemented through organic farming, integrated farming, integrated pest management, urban farming, and LEISA (Low External Input Sustainable Agriculture). Additionally, sustainable agriculture has its own principles: (a) using effective, productive, and low-cost external input systems, and eliminating production methods that use industrial input systems; (b) understanding and appreciating local wisdom and involving more farmers in the management of natural and agricultural resources; (c) implementing conservation of natural resources used in the production system (Shepherd, 1998, in Budiasa, 2011).

The green economy aims to build an economy with the idea that entrepreneurs reduce the risk of environmental damage. "Promoting a green economy as a new source of sustainable economic growth in the future is a necessity for global good. Besides, we must also focus on embracing every opportunity to achieve a just and affordable transition," said Sesmenko Susiwijo. Additionally, the green economy is related to controlling economic deficits and can reduce the risk of inflation. Dogaru (2021) also states that the green economy involves activities from the start of production, distribution, to the level of consumption related to sustainability.
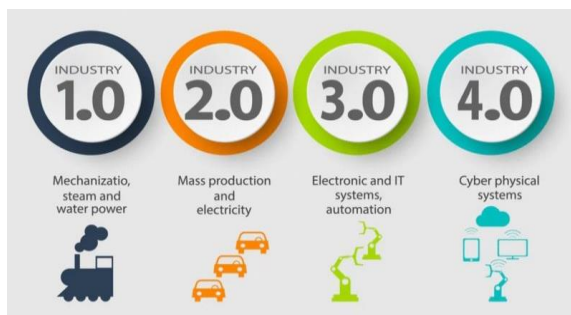
Methods

In this journal, the data source used is secondary data, which is obtained from intermediaries related to past and ongoing research. Additionally, data is collected indirectly through books, articles, journals, and documentation that can serve as evidence that this research was indeed conducted (Sugiyono, 2016). This analysis employs descriptive analysis using secondary data from the Central Bureau of Statistics (BPS), Bappenas data, and research journals. The data analysis technique used in this journal involves analyzing various patterns and themes based on the data, and then correlating the collected data. This technique is employed to obtain a foundation and information, as well as to gather written opinions and understand the literature related to the research (Nazir, 2013).

Results and Discussion

Analysis of Future Megatrend Factors in Agricultur

Technological development is linked to the evolution of industry from 1.0 to 4.0. With the end of Industry 1.0, Industry 2.0 emerged, followed by the Industrial Revolution eras 3.0 and 4.0, which have continued into the present day (Gufron, 2018).

*Gambar 1 Perkembangan Industri 1.0 sampai 4.0*

Sumber : Kompasiana.com

In agriculture, particularly rice (Oryza sativa), the latest food production technology systems used by farmers include two application methods. The first is the level of technology application (PTT), which uses chemical and organic fertilizers. The second method is the system of rice intensification, which uses organic fertilizer without chemical additives, although this can reduce productivity compared to the PTT method (Vini, 2021).

Climate change phenomena impact rainfall in several regions, manifesting in uncertain seasons. Increased rainfall can lead to potential floods and landslides, reducing agricultural land areas (Pradana and Sesanti, 2018). Utilization of climate information or knowledge for the agricultural sector in Indonesia is still very minimal, even though a large portion of the Indonesian population relies on agriculture for their livelihood. Climate knowledge, including predictions and characteristics, is essential for farmers to determine what crops to plant, when to plant them, and their production strategies (Kamala et al., 2015). In Bogor, there is a policy for climate index-based agricultural insurance, where local farmers consider local climate variability and socio-economic conditions, making agricultural insurance a protection against economic losses due to climate disasters (Wati et al., 2016).

Land clearing for agriculture promotes environmental stability as it enhances carbon dioxide filtration on the Earth's surface. According to Noviyanti (2021), human-utilized agriculture involves the physical and biotic environment correlating with human welfare, such as in agriculture, mining, housing, transportation, and industry for commodity production. The future megatrend in agriculture aims to maintain environmental stability, preventing air pollution through controlled land clearing. Additionally, environmentally considerate land clearing can boost the economy, increasing national income.(Margolang & Nurhasanah, 2023)

In the future, the demand for jobs will rise due to continuous population growth. In North Sumatra, the percentage of informal agricultural labor reached 80.76% in 2020, increasing to 82.88% in 2022 (BPS, 2023).

Gambar 2 Grafik Rumah Tangga Usaha Pertanian 2003-2013
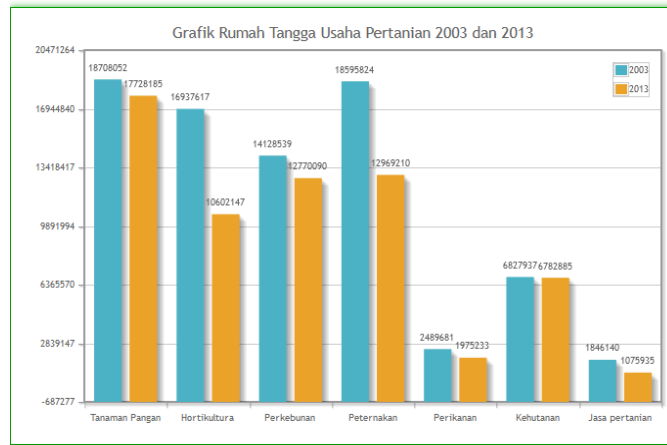
Sumber : BPS dalam Sensus Pertanian

Therefore, enhancing agricultural efforts is crucial, as seen in smallholder farmers (households), where 25,751,267 agricultural households were recorded using land (BPS, 2023). Allocating household labor is a strategy to sustain farmers' household income. According to Ngadi (2020), farmers' households should allocate members to the labor market to maintain labor interest stability in the agricultural sector. Achieving future megatrends requires a high level of education among farmers to attain sustainable agriculture. Education provides knowledge and skills for better human resource investment, leading to a better life. Higher education levels typically result in jobs with more responsibility and higher pay compared to lower education levels (Purnami, 2016).

Future Megatrend in Agriculture and Its Impact on the Green Economy

The increasing prevalence of environmentally conscious agricultural products is a form of green policy implementation aimed at achieving sustainable living stability. Technological advancements in the agricultural sector facilitate farmers in boosting their production, thereby creating a robust economy for them. Additionally, the implementation of ESG (Environment, Social, and Governance) practices by farmers in Indonesia ensures that agricultural entrepreneurs consider environmental, social, and corporate governance impacts. Meanwhile, banks are enhancing their green economy policies by providing capital to entrepreneurs who adhere to environmental, social, and corporate governance aspects. A high level of education among farmers fosters a deep understanding of environmental care and the impact of climate change on their production, leading to job creation in the agricultural sector and ultimately contributing to a sustainable green economy.

Skema 1. Pengaruh *Future Megatrend* pertanian terhadap ekonomi hijau
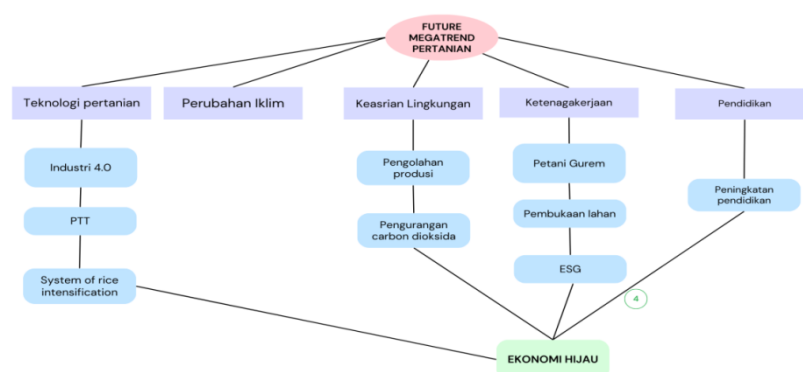
In this approach, the SDG goals related to this study are Goal 2: "No Hunger," emphasizing the need for increased food production in agriculture. According to FAO, by 2050, the agricultural and food sector must increase supply by 50% to meet the growing demand for food. Additionally, Goal 4: "Quality Education" is highlighted, focusing on educating farmers to realize future agriculture. Moreover, Goal 9: "Industry, Innovation, and Infrastructure" encompasses innovation in agriculture, including agroforestry, mixed cropping, integrated farming, and STS. Innovation also stems from the development of IoT. As Anton explained at the BSSN-Huawei Cyber Hunt event on 'Cybersecurity for IoT,' in 2014, there were approximately 16 billion connected devices, which was expected to reach 28 billion by 2021. However, by 2020, there were already 31 billion devices

Goal 13: "Climate Action" emphasizes the importance for agricultural developers to consider climate changes as they significantly impact production. Additionally, the utilization of production results must be managed to prevent carbon emissions from affecting the climate. Goal 6: "Clean Water and Sanitation" is another critical factor in agriculture, highlighting the need for proper irrigation and clean water for plant growth.

The interrelation of the SDG goals with future megatrends in agriculture will be correlated with sustainable green economy goals, such as Goal 8: "Decent Work and Economic Growth." Maintaining economic growth in agriculture is a government obligation, particularly in the agricultural sector. In 1998, Indonesia experienced its most significant economic crisis since independence, and agriculture contributed to stabilizing the economy, preventing it from falling further. Thus, agriculture is a crucial sector influencing the economy.

Skema 2. pendekatan SDGs terhadap future megatrend pertanian dan ekonomi hijau berkelanjutan

The use of land for the new capital city will reduce the agricultural reach, causing farmers to lose their primary jobs and shift to other professions to meet the human resource needs offered by the government and private sectors. The loss of agricultural land will impact the region's food security; the more land converted to buildings or infrastructure, the fewer food suppliers the region will have. The relocation of the government will positively contribute to Indonesia's economy, particularly in East Kalimantan. Trade flows to the new capital will increase significantly, and good productivity, innovation, and technology will drive the capital's optimal advancement (Amila, 2023). Regions in Indonesia will experience a 50% increase in trade flow if the capital is moved to Kalimantan. Additionally, investments in other provincial areas will expand, resulting in increased output (Giating Khoiriamal et al., 2022). The government's plan to relocate the capital to East Kalimantan is expected to reduce or maintain the inflation rate in Indonesia (Alinda and Adinugraha, 2022).

Conclusion

Future megatrend factors have become an obligation for farmers, especially in Indonesia. Educational and employment factors, along with technological advancements in the agricultural sector, create a green economy. By considering future megatrend factors in agriculture, farmers can improve their economy while taking good care of the environment. The SDGs encourage people to develop innovations, particularly in the agricultural sector, to achieve the SDGs' goals. The impact of the new capital city (IKN) will provide a platform for developing future megatrend agriculture.

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