

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,500

Open access books available

176,000

International authors and editors

190M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Chapter

Impact of Globalization on Sustainable Land Use and Farming System in the Rural Development

Fachrur Rozi, Dian Adi Anggraeni Elisabeth, Adri Adri, Yardha Yardha, Firdaus Firdaus and Yanti Rina Darsani

Abstract

Globalization can accelerate development while, at the same time, negatively impacting nations that are not ready. Globalization benefits rural communities organizing the citizens' life order systematically. Exploiting land use to fulfill human needs is a result of globalization's effects on economic activity. Agricultural and industrial sectors must increase production reasonably and suitably. There is a gray area of needs due to the dependency on the land resources use, which causes rivalry in procuring production inputs for each sector and has a significant effect on the agricultural industry. Transformation of human, environmental, financial, and institutional resources for rural agriculture by implementing effective and efficient agricultural modernization will reduce globalization's negative effects. Smart farming applies modern technology to agriculture in order to achieve more productive and sustainable agricultural production. Agricultural land intensification initiatives must be improved through the best use of technological innovation and agricultural infrastructure. Competition for resource utilization causes changes or decreases in land resources quality, which can be anticipated by technological capacities and capabilities, and adaptive capacity to innovations. Unhealthy competition must be eliminated, even these sectors will help each other because of government policy instruments so that the goal of rural sustainable agricultural growth will be achieved.

Keywords: globalization, land use, sustainable, resources, rural development

1. Introduction

Globalization may accelerate a nation's growth rapidly. On the other hand, countries that are not ready for globalization are predicted to struggle [1, 2]. Each country, especially developing countries, must deal with the effects of globalization, which are extremely complex. Globalization causes the world to become borderless due to the development of information and communication technology in the advanced era [3]. Globalization is signed with no limitation of goods and services

moving and production factors through a border of a political state. The political border is the demarcation of ethnics, language, culture, unity of preference and consumption patterns [4, 5].

Many impacts, both beneficial and negative, have been brought through globalization in all aspects, including politics, technology, economy, social, and cultural. Regarding the globalization era, the main problem at present and future are basic needs supply, that is. food, clothing, housing, education, health, including water and environment, energy, transportation, and communication [6, 7].

In fact, both urban and rural communities are experiencing the effects of globalization. Globalization undoubtedly affects community in both positive and negative ways [8]. Globalization supports rural communities by helping them in their activities and organizing the life order systematically. Additionally, the citizen's quality of life will improve in a better direction. For instance, modern technology makes it easier for villagers to communicate and work by using tractors to plow rice fields and providing electricity, internet access, and other modern conveniences in the house. Because of these technological advancements, rural community citizens are also negatively affected in such a way such as increasing individualism, a consumptive lifestyle, and social inequality [9, 10].

Agriculture continues to be the basis of growth, together with the entrance of the globalization period, particularly in Indonesia's rural areas. Great agricultural potential, the majority of farmers, however, are from the lower economic class. It indicates that the government does not support farmers in expanding the agricultural sector in rural areas. Economic globalization positively impacts developing countries, but its implementation must focus on achieving sustainable development goals [11, 12].

In most of Indonesia's regions, agricultural land will inevitably shrink due to capitalism [13, 14]. For rural communities to survive, the land is a crucial resource. Industries that employ land as their primary raw material are those that grow in the capitalist era. Furthermore, the same land area is used for direct agricultural production. The short-term use of land resources is frequently unwise; consequently, it is not sustainable. It indicates that the availability of land resources will eventually decrease and rely mostly on low-quality soil resources [15–17].

Sustainable practices must be used to increase production due to economic activity in both agricultural and industrial sectors [18]. They involve preventing soil fertility loss, as well as lowering reliance on the usage of nonrenewable resources. Moreover, maintaining and improving the environment's quality of agricultural land while always preserving natural resources and biodiversity [19].

2. Methodology

Rural is inextricably linked with agriculture. This study was conducted to determine the effect of globalization on land use in rural areas. It is based on library research and a case field study of the roof tile industry (in-depth study) in rural areas. The need for raw materials in this industry is directly related to the agricultural resources in the village. The study was conducted in 2022 in the village of Urek-urek, Malang Regency, East Java Province, Indonesia, the center of the country's agricultural and roof tile industries (**Figure 1**). In this area, roof tile production was started in 1940, and reportedly about 300 craftsmen are working there.

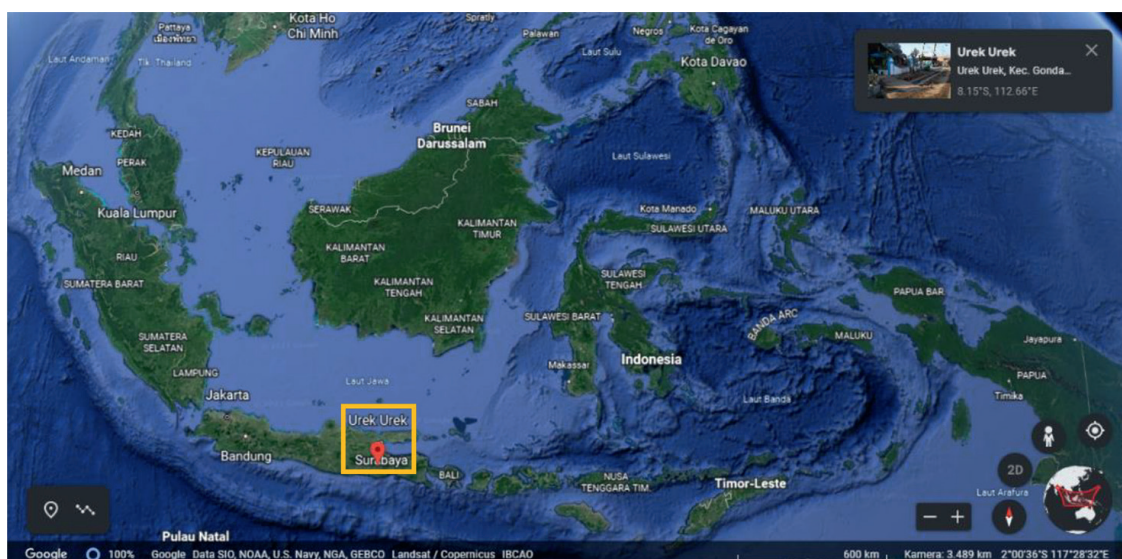


Figure 1.
Location of study with GPS coordinate of 2°58'08"S 118°36'02"E (source: <https://earth.google.com>).

The sample of study was taken purposively by 10% of the total craftsmen. The selected 30 roof tile industries are expected to represent all levels of the business scale. In order to determine the impact of the tile industry on farming system activities and the relationships between industrial and agricultural aspects, a sample of farmers who are also landowners was also collected. This information is needed to determine the sustainability of agricultural land resources. The survey data were analyzed using a qualitative descriptive method accompanied by pictures to clarify the study.

3. Problems finding in rural areas

Natural resources are one of the most crucial components of all manufacturing processes in the industrial, agricultural, and service sectors. Land resources are used for a wide range of purposes to produce goods to satisfy community's increasing needs. It occurs from both a growing population and economy [20–22].

Most industrialized and developing countries, including Indonesia, employ conventional agricultural methods and practices, which are incompatible with the ideas of sustainable development. In the beginning, conventional agriculture improved agricultural and food productivity significantly, but as time passed, production efficiency fell under the influence of several negative impacts [19, 23]. Increased surface erosion, poor soil fertility, the loss of soil organic matter, salinization of groundwater, irrigation, and soil sedimentation are some of the negative effects of conventional agricultural methods and practices [18].

A loss in soil fertility caused by the procurement of raw materials for the tile industry in the study location is an example of exploitation for conventional agriculture, namely selling dry land to a buyer while considering the depth to satisfy the tile industry's volume requirements, with a thickness of between 1 and 3 meters (**Figure 2**). The owner will sell the land until the maximum amount of dry land can be used for rice fields, which are still in the form of a hill. 20% of the raw material from the rice



Figure 2.
Collection of raw materials for roof tile industries from dry land and rice fields (source: Personal documentation).

field soil serves as an adhesive, while soil from the dry land form up the remaining 80% of the tile raw mixture. In the short term, collecting land from dry land is not a problem, but collecting land from rice fields would harm agricultural productivity by decreasing the soil quality (**Figure 2**).

In a specific area, the depth of the soil determines the agreement between the owner and the buyer about the sale of topsoil in rice fields. The cost of 0.1 hectares of “topsoil” rice fields with a 0.25 m depth is IDR 20 million. The selling price of IDR 20 million equals the five-year local farming income if it is managed by farmers for growing maize or rice. Landowners only use the income they receive from selling their land for urgent necessities. Farmers (landowners) are aware of the long-term losses in the form of lower agricultural yields and will require a significant amount of money to restore soil quality to its initial state. Considering 0.25 m is the tolerance limit for land production, rice field landowners maintain extremely strict monitoring with a 0.25 m height limit. During the dry season, purchases are made and stored for one year’s worth of supplies (**Figure 3**).

Table 1 describes the exploitation of land resources for tile raw material needs of tile craftsmen in Urek-urek village. Each year, 60 ha of rice fields are taken. The average area required for dry land is 15 ha (**Table 1**). The village has enough resources for procurement, and the total area of dry land in Urek-urek village is 241 ha. Rice fields will develop due to continuous taking at a particular depth on dry land at a specific



Figure 3.
 Soil storage as raw material for roof tiles (source: Personal documentation).

Material	Land requirement per year (trucks) for		The exploitation of the depth of the soil (m)	Total area required per year (ha)
	A tile craftsman	The entire tile craftsmen		
Rice field	10	3000	0.25	60
Dry land (<i>tegalan</i>)	26	7600	2	15

Table 1.
 The exploitation of land resources for roof tile raw materials in the village of Urek-urek, Malang regency, East Java Province, Indonesia.

height. The growth of new rice fields, which would increase the land's productivity for farming, is another impact of exploitation on dry land.

4. Agricultural sector vs. industrial sector

In Indonesia, agricultural development policies have taken on a critical importance for developing the country. If several associated policies are not correctly developed, agriculture might face a significant threat while having extremely bright future possibilities. In order to ensure the welfare of rural communities, it is essential to manage these resources efficiently and sustainably as this policy manages the increasingly scarce land resources [13, 24, 25]. An overview of the natural conservation patterns of land resources in the economic activities of rural communities may be obtained from the phenomena of the tile industry, which reflects the process of exploitation of land resources by the industrial sector.

Conventionally, the industry creates employment opportunity and increase the villagers' income, devastating their subsistence base. As an example, roof tiles making in the rural area (Figure 4). The industry uses the topsoil of the rice fields as raw material. It consumes so much rice field soil in the village and surrounding villages. Poor farmers sold the topsoil for their income earnings and lost land resources for future rice production. It is a sort of survival strategy for the poor. Income earning in the present and near future is much more important than relatively distant future. Their time preference is very short, and they have a high discount rate. The poor must sell their future to survive today. If the impact of globalization provides another large-scale market, such soil exploitation could become substantial extent. We need to test whether the industry is sustainable or not.



Figure 4.
The production of roof tile in Urek-urek village (source: Personal documentation).

Land type	Land tenure (%)		
	<0.5 ha	>0.5 ha	Total
Technical irrigation	41	3.7	44.7
Semi-technical irrigation	3.7	3.7	7.4
Village irrigation	74	11.1	18.5
Rainfed	—	18.5	18.3
Dry land	—	11.1	11.1

Table 2.
Development and land use in the village of Urek-urek, Malang regency, East Java Province, Indonesia.

4.1 Land productivity for the agricultural sector

The majority (70.6%) of the natural resources in Urek-urek village are rice fields, which have good land resource conditions and relatively high yield productivity for agriculture (**Table 2**).

In this village, the percentage of rice fields is high enough because dry land could be used to produce more rice fields. Farmers still prioritize farming with food crops in order to supply food demands. **Table 3** shows the cropping pattern in rice fields includes rice-rice-maize (46%) and rice-rice (15%). This data shows that farming is still oriented toward providing daily necessities or providing food security rather than solely seeking financial profit. The farmers' considerations include limited land ownership, capital, and reduced risks.

Rice farming remains the top priority in agriculture because of farmers' poor knowledge and socioeconomic conditions. It is technically possible; thus, rice will be planted three times a year or every season. Rice cannot technically be grown on the dry land (*tegalan*); maize or sugar cane used to be planted.

In this village, soil is a very liquid asset. Soil (not land) for tile raw material sells very quickly. As an illustration, the sale of land (top soil) from rice fields, which is

Planting pattern	Percentage (%)
A. Rice fields	
Rice-rice-maize	46
Rice-rice	15
Rice-rice-rice	4
B. Dry land	
Maize-maize	6
Sugarcane	29

Table 3.
Planting pattern in a year in the village of Urek-urek, Malang regency, East Java Province, Indonesia.

only 1000 m² in area and 0.25 m deep, costs IDR 20 million. However, the consequence will be a decrease in land productivity, and to restore fertility, the land needs to rest for 3–5 years.

4.2 Land productivity for the industrial sector

The 2:1 mixture of dry land soil and rice field soil, which functions as an adhesive, is the primary raw ingredient. Due to abundant resources, dry land soil materials are collected inside the Urek-urek village. Meanwhile, because of the limited amount of rice field soil available, it must be collected outside the village, although it is still in the same subdistrict and is located between 5 and 10 kilometers from the craftsmen's location. As a result, land resources are now being exploited outside the village. The tile sector benefits the rural economy. High incomes, employment, higher labor wages in the agriculture sector, and the creation of new jobs, including transportation services, land grinders, and brokers, as an outcome of the availability of tile products, are just a few examples. However, as the area expands, so does land exploitation, which lowers the quality or fertility of the land.

For illustration, assuming that each tile craftsman has two employees, there are 600 persons employed in this sector in the village, or 39.8% of the total labor force in Ureg-ureg village with a total of 1505 people. The average daily wage for a worker in this sector is IDR 100,000. It means twice as many earnings as those employed in agriculture. In addition, labor is not as demanding as in the agriculture sector.

The income from the tile sector is very intriguing regarding the business analysis. Fifty trucks of land or 250 tons of soil were purchased for raw materials from the transaction of 0.1 ha of topsoil. If processed, this amount will produce a total of 600,000 roof tiles with a gross income of IDR 570 million. 30% of gross sales or IDR 171 million is the total cost of producing roof tiles. For two years, tile craftsmen earned a net income of IDR 399 million. When calculated, the monthly household income from the tile sector of IDR 16 million is much higher than the monthly income from the agricultural sector, which is IDR 1–2 million.

5. Sustainability of agricultural development

The basic human needs always grow, so the real condition of the community's life standard is still low. The important factors influencing basic needs are human and

physical or natural resources, including land and water, finances, and institutions. In an agrarian and rural community, the farm management resources must be focused on reaching sufficient basic needs and welfare. The rural economy has been transformed into a more diversified activity with a stronger linkage to the urban sector. Moreover, agricultural growth has begun to lay the foundation for growth in rural areas with more diversified economic activities [26].

There is a complimentary dependence between the agricultural and industrial sectors for a wide range of production activities in the study's rural areas (**Figure 1**). Each sector requires various factors of production, especially natural resources (land) and firewood. With continuous exploitation to ensure the smooth running of production activities, these resources will be depleted if there is no natural addition to their supply. Meanwhile, economic activity continues to this day.

Farm management in rural areas is supported by human, physical or natural (land and water), finances, and institutions (**Figure 5**). Farm management's economic activities have three domains, including the agricultural sector, the industrial sector, and both. The diagram shows a "gray area" where the interaction of two sectors occurred at the study site. Each sector needs inputs for the production process. The

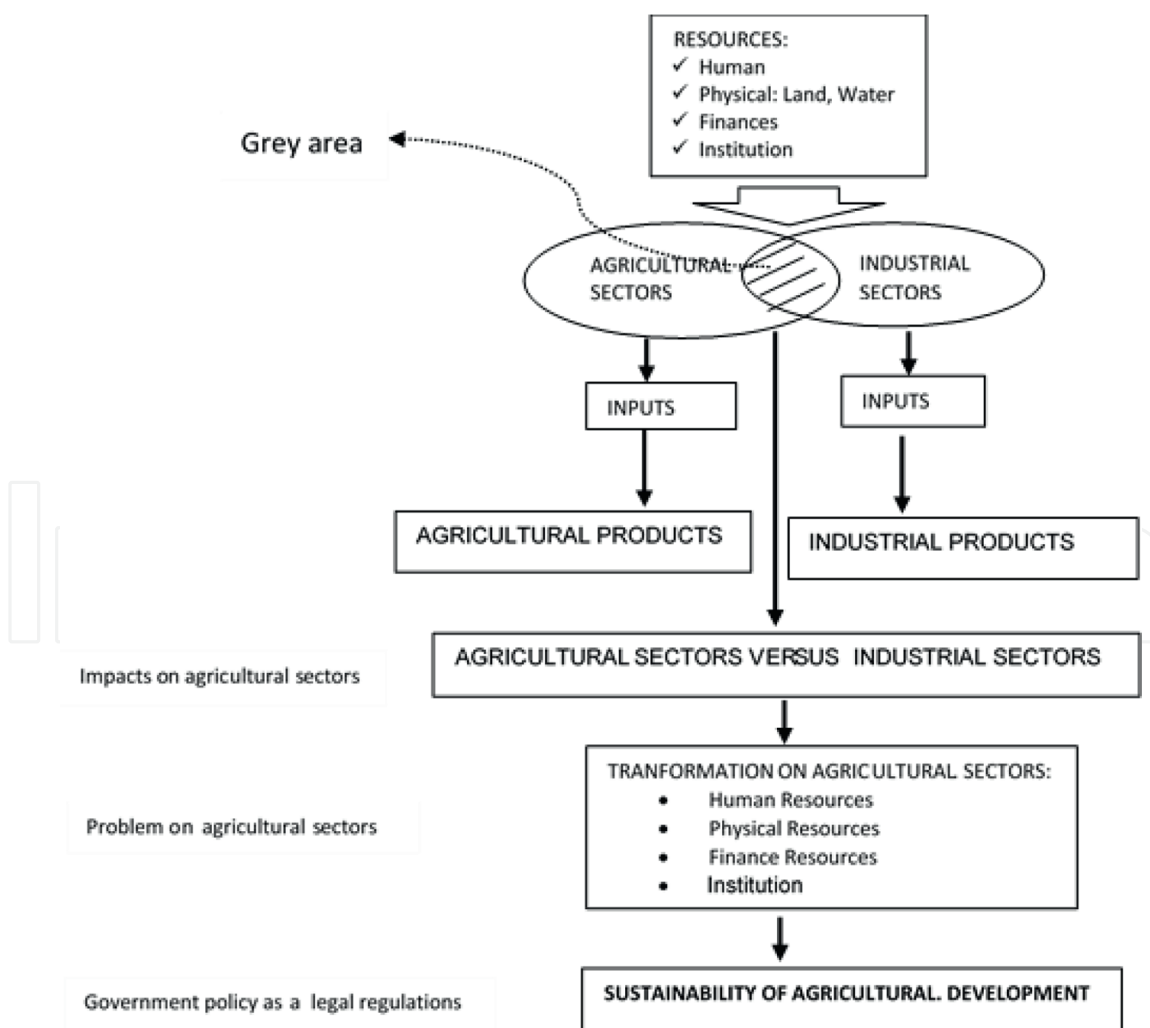


Figure 5. The framework of sustainability of land use for economic activities in rural (source: Personal concept based on survey finding).

same interest in the function and economic activities as inputs, production, marketing, and income cause an interaction.

The interaction effect raises a change in farm resources and impacts the agricultural sector. The use of human, physical, and other resources in rural areas influences agricultural development. In addition to internal factors, the transformation of agricultural resources is also influenced by globalization. Therefore, rural development must create economic activities in the agricultural or industrial sector based on renewable resources. The goal of rural development should add value to the rural population's quality of life. This goal could be achieved through effective and efficient utilization of natural, human, institutional, and financial resources inside or outside the village.

There is increased competition for the procurement of production inputs as a result of interdependence in the intersection area (the "gray area"). As a result, there will be more modifications to these agricultural resources, which will seriously affect the agricultural industry. Only government policy tools can stop this unhealthy competition and will support these industries' interests. The purpose of sustainable agricultural development will be achieved in this manner.

5.1 Rural land protection

The use of natural resources has long been considered an element of both human rights and economic development, leading the United Nations, amid its work on advancing decolonization in the 1960s, to declare that "[t]he right of peoples and nations to permanent sovereignty over their natural wealth and resources must be exercised in the interest of their national development and of the well-being of the people of the State concerned" in UN General Assembly Resolution 1803 (XVII) [27]. According to the FAO conference in 1991, the management and conservation of the natural resource base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry, and fisheries sectors) conserves land, water, plant, and animal genetic resources and is environmentally none degrading, technically appropriate, economically viable, and socially acceptable [28].

The reasons for being concerned with sustainability are clear. Achieving short-term gains at the expense of long-term productivity is foolhardy. While we value this generation's welfare, it would be irresponsible to damage the future generation's hope for leading a fulfilling human existence, especially where environmental deterioration affects future production possibilities adversely and irreversibly [29].

Much as their fertility may be renewed, soil resources are renewable natural resources. To achieve the best productivity for an infinite time, conservation efforts focus on preventing soil degradation, healing damaged soil, as well as preserving and increasing soil fertility [30].

Landowners discovered that land exploitation decreased rice yield by 30%. The rice fields will regain their original fertility within 2–3 years by being covered with topsoil brought back by the flow of water. In addition, the owner also provides treatment with salt (salinity) and manure, which is applied without a specific dose. Due to water availability, planting is only 1–2 times as intensive on dry land. Since the land was converted into rice fields as a result of being used as raw material of roof tiles, crop intensity has increased. Hilly dry land (*tagalan*) that has been exploited becomes flat, enabling water to flow in. This model is in line with the concept of conservation, which allows for making the best possible use of natural resources for long-term and extensive good.

This globalization phenomenon impacts the existence of local wisdom. Local wisdom is truth possessed by the community in an area that has been a tradition from generation to generation [31]. Globalization, a symptom of a change in society, is often considered a threat and challenge to the identity of a specific local area [32]. The concept of local wisdom in environmental management was described with the terminology of traditional ecological knowledge [33]. The term means a collection of knowledge, practices, and beliefs that evolved through an adaptive process (adjustment) passed from generation to generation through culture, associated with the relationship between living beings (including humans) and the surrounding environment. Connection with nature, the main factor to consider, is acquired over a long time and passed from generation to generation [34].

The functions of local wisdom include (1) natural resource conservation and preservation, (2) human resource development, (3) cultural and scientific development, and (4) religious beliefs. Indonesian local communities contribute to conservation through traditional land management [35, 36]. Indigenous communities in Indonesia conceptualize local wisdom through behaviors that promote the natural world and environmental sustainability. Local wisdom controls how the surrounding community behaves and interacts with the environment [37]. Regarding land conservation programs, Indonesian local wisdom differs for each tribe and region.

The community in Urek-urek village preserved land by engaging in application salt (salinity) and manure, which is applied without a specific dose. In addition to farming, many farmers in the village also breed cattle and utilize cow dung. Cow dung is spread on the ground and left to decompose naturally to form manure. According to the locals, manure can be used if the color is black such as the soil color [38]. The form of local wisdom that has been practiced by the community in the study area has contributed to land resources preservation.

6. Transformation of natural resources, human resources, institutional, and financial

6.1 Natural resource aspect

There is a connection between global economic activity and ecological damage in the field of natural resources. The dominance of the market paradigm as a consequence of economic activity led to the current ecological disaster [29]. Natural resources have suffered a lot of damage due to their exploitation for economic and commercial purposes, although these resources are the primary support for human life in terms of economic activities and community welfare. Exploitation causes depletion and deterioration. Both in terms of quantity and quality, this tendency is seen practically everywhere, whether in industrialized or developing countries [39–41].

The conservation and maintenance of soil productivity, as well as the quantity and quality of water, are the purposes of soil and water conservation, also known as soil preservation. The rice fields become stagnant water and are not utilized in the production process if the productivity level of the land decreases as a result of inappropriate exploitation. Additionally, this occurred in the study site at Urek-urek village (**Figure 6**).

It is important to carry out land management due to human activities that increase land use volume, which is inconsistent with its designation or land



Figure 6.
The impact of land use in rice fields (source: Personal documentation).

management and not based on conservation measures. Land management aims to optimize resources consumption while maintaining the sustainability of those resources [42, 43].

Using appropriate soil and water conservation methods is necessary when using dry land (*tegalan*) for food production to increase productivity sustainably and save the environment. An agroecosystem approach to soil and water conservation may improve farming income, promote food security, and increase land productivity sustainably [44]. Applying the three concepts of soil and water conservation—minimal tillage, use of a permanent soil cover made of plant residues (cover crop), and crop rotation—is another possible effort [45].

Farmers can plant various commodities alternately on a land as a soil conservation technique such as planting legumes, tubers, maize, sugarcane, and other commodities. Since it might change the soil water balance, the organic soil cover is crucial for soil and water conservation on degraded dry land in the tropics. Technologies help conserve soil and water, increase organic matter, and improve soil fertility [46, 47]. Plant residues can shield soil's nutrient content from erosion while holding soil particles in position [48, 49]. Long-term efforts to prevent climate change and land degradation are gained through soil and water conservation [50].

6.2 Human resource aspect

People now should always be ready to deal with the changes and competition on a global scale as a consequence of globalization. Humans will struggle if they are unable to adapt [51]. The capacity of human resources should be increased in order to survive in the globalization era. Being able to anticipate the changes that will occur and successfully adapt to current situations are essential needs for human resources in rural areas, considering the issues that are currently existing.

In order to be competitive in the labor market and create opportunities that can increase household income, rural communities need to develop their human resources. Since small land cannot potentially boost their well-being, this opportunity does not always have to be in main rice farming. It may also be in non-rice farming (on-farm), off-farm, or even outside farming (non-farm).

The advancement of digital technology and various forms of technological automation led to the Industrial Revolution 4.0. The industrial movement, known as “Industry 4.0”, combines automation technology with cyber technology. The Industrial Revolution 4.0’s influence appears as a disruption across all industries to which a fast response is required to avoid falling behind in technological advancement. A leap occurred, accelerating transformation across practically all industries, including agribusiness. The trade of industrial and agricultural commodities has also grown significantly, demanding changes throughout the whole production chain, including the availability of human resources in rural areas [52].

It is a challenge for individuals to be able to adjust their competencies in the Industrial Revolution 4.0 era along with the use of advance information technology. The concept of automation no longer requires human labor in its application. Today’s factories are known as smart factories because the collection or exchange of production data can be done *via* the Internet, so that they are ready when needed. There are several technological advancements such as the Internet of Things (IoT), big data, 3D printing, artificial intelligence (AI), driverless cars, genetic engineering, robots, and smart devices [53]. The IoT is one of the critical parts of Industrial Revolution 4.0 [54]. Human resources need to have the ability to form strong interpersonal skills to interact with everyone and grow as a person. In order to develop excellent human resources, interpersonal skills may be explored through formal and informal education by expanding offline and online social interactions. Quality human resources have been prepared by the Indonesian government for the 4.0 era and globalization.

6.3 Institutional aspect

The collapse of local institutions that support agriculture is one consequence of globalization [12]. Rural farmer institutions such as access to agricultural knowledge, finance, infrastructure, and markets. As well as the adoption of agricultural technologies, all help to hasten the socioeconomic growth of farmers. Additionally, the government and other parties involved will find it simpler to support and provide upgrading of activity programs in rural areas as an outcome of the creation of farmer institutions.

Although it has not been functioning optimally to this point, the revitalization of farmer institutions is expected to help farmers solve the problem of farmer economic inequalities. On the other hand, developing countries such as Indonesia must face the hard truths of globalization and economic liberalization as they relate to the ratification of the General Agreement on Tariffs and Trade (GATT) and World Trade Organization (WTO). Therefore, to survive amid global economic competition, it is necessary to obtain appropriate agricultural technology and the ability to compete with farmers. Through the development of agricultural institutions, including developing farmer capacity, efforts are made to increase productivity, farming efficiency, and farmer competitiveness [55].

As an illustration, over recent decades, rural development strategies in Europe have adopted two contrasting stances toward the global economy. Initially, the emphasis was placed on the attracting foreign direct investment, especially in manufacturing, as part of a wider modernization paradigm in rural development [10]. Accordingly, the emphasis within European rural development has shifted since the early 1990s to a “new rural development paradigm” focused on “neo-endogenous development” [9, 10, 56]. Rather than relying on external investment to stimulate economic development, this approach looks inward to mobilize local actors and valorize local resources but equally seeks to engage customers and markets outside the region.

6.4 Financial aspect

An effective agriculture financing service program has been developed in response to globalization and intense competition [57, 58]. Improved communication between the banking system (and other financial institutions) and the agriculture sector should come first. Agriculture no longer views banking as an elite sector and has little interest in learning about the characteristics of farmers or the agricultural sector as a whole. Second, the development of innovative banking products for funding the agricultural sector such as forward financing scheme with standard commercial interest rates. Third, it is necessary to revive protection schemes for the agricultural sector, such as crop insurance, to make them more effective. The risk of weather disturbances and climate change, pest and disease outbreaks, crop failures, and other factors can all be reduced with the help of this crop insurance [59, 60].

During the 1970s, when economic development was recognized as the dominant paradigm, little attention was often paid to the noneconomic benefits of financial incentives in rural areas. The rural financial schemes are often evaluated with quantitative criteria, even though they have profound noneconomic benefits for community development. Evidence is presented from success stories in the developing world and fieldwork done in South Africa, which reveal that successful rural financing is often determined by indicators of a qualitative nature [61].

Thus, agricultural modernization that transforms human, natural, institutional, and financial resources will effectively and efficiently counter the harmful impacts of globalization [62]. In the end, each nation's capacity for technological advancement, innovation, and adaptation will determine how well they can compete. They must constantly update and advance their technology to compete globally [63].

Therefore, natural resource transformation is implemented through agricultural modernization, which can be seen in the use of better and more effective cultivation methods, the use of higher-qualified of agricultural human resources, and the efficient use of natural resources, especially irrigation water, to maintain environmental balance. The use of modern information and communication technology (IT) in agriculture such as the IoT, sensors and actuators, Global Positioning System (GPS), big data, robots, and others, is known as smart farming [64, 65].

From a farmer's perspective, smart agriculture offers farmers extra value in improved decision-making and more effective exploitation management. The use of IoT-based smart farming could be a new mechanism to improve very transparent agriculture and support growth trends in agriculture such as organic farming and family farming (complex or small space, specific livestock and culture, preservation of certain varieties of high quality, and many more) [66, 67].

Robotic autonomous devices have been designed for agricultural cultivation tasks such as mechanically removing pests, applying fertilizer, or picking fruit. The development of unmanned aerial vehicles or drones, with small engines and cameras, can measure crop fertilization levels and biomass development and make recommendations to farmers [68].

7. Policies in agricultural development in rural areas

The loss in biodiversity of land resources is related to the economic activities of the agricultural and industrial sectors in rural areas, which are considered to be the root cause of low food production and low community income. On the other hand,

Indonesia's population continues to grow, thereby increasing the need for food. The government uses two fundamental tactics to meet food demand through increasing the use of existing agricultural land (intensification) and expanding the agricultural land (extensification) [69, 70].

Land conversion control policies are one type of important agriculture sector development strategies. Profits made in the short term will require expenditures or costs in the long run due to damage to the land's production. According to [71], the assessment of the welfare of the current generation must consider the damage to resources for the upcoming generation, particularly environmental damage that affects the future production of nonrenewable resources.

In Indonesia, agricultural development over the last several decades has improved the economy and welfare of the community, but in some regions, it has also changed or degraded the quality of land resources. A reduction in physical, chemical, and biological qualities characterizes the process of decreasing land productivity, which may be temporary or permanent [72, 73]. The potential for land resources degradation will rise due to population growth [74].

In order to accelerate the achievement of the sustainable development goals (SDGs) in a national scope, on September 13th, 2022, the President of Republic of Indonesia has enacted Presidential Regulation number 111 concerning the Implementation of Achieving SDGs. This regulation refers to the United Nations (UN) of SDGs with the 2030 Agenda, whereas one of the countries members of the UN, Indonesia plays an active role in setting the goals of the SDGs. This is stated in the document of transforming our world: The 2030 Agenda for Sustainable Development.

Through Presidential Regulation number 111/2022, the president of Republic of Indonesia has set targets for the 2024 national SDGs, which were arranged by referring the 2030 Agenda of the UN SDGs as well the objectives and the national targets for the 2020–2024 medium-term development plan. The SDGs as referred to in Article 2 of Presidential Regulation number 111/2022 aim to: 1) maintain the sustainable improvement of the community's economic welfare, 2) maintain the sustainable social life of community, 3) maintain the environmental quality and inclusive development, and 4) implement governance, which is able to sustain an increase in the quality of life of one generation to the next generation.

The urgency of the SDGs is to end poverty, reduce inequality, and protect the environment. The Indonesian government's quick responses to the implementation of the Global SDGs are outlined in Presidential Regulation Number 59/2017 concerning the implementation of achieving sustainable development goals. Related to rural development in Indonesia, the localization of SDGs into SDGs in the village scope is urgently needed. The SDGs in the village scope are the main reference for the medium-term development of villages throughout Indonesia. The tested SDGs make it easier to measure the development and are more comprehensive toward aspects of community's lives and land. Therefore, the localization of SDGs as Village SDGs makes the direction of village development clear and detailed in holistic goals.

The government and environmentalists have undertaken many actions to set up soil and water conservation programs. The Law Number 37 of 2014, concerning soil and water conservation is one of the laws and regulations that are now in place and used in these efforts. The law specifies that several concepts, including (1) participatory, (2) cohesiveness, (3) balance, (4) justice, (5) benefits, (6) local wisdom, and (7) sustainability, serve as the foundation for the execution of soil and water conservation. In line with their authority, communities have the same chance to participate in the government's execution of soil and water conservation [75].

The strategies for sustainable agricultural development are: (1) optimizing the use of domestic resources (land, water, labor, capital, and technology), (2) expanding the spectrum of agricultural development through diversification of technology, resources, production, and consumption, (3) applying site-specific agricultural technology engineering dynamically, and (4) increasing the efficiency of agro-industry systems to increase science and technology-based and high competitive agricultural production, to provide increased welfare for farmers and communities in a balanced way [76].

The loss in biodiversity of land resources is widely linked to economic activity from the agricultural and industrial sectors in rural areas, which is thought to be the root cause of low food production and low community income. On the other hand, Indonesia's population grows, thus increasing the food need. The government utilizes two fundamental tactics to fulfill the demand for food through improving the use of existing agricultural land (intensification) and expanding the agricultural land (extensification) [69, 70].

The processes of land intensification must be executed properly and efficiently concerning the resources currently available in rural areas. Four basic ideas need to be considered in carrying out sustainable intensification including (1) the need for increased production, (2) the importance of higher yields to compensate for increased agricultural land use and associated environmental costs, (3) the importance of improving environmental sustainability while simultaneously increasing productivity, and (4) the goal and the implementation of sustainable intensification must take into account the biophysical and social context [77].

Technology innovation and agricultural infrastructure (tools, types of machinery, and others) will help enhance the agricultural land intensification program. By managing available agricultural land as efficiently as possible, land intensification is achieved to raise the cropping index, followed by raising land productivity [78].

The first step in intensifying agricultural land is to raise its quality by using just a small amount of external input and prioritizing the use of locally accessible organic inputs. The agriculture and livestock farming provide enough organic resources in rural areas. Organic waste from crop residues and livestock waste can be utilized [79]. The obstacle in carrying out agricultural intensification is the difficulty of modifying farmers' routines. Therefore, by maximizing the available natural resources, educational programs for farmers and rural communities may be implemented to increase the growth in agricultural production.

8. Conclusions

The economic activities of rural farm management have three domains namely agricultural sector, industrial sector, and both. There is a gray area, where interaction between two sectors like occurred at the study site. Each sector needs inputs to the production process. The same interest in the function and economic activities as inputs, production, marketing, and income cause an interaction. The interaction effect raises land use competition and farm resource change and impacts the agricultural sector.

Community behavior in rural areas as a form of local wisdom contributes to the preservation of land resources. Extracting soil for raw material of roof tile industry needs some requirements such as only taking topsoil from rice fields to a depth of 0.25 m, then letting the land rest for two to three years while being treated with manure. Hence, the production and soil quality will be returned to their initial state.

By adopting effective and efficient agricultural modernization, transformation of natural resources, human resources, institutional, and financial of agricultural sector in rural areas will be able to mitigate the negative effects of globalization. A more appropriate and resource-efficient strategy is used in smart farming, which applies modern information and communication technology to agriculture to achieve more productive and sustainable agricultural production. Government policies, such as laws and regulations, can reduce harmful competition and even work together among the sectors to support one another. Therefore, the purpose of sustainable agricultural growth in rural areas will be achieved in this manner. Based on Presidential Regulation number 111/2022 concerning SDGs, the localization of SDGs as a village SDGs accelerates the implementation of achieving sustainable development goals and makes the direction of village development clear and detailed in holistic goals.

Conflict of interest

The authors declare no conflict of interest.

Author details

Fachrur Rozi^{1*}, Dian Adi Anggraeni Elisabeth², Adri Adri², Yardha Yardha³, Firdaus Firdaus² and Yanti Rina Darsani²


1 Research Center for Macroeconomics and Finance, National Research and Innovation Agency, Jakarta, Indonesia

2 Research Center for Behavioral and Circular Economics, National Research and Innovation Agency, Jakarta, Indonesia

3 Research Center for Food Crops, National Research and Innovation Agency, Cibinong, Indonesia

*Address all correspondence to: f_rozi13@yahoo.com

IntechOpen

© 2023 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

References

- [1] Kılıçarslan Z, Dumrul Y. The impact of globalization on economic growth: Empirical evidence from the Turkey. *International Journal of Economics and Financial Issues*. 2018;**8**:115-123
- [2] Shopina I, Oliinyk O, Finaheiev V. Globalization and its negative impact on the global economy. *Baltic Journal of Economic Studies*. 2017;**3**:457-461
- [3] Prasad E, Rogoff K, Wei SJ, Kose MA. Effects of Financial Globalization on Developing Countries: Some Empirical Evidence. In: Tseng W, Cowen D, editors. *India's and China's Recent Experience with Reform and Growth. Procyclicality of Financial Systems in Asia*. London: Palgrave Macmillan; 2005
- [4] Gross L, Vagts DF. *Global Reach. The Power of the Multinational Corporations*. Richard J. Barnet and Ronald E. Müller New York: Simon and Schuster; 1976. p. 508. Index. \$4.95, paper. Am J Int Law [Internet]. 2017/02/27. Cambridge University Press; 1977;**71**:164-5. Available from: <https://www.cambridge.org/core/article/global-reach-the-power-of-the-multinational-corporations-by-richard-j-barnet-and-ronald-e-muller-new-york-simon-and-schuster-1976-pp-508-index-495-paper/F409D584F84C64092B62BB59866D48BC>
- [5] Ceglowski J. Has globalization created a borderless world?. In: *Globalization and the challenges of a new century*. Bloomington, USA: Indiana University Press; 2000
- [6] Kara B. The impact of globalization on cities. *Journal of Contemporary Urban Affairs*. 2019;**3**:108-113
- [7] Mulyono M. The problems of modernity and identity in globalization era. *Journal of Maritime Studies and National Integration*. 2017;**1**:106-111
- [8] Rahman MM. *Impact of Globalization on Rural Development*. Munich: GRIN Verlag; 2013
- [9] Van der Ploeg JD, Renting H, Brunori G, Knickel K, Mannion J, Marsden T, et al. Rural development: From practices and policies towards theory. *Sociologia Ruralis*. 2000;**40**(4):391-408
- [10] Woods M, McDonagh J. Rural Europe and the world: Globalization and rural development. *European Countryside*. 2011;**3**:153
- [11] Nugroho AD, Bhagat PR, Magda R, Lakner Z. The impacts of economic globalization on agricultural value added in developing countries. *PLoS One. Public Library of Science San Francisco, CA USA*. 2021;**16**:e0260043
- [12] Killick T. Globalisation and the rural poor. *Development Policy Review*. 2001;**19**:155-180
- [13] Dib JB, Alamsyah Z, Qaim M. Land-use change and income inequality in rural Indonesia. *Forest Policy and Economics*. 2018;**94**:55-66
- [14] Rozaki Z. Decrease of agricultural land and industry growth in special region of Yogyakarta. *IOP Conf Ser Earth Environ Sci. IOP Publishing*. 2020;**458**(1):e012033
- [15] Lambin EF, Meyfroidt P. Global land use change, economic globalization, and the looming land scarcity. *Proceedings of the National Academy of Sciences of the United States of America*. 2011;**108**:3465-3472

- [16] Polackova H. Socio-economic consequences of globalization in agriculture in relation to social responsibility. SHS Web of Conferences. 2020;74:e04020
- [17] Winkler K, Fuchs R, Rounsevell M, Herold M. Global land use changes are four times greater than previously estimated. Nature Communications Nature Publishing Group UK London. 2021;12:2501
- [18] Siebrecht N. Sustainable agriculture and its implementation gap—Overcoming obstacles to implementation. Sustainability. 2020;12:3853
- [19] Hani FJ, Pintér L, Herren HR. Sustainable Agriculture: From Common Principles to Common Practice. Canada: IISD: International Institute for Sustainable Development; 2007
- [20] Vemuri AW, Costanza R. The role of human, social, built, and natural capital in explaining life satisfaction at the country level: Toward a National Well-Being Index (NWI). Ecological Economics. 2006;58:119-133
- [21] Fazal S. Urban expansion and loss of agricultural land—a GIS based study of Saharanpur City, India. Environment and Urbanization. Sage Publications Sage CA: Thousand Oaks, CA. 2000;12:133-149
- [22] Kanianska R. Agriculture and its impact on land-use, environment, and ecosystem services. In: Landsc Ecol Influ L Use Anthropog Impacts Landsc Creat. Croatia: London, UKInTech; 2016. pp. 1-26
- [23] Shivakoti G, Ghale Y, Upreti B. The ecological dynamics of low external input agriculture: A case study of hill farming in a developing country. The International Journal of Sustainable Development and World Ecology. 2005;12:385-397
- [24] Sutrisno FXA, Setiawan B. Sustainable Urban agricultural land protection policy. Jurnal Perencanaan Pembangunan: The Indonesian Journal of Development Planning. 2018;2:227-240
- [25] Westphal JM. Managing agricultural resources at the urban–rural interface: A case study of the old Mission peninsula. Landscape and Urban Planning. 2001;57:13-24
- [26] Evans HE, Ngau P. Rural-urban relations, household income diversification and agricultural productivity. Development and Change. 1991;22:519-545
- [27] Nguyen H. Sustainable Food Systems: Concept and Framework. Italy: Food Agric Organ United Nations Rome; 2018
- [28] Food and Agriculture Organization. Report of the Council of FAO [Internet]. Rome: Italy; 1991 Available from: <https://www.fao.org/3/t0482e/t0482e00.htm>
- [29] Everett T, Ishwaran M, Ansaloni GP, Rubin A. Economic growth and the environment. 2010. p. 51. Available from: <https://mpr.aub.uni-muenchen.de/23585/>. MPRA (Munich Personal RePEc Archive) Paper No. 23585
- [30] Suparmoko M. Ekonomi sumber daya alam dan lingkungan. Suatu Pendekatan Teoritis (4th revised edition). Yogyakarta: BPFE UGM; 2012
- [31] Gobyah IK. Berpijak pada Kearifan Lokal. Denpasar, Bali: Bali Post Online [Internet]; 2003. Available from: <http://www.balipost.co.id/BALIPOSTCETAK/2003/9/17/bd3.htm>
- [32] Sartini S. Menggali kearifan lokal Nusantara: Sebuah kajian filsafati Jurnal Filsafat. 2007;14(2):111-120

- [33] Berkes F. Traditional Ecological Knowledge in Perspektif. In: Inglis JT, editor. *Traditional Ecological Knowledge: Concept and Cases*. Canadian Museum of Nature, Ottawa; 1993
- [34] Berry JW. Globalisation and acculturation. *International Journal of Intercultural Relations*. 2008;**32**:328-336
- [35] Zuhud EAM, Hikmat A, Kosmaryandi N. Traditional land practice and forest conservation: Case study of the Manggarai tribe in Ruteng Mountains, Indonesia. *Komunitas: International Journal of Indonesian Society and Culture*. 2016;**8**:256-266
- [36] Tamalene MN, Hasan S, Kartika K. Local knowledge and community behavior in the exploitation of parrots in surrounding area of aketajawe lolobata national park. *Biosfer: Jurnal Pendidikan Biologi*. 2019;**12**:24-33
- [37] Guntur A, Sayamar E. Kajian Kearifan Lokal Petani Padi Sawah di Desa Huta Gurgur II Kecamatan Silaen Kabupaten Toba Samosir. Riau University
- [38] Utomo AP, Al Muhdhar MHI, Syamsuri I, Indriwati SE. Local knowledge of the using tribe farmers in environmental conservation in Kemiren Village, Banyuwangi, Indonesia. *Biosfer: Jurnal Pendidikan Biologi*. 2020;**13**:14-27
- [39] Gutti B, Aji MM, Magaji G. Environmental impact of natural resources exploitation in Nigeria and the way forward. *Journal of Applied Technology in Environmental Sanitation*. 2012;**2**:95-102
- [40] Rhett AB. Revised Deforestation Figures from the Food and Agriculture Organization. Nigeria: FAO; 2005
- [41] Clinton A, Budnukaeku AC. Environmental degradation its impact on natural resources depletion. *Journal of Environmental Science and Public Health*. 2021;**5**:50-55
- [42] Lee T-C, Anser MK, Nassani AA, Haffar M, Zaman K, Abro MMQ. Managing natural resources through sustainable environmental actions: A cross-sectional study of 138 countries. *Sustainability*. 2021;**13**:12475
- [43] Kartasapoetra G, Kartasapoetra AG, Sutedjo MM. *Teknologi konservasi tanah dan air*. Jakarta: PT Bina Aksara; 1985
- [44] Mazvimavi K. *Socio-Economic Analysis of Conservation Agriculture in Southern Africa*. Johannesburg, South Africa: FAO Regional Emergency Office for Southern Africa (REOSA); 2010
- [45] FAO Regional Emergency Office for Southern Africa (REOSA). *Farming for the Future in Southern Africa: An Introduction to Conservation Agriculture*. Johannesburg, South Africa: FAO Regional Emergency Office for Southern Africa (REOSA); 2010
- [46] Sutrisno N, Heryani N. *Teknologi konservasi tanah dan air untuk mencegah degradasi lahan pertanian berlereng*. Badan Penelitian dan Pengembangan Pertanian; 2013
- [47] Lahmar R, Bationo BA, Lamso ND, Guéro Y, Tiftonell P. Tailoring conservation agriculture technologies to West Africa semi-arid zones: Building on traditional local practices for soil restoration. *Field Crops Research*. 2012;**132**:158-167
- [48] Reicosky DC. Role of carbon in ecosystem services from conservation agriculture. Lead paper of 4th World Congress on Conservation Agriculture, New Delhi, India. 2009:418-424
- [49] Varvel GE, Wilhelm WW. No-tillage increases soil profile carbon and nitrogen

under long-term rainfed cropping systems. *Soil and Tillage Research*. 2011;**114**:28-36

[50] Marongwe LS, Kwazira K, Jenrich M, Thierfelder C, Kassam A, Friedrich T. An African success: The case of conservation agriculture in Zimbabwe. *International Journal of Agricultural Sustainability*. 2011;**9**:153-161

[51] Broswimmer F. *Ecocide: A Short History of the Mass Extinction of Species*. UK: Pluto Press; 2002

[52] Bongomin O, Yemane A, Kembabazi B, Malanda C, Chikonkolo Mwape M, Sheron Mpofo N, et al. Industry 4.0 disruption and its neologisms in major industrial sectors: A state of the art. *Journal of Engineering*. 2020;**2020**:1-45

[53] Sumardjo. *Keterkaitan sistem penyuluhan pertanian era Industri 4.0 dan society 5.0*. Bogor, Indonesia: BPPSDMP, Kementerian Pertanian; 2019

[54] Baenanda L. *Mengenal lebih jauh revolusi industri 4.0*. Jakarta: Binus University; 2019. Available from: <http://binus.ac.id/knowledge/2019/05/mengenal-lebih>

[55] Swastika DKS, Indraningsih KS. Strategy formulation of farmers capacity building through technological innovation in disadvantaged regions of Indonesia. *Jurnal Agro Ekonomi*. 2020;**38**:15-27

[56] Ray C. Neo-endogenous rural development in the EU. *Handbook of Rural Studies*. 2006;**1**:278-291

[57] Brigitte K, Richard M, Alfred H, Jill B, Michael F. *Better Practices in Agricultural Lending. Agricultural Finance Revisited*. Rome: FAO-GTZ; 1999

[58] Soediro A, Meutia I. The effectiveness of Bank financing to the productivity of agriculture sector in south Sumatera. *Jurnal Manajemen dan Bisnis Sriwijaya*. 2017;**15**:156-163

[59] Bhuiyan MA, Davit M, XinBin Z, Zurong Z. The impact of agricultural insurance on farmers' income: Guangdong Province (China) as an example. *PLoS One. Public Library of Science San Francisco, CA USA*. 2022;**17**:e0274047

[60] Pratiwi LPK, Budiassa M. Effectiveness of agricultural insurance program as a sustainable agricultural development effort. *SEAS (Sustainable Environment Agricultural Science)*. 2022;**6**:134-143

[61] Vermaak NJ. Rural financial schemes' contribution to community development. *Community Development Journal*. 2001;**36**(1):42-52

[62] Bonnen JT. *Agricultural development: Transforming human capital, technology, and institutions*. In: *International Agricultural Development*. 3rd ed. Baltimore, Maryland, USA: Johns Hopkins University Press; 1998. pp. 271-286

[63] Şener S, Sarıdoğan E. The effects of science-technology-innovation on competitiveness and economic growth. *Procedia - Social and Behavioral Sciences*. 2011;**24**:815-828

[64] Zambon I, Cecchini M, Egidi G, Saporito MG, Colantoni A. *Revolution 4.0: Industry vs. agriculture in a future development for SMEs*. *Processes*. 2019;**7**:36

[65] Ane T, Yasmin S. Agriculture in the fourth industrial revolution. *Annals of Bangladesh Agriculture*. 2019;**23**:115-122

[66] Simonović A, Marković D, Simonović V, Krstić D. Impact of industry

4.0 on agricultural industry. Ind
40. Scientific Technical Union of
Mechanical Engineering" Industry 4.0".
2020;5:164-166

[67] Yusianto R, Marimin M,
Suprihatin S, Hardjomidjojo H. IOT
based smart agro-industrial technology
with spatial analysis. *Jurnal Teknologi
dan Industri Pertanian Indonesia*.
2020;30:319-328

[68] Sung J. The fourth industrial
revolution and precision agriculture. In:
*Automation in Agriculture: Securing
Food Supplies for Future Generations*.
DOI: 10.5772/intechopen.71582

[69] Uchida K, Ushimaru A. Biodiversity
declines due to abandonment and
intensification of agricultural lands:
Patterns and mechanisms. *Ecological
Monographs*. 2014;84:637-658

[70] Zabel F, Delzeit R, Schneider JM,
Seppelt R, Mauser W, Václavík T. Global
impacts of future cropland expansion
and intensification on agricultural
markets and biodiversity. *Nature
Communications*. Nature Publishing
Group UK London. 2019;10:2844

[71] Purnomo EP, Anand PB, Choi J-W.
The complexity and consequences of
the policy implementation dealing with
sustainable ideas. *Journal of Sustainable
Forestry*. 2018;37:270-285

[72] Young A. *Land Degradation in
South Asia: Its Severity, Causes and
Effects upon the People*. Rome, Italy:
FAO; 1994

[73] Suradisastra K, Las I, Pasandaran E.
Membalik kecenderungan degradasi:
Pengelolaan air melalui pengelolaan
lahan. In: *Membalik Kecenderungan
Degradasi Sumber Daya Lahan dan
Air*. Jakarta: Badan Penelitian dan
Pengembangan Pertanian; 2010

[74] Ilham MI. Economic development
and environmental degradation in
Indonesia: Panel data analysis. *Jurnal
Ekonomi & Studi Pembangunan*.
2021;22:185-200

[75] Pontoh EA. TINDAK PIDANA
KONSERVASI TANAH DAN AIR
MENURUT UNDANG-UNDANG
NOMOR 37 TAHUN 2014 TENTANG
KONSERVASI TANAH DAN AIR. *LEX
CRIMEN*. 2019;7

[76] Ellis F. *Agricultural Policies in
Developing Countries*. Cambridge: UK:
Cambridge University Press; 1992

[77] Garnett T, Appleby MC, Balmford A,
Bateman IJ, Benton TG, Bloomer P, et al.
Sustainable intensification in agriculture:
Premises and policies. *Science
(80-)*. American association for the
Advancement of Science. 2013;341:33-34

[78] Kubitza C, Krishna VV, Urban K,
Alamsyah Z, Qaim M. Land property
rights, agricultural intensification, and
deforestation in Indonesia. *Ecological
Economics*. 2018;147:312-321

[79] Dewi WS. Improvement soil
biology characteristics of paddy field
by system of rice intensification. *Sains
Tanah - Journal of Soil Science and
Agroclimatology*. 2016;12:67-75