

## AGRICULTURAL SECTOR TRANSFORMATION AND ITS IMPACT ON RURAL DEVELOPMENT

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**Abstract:** Agricultural sector transformation plays an important role in promoting rural development, especially in developing countries. This article aims to explore the process of agricultural sector transformation and its impact on social, economic and environmental aspects in rural areas. Using the literature review research method, this article analyzes various studies and reports relevant to agricultural sector transformation and its benefits for development in rural areas. The results show that technological modernization, product diversification, and the adoption of sustainable agricultural practices have contributed positively to increasing the productivity and welfare of rural communities. Agricultural sector transformation has an impact on changes in the economic structure in rural areas. In addition, agricultural sector transformation also has a socio-economic impact through improved quality of life, education, and poverty reduction. In addition, research results also show that transformation through digital agriculture will improve environmental sustainability. However, this transformation also presents challenges, such as unequal access to technology. This article recommends strengthening inclusiveness-based policies, improving access to technology, and empowering local farmers to maximize the benefits of agricultural sector transformation for rural development. Thus, agricultural sector transformation is not only a catalyst for economic development, but also an important instrument in creating social and environmental balance in rural areas.

**Keywords:** Agricultural Transformation; Digital; Rural Development.

### Introduction

The agricultural sector plays an important role in economic development, especially in developing countries (Hassan et al., 2020). In Indonesia, this sector is one of the backbones of the economy, as it not only provides food needs for the community, but is also the main source of livelihood for most of the rural population. In addition, the agricultural sector also has a significant contribution to economic growth. This is based on data published by Satu Data Pertanian that during 2019 to 2022, the broad agricultural business sector (including forestry and fisheries) ranked second after the manufacturing sector with an average contribution of 13.02% to Indonesia's GDP. This can be seen in the following figure.



**Table 1: Contribution of the Broad Agricultural Sector to Indonesia's GDP, 2019-2022**

Source: Ministry Of Agriculture, 2023

The contribution of the broad agricultural sector to Indonesia's GDP during 2019-2022 on average showed an increase in its contribution, namely in 2019 it contributed 12.71% then increased to 13.70% in 2020, then decreased to 13.28% in 2021 and 2022. However, with technological developments, globalization, and climate change, the agricultural sector is experiencing major challenges that force transformation to remain relevant and sustainable (Singh et al., 2018).

The transformation of the agricultural sector involves significant changes in the structure, technology, and pattern of production. This transformation involves the modernization of equipment, the use of digital technologies such as the Internet of Things (IoT) and Artificial Intelligence (AI), and the integration of sustainable agricultural practices (Wijayanto & Puspitojati, 2024). This process not only aims to increase productivity, but also maintain a balance between environmental sustainability and farmer welfare. This transformation is particularly relevant in the face of global challenges, including food security, environmental degradation and international market dynamics.

On the other hand, the impact of this transformation on rural development is one important aspect that must be examined. The agricultural sector is closely related to the dynamics of rural life, both in terms of economic, social and cultural aspects. When the agricultural sector undergoes changes, this will have direct implications for the living conditions of rural communities, such as access to technology, increased income, and changes in work patterns (Finger, 2023). However, these impacts are not always positive, as transformation can widen the gap between those who are able to adapt to technology and those who are left behind.

Rural development should not only rely on agricultural modernization, but also requires a holistic approach that considers social, economic and environmental aspects. Agricultural transformation is expected to create new jobs, increase the competitiveness of local products, and encourage economic diversification in rural areas (Barrett et al., 2022). However, the implementation of this transformation requires appropriate government policy support, including the provision of infrastructure, access to funding, and training and education for farmers (Rahman, 2022). In addition, inclusive and sustainable rural development must also consider emerging social challenges, such as the migration of labour from villages to cities due to modernization (Ge et al., 2020). This often results in a decrease in the number of workers in the agricultural sector, which calls for strategies to maintain farmer regeneration and ensure farm sustainability. In this article, we will discuss the transformation process of the agricultural sector and its impact on rural development. This study is expected to provide a comprehensive picture of the relationship between agricultural modernization and the welfare of rural communities.

## Literature Review

### Economic development

Economic development refers to the process of increasing the capacity of a country or region to improve the standard of living of its people through sustainable economic growth, equitable distribution, and economic structural transformation (Lestari et al., 2021). According to Todaro (2000), economic development is not only measured by the increase in gross domestic product (GDP), but also from other aspects, such as income equality, poverty alleviation, and improving the quality of life. In this context, economic development involves integrated social, cultural and institutional changes to support inclusive economic progress.

Various theories have been put forward to explain the dynamics of economic development. One of the classic theories is the Harrod-Domar growth theory, which emphasizes the importance of investment and savings in increasing economic growth (Dahlan & Nurlaeli, 2024). On the other hand, Rostow's development theory (Stages of Economic Growth) describes development as a gradual process that starts from a traditional society to reach a mass consumption society (Nindhi et al., 2024). In addition, dependency theory criticizes the dependency of developing countries on developed countries, which is considered to be an obstacle in the process of economic development (Mahfuzah et al., 2022). Currently, the sustainable development approach is the main focus, where development must consider economic, social and environmental aspects in a balanced manner.

### Agricultural sector transformation

Agricultural sector transformation refers to significant changes in the structure, technology and activity patterns of the agricultural sector to improve productivity, efficiency and sustainability. Agricultural transformation is an integral part of the economic development process, involving a shift from traditional subsistence farming systems to modern technology- and market-based farming systems. This transformation is not only aimed at meeting food needs, but also at promoting economic diversification and improving the welfare of rural communities (Annachhatre, 2019).

Agricultural transformation theory is widely discussed in the economic development literature. One of the relevant theories is the structural transformation theory by Lewis (1954), which explains the shift of labor from the traditional agricultural sector to the industrial and service sectors (Firmansyah et al., 2024). Agriculture is the initial foundation for economic development because it supplies food, labor, and capital for other sectors. In addition, the modern approach emphasizes the importance of technology adoption, agribusiness innovation, and integration with global markets to accelerate agricultural transformation (Sharp, 2021).

### Method

The literature review research method is an approach used to collect, analyze, and synthesize literature relevant to the research topic (Lame, 2019). In the context of research on agricultural sector transformation and its impact on rural development, this method begins with the identification of a specific research problem, such as how agricultural sector transformation occurs, its impact on rural development, and the factors that influence the process. Next, relevant literature was collected from various sources, such as scientific journal articles, academic books, reports from international institutions (e.g. FAO and World Bank), and case studies that provided empirical data. The literature search was conducted through academic databases such as Scopus, ScienceDirect and Google Scholar using specific keywords.

Once the literature was collected, inclusion and exclusion criteria were applied to ensure the relevance and validity of the sources. Inclusion criteria included literature that focused on the topic of agricultural sector transformation or rural development, was published within the last 10 years, and used valid methodologies. Literature that was irrelevant or had methodological flaws

was excluded from the analysis. The next stage was a critical analysis of the content of the literature, which included identifying theories, empirical findings, and policy evaluations related to agricultural sector transformation. The results of this analysis were then synthesized by grouping the findings based on key themes, such as the drivers and inhibitors of transformation, its impact on the rural economy and society, and relevant case studies.

From the results of the literature synthesis, the researcher develops a theoretical framework that serves as the foundation of the research. In this context, the theoretical framework may include structural transformation theory, the concept of sustainable agriculture and inclusive rural development approaches. This framework serves to explain the relationship between agricultural sector transformation and its impact on rural development, and provides a basis for further discussion. However, the literature review method has limitations, such as reliance on secondary data and potential bias in literature selection. Therefore, it is important for researchers to remain critical and objective in evaluating the validity of the sources used.

### **Result and Discussion**

Based on the literature analysis, agricultural sector transformation has a significant impact on rural development. This transformation process involves a change from traditional subsistence-based agriculture to a more modern, efficient and technology-based system. Some of the main results of this study are:

#### **Changes in Rural Economic Structure**

The transformation of the agricultural sector has triggered a shift in the structure of the rural economy from dependence on the primary sector to economic diversification that includes secondary and tertiary sectors. Several studies including those conducted by (Barrett et al., 2022) mention that value chains and food that have grown rapidly are the main providers of employment, and the main locations for technology transfer and investment in developing countries. Then research conducted by (Annachhatre, 2019) states that structural transformation in agriculture can increase productivity and yield per hectare along with the spread of technology in the sector. Then research conducted by (Zhang & Diao, 2020) which states that increasing labor productivity in agriculture has led to rapid growth which indirectly contributes to overall economic productivity growth through structural changes. Based on these studies, it can be concluded that through agricultural modernization, new value chains can be created through agribusiness development, farm product distribution, and local product processing. In Vietnam, for example, agrarian policy reforms increased rice productivity and encouraged the growth of rural micro-enterprises.

The transformation of the agricultural sector is a key driver of rural development by creating new jobs and increasing the competitiveness of local products in the global market. This is as revealed in research conducted by (Grodzicki & Jankiewicz, 2022). The study revealed that agriculture has succeeded in increasing employment levels and GDP per capita and reducing poverty levels in rural areas in the European Union. A modern agricultural sector can be the basis of rural economic growth, which in turn promotes inclusive development. However, this transformation requires infrastructure support, access to finance, and training for farmers to adopt new technologies. These suggestions have been put forward by many studies including those conducted by (Khaspuria et al., 2024; Murphy, 2021; Yigezu et al., 2018).

#### **Increasing Farmer Productivity and Income**

Technology has a very significant role in increasing agricultural yields and productivity. The adoption of modern technologies, such as mechanization, the use of high-quality fertilizers, and efficient irrigation systems, is proven to significantly increase crop yields. This is as revealed in research conducted by (Harnowo et al., 2024; Mukhamedova et al., 2022; Wijayanto &

Puspitojati, 2024). Future agricultural mechanization utilizes technologies based on weather analysis, soil sensor information, and satellite and drone imaging that can increase agricultural productivity. Precision agriculture innovation to improve the accuracy of agricultural business management is carried out by utilizing sensor systems, drones, remote sensing, digital technology, and the Internet of Things (IoT) to collect, process, and present data that will be used by smart agricultural systems. Integrated information system innovations for the supply chain are designed to bridge farmers, distributors, markets, and end buyers by utilizing mobile applications. The process of transitioning from traditional to modern and implementing smart digital farming requires mentoring and field learning in the agricultural process from upstream to downstream.

### **Socio-economic Impact**

Agricultural sector transformation does not only have a positive impact on agriculture but goes beyond that. Agricultural sector transformation has a positive impact on improving the quality of life of rural communities, such as better access to education, health, and infrastructure. This is as revealed in research conducted by (Singh et al., 2018). The study states that people living in suburban and rural areas experience an increase in the quality of life through the transformation of agricultural technology. Furthermore, research conducted by (Hassan et al., 2020) states that successful agricultural transformation can reduce poverty. This is because agricultural transformation can create a strong rural economic growth engine. The dynamics of agricultural transformation begin with increasing rural household income, higher productivity in agriculture, and greater demand in local markets. Furthermore, research conducted by (Grodzicki & Jankiewicz, 2022) that joint agricultural policies have succeeded in increasing employment levels and Gross Domestic Product (GDP) per capita and reducing poverty levels in rural areas of the EU. However, the impact is uneven, as small farmers often face difficulties in accessing technology and financing. This social gap needs to be addressed through inclusive policies.

### **Environmental Sustainability Issues**

The transformation of the agricultural sector that is optimized through technology also has an impact on the environment. Agricultural sector transformation is often accompanied by environmental sustainability challenges. The use of eco-friendly technology needs to be prioritized to reduce negative impacts on the ecosystem. Practices such as organic farming, agroforestry systems, and efficient water resource management can be applied to create an environmentally friendly agricultural sector. Based on research conducted by (Finger, 2023) that digital innovation can contribute to a more sustainable and resilient agricultural system. For example, digital innovation enables increased productivity, reduced environmental footprint, and higher agricultural resilience. In addition, research conducted by (Dayioğlu & Türker, 2021) states that digital transformation in agriculture can increase crop productivity, improve crop quality, protect the environment, and reduce input costs for a sustainable future.

### **Conclusion**

Agricultural sector transformation is an important process in promoting inclusive and sustainable rural development. Changes from traditional agricultural systems to more modern and technology-based systems have a significant impact on various aspects of rural development. The agricultural sector has great potential to improve the quality of life of rural communities and support overall economic development. With the right policies, technological support, and attention to sustainability, this transformation can be a key driver of inclusive, prosperous, and sustainable rural development. Further research is recommended to explore transformation implementation strategies in various local contexts to ensure maximum benefits for rural communities.

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