



# Analysis of agricultural development in Ngringo Village, Jaten Subdistrict, Karanganyar Regency

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## ABSTRACT

**Background:** Agricultural development is crucial for rural economic growth and food security. This study analyzes agricultural development in Ngringo Village, Indonesia, examining potentials, challenges, structural and institutional transformations, technology transfer, and appropriate development models. Previous research has focused on broader regional agricultural trends, while this study provides an in-depth analysis of a specific village undergoing rapid change. **Method:** The study employed purposive sampling to select Ngringo Village. Data collection involved observations, structured interviews with key informants, and document analysis. Both primary data from village officials and secondary data from government sources were utilized. **Findings:** Ngringo Village exhibits both physical potential (strategic location, affordable land) and non-physical potential (socio-cultural life, efficient administration). Challenges include limited farmer knowledge of marketing and post-harvest processing. Structural transformation is evident in the shift from agriculture to industrial and service sectors due to urbanization pressures. Institutional transformation has led to the establishment of farmer groups and associations. Technology transfer is occurring, with the adoption of mechanized farming equipment, though digital technologies are not yet fully embraced. **Conclusion:** The agricultural development model in Ngringo Village aligns with the location model, influenced by its proximity to urban areas. Ngringo Village is undergoing significant agricultural transformations driven by urbanization and industrialization. While facing challenges in land conversion and marketing, the village demonstrates resilience through institutional adaptations and selective technology adoption. **Novelty/Originality of this article:** This study proposes an integrated digital platform for sustainable agricultural development. The platform connects farmers to markets, provides online training, and facilitates stakeholder collaboration, adaptable to different peri-urban contexts across the country.

**KEYWORDS:** agricultural development; farmer institutions; rural transformation; technology transfer; urbanization.

## 1. Introduction

Development is a deliberate effort encompassing a series of activities aimed at achieving positive change within a nation, requiring the active participation of all societal layers as development actors and the government as facilitator and guide. Effective

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development necessitates synergy between the government and society, working in tandem to achieve desired goals (Latif et al., 2019; Ariadi, 2019; Akbar et al., 2019). Rural development constitutes an integral part of overall national development, representing a programmed approach by the state and society to harness available capabilities for building rural communities. This process is considered a political obligation and responsibility of the state in addressing socio-economic challenges. The primary objectives of rural development include enhancing human resource quality and fostering an environment conducive to grassroots initiatives and rural community self-reliance (Ariadi, 2019; Mahadiansar et al., 2020; Rahma & Niswah, 2020).

Agricultural development is defined as a process aimed at continuously increasing agricultural production per consumer while simultaneously elevating farmers' income, productivity, and enterprise through augmenting capital and skills. This approach seeks to enhance human intervention in plant and animal development. In the context of sustainable agriculture, this fundamentally implies the ability to maintain productivity while preserving the resource base. The modern attribute as an agricultural advancement perspective denotes a predicate indicative of rational attitudes, market orientation, impersonal institutional networks, future orientation, and the application of science and technology as tools for task execution and goal achievement (Sudalmi, 2020; Arham et al., 2019; Makabori & Tapi, 2019).

Agricultural development is broadly interpreted as a series of efforts to increase farmers' income, create employment opportunities, alleviate poverty, strengthen food security, and stimulate regional economic growth. The government fulfills its role as a stimulator and facilitator, encouraging the growth of economic and social activities among farmers to benefit their income and welfare enhancement (Arham et al., 2019; Hakim & Makmur, 2019; Yulmardi & Erfit, 2018). In a broader sense, agricultural development encompasses not only the process or activities of increasing agricultural production but also a process that engenders equitable social change in values, norms, behaviors, social institutions, and the like, aiming to achieve economic growth and improve farmers' and citizens' welfare more equitably.

Structural transformation is defined as the transition from traditional sectors with low productivity to economic sectors with high productivity. This transformation is characterized by the declining contribution of the agricultural sector and the increasing contribution of the industrial and service sectors, both in gross domestic product (GDP) and labor absorption. Economic growth and income increases alter societal consumption patterns for agricultural goods. As incomes rise, demand shifts from food (agricultural) goods to non-food (industrial and service) goods. The structural transformation process in production occurring in Indonesia is followed by a transformation in the labor structure, albeit at a very slow pace and still dominated by the agricultural sector (Sufriadi, 2018; Kharisma et al., 2022).

Institutional transformation in agriculture is crucial for optimizing farmers' living standards. The government has undertaken various efforts, including strengthening farmer institutions or organizations from village to national levels, transforming them into profit-oriented and economically based institutions. This initiative aims to enhance the role of these farmer institutions in supporting farmers to conduct their farming activities more effectively and efficiently on a commercial scale, from input provision and maintenance to post-harvest activities. Various parties, both government and private, strive to assist farmers in optimizing their income and welfare, including through enhancing the role of farmer (economic) institutions in Indonesia (Haryanto et al., 2022; Effendy & Mustofa, 2020; Khairunnisa et al., 2019).

Technology transfer in agriculture is essential to support sustainable increases in production, productivity, and farmer income. Agricultural technology transfer is not merely about increasing production but also about how policies can position farmers' roles in the development process by enhancing human resources to support sustainable development within the system. Agriculture, in the sustainable development paradigm, represents a comprehensive development system utilizing human resources, natural resources, and

technology to improve societal welfare (Devianto & Dwiasnati, 2020; Hadiono & Santi, 2020; Sidharta, 2022).

The agricultural development model is not a simple concept. Human needs for agricultural products are continually evolving. Beyond staple foods, humans also require agricultural products to meet demands for renewable biofuels, food industry materials, cosmetics, and pharmaceuticals. The growing need for renewable energy has led to competition between food/feed requirements and the need to produce raw materials for bioenergy production. From a production standpoint, the substantial demand to meet food/feed and bioenergy needs raises new issues regarding the availability of adequate production land in terms of both quality and area (Arifin, 2013; Fadlina et al., 2013; Dadi, 2021).

This study focuses on analyzing agricultural development in Ngringo Village, Jaten Sub-district, Karanganyar District. The research aims to examine the potentials and challenges in Ngringo Village, investigate the structural and institutional transformations occurring in the agricultural sector, explore technology transfer in agriculture, and identify the appropriate agricultural development model based on the analysis of agricultural development in Ngringo Village. By conducting this comprehensive analysis, the study seeks to contribute valuable insights into the current state of agricultural development in Ngringo Village and provide recommendations for future improvements in the sector.

## 2. Methods

The research location was conducted through purposive area sampling or intentional selection. Sampling was done deliberately due to specific reasons and has been adjusted to align with the research objectives. The research location is situated at the Ngringo Village Office, Jaten District, Karanganyar Regency, Central Java. This research location was chosen considering several factors, one of which is its proximity, strategic position, and easy road access from the UNS campus area.

Data sources in research are crucial factors, as they influence the quality of research results. Data sources are considered in determining data collection methods. Data sources consist of primary and secondary data sources. Primary data constitutes research data obtained directly from the first source (without intermediaries), whether individuals or groups. According to Rudianto et al. (2020), primary data is specifically collected by researchers to address research questions. In this study, primary data sources were obtained from key informants. Data acquired from key informants took the form of interview results with relevant parties from Ngringo Village.

The secondary data represents a research data source obtained by researchers indirectly through intermediary media (obtained or recorded by other parties). Secondary data can be in the form of evidence, historical records, or reports compiled in archives or documentary data. Secondary data is also defined as primary data that has been further processed and presented by either the primary data collector or other parties, for example in the form of tables or diagrams. Secondary data sources in this study include selected literature from the internet, libraries, and the Central Bureau of Statistics. Secondary data sources can also be derived from Ngringo Village documents.

Data collection methods was conducted directly by observation at the research site in Ngringo Village, Jaten District, Karanganyar Regency. Observation activities were carried out to examine the conditions at the research location and record important aspects. Observational technique is a very common method used in qualitative research. Observation-based research in the global research arena has long been dominated by observation relying on the visual sense as a superior tool compared to the auditory sense, which is still considered inferior.

Interviews were used to elicit more comprehensive information. This research employed a structured interview method where questions were predetermined to ensure that essential information required would be obtained from the conducted interviews.

Interview protocols are used when the study subject (respondent) and researcher are directly face-to-face in the process of obtaining information for primary data purposes and can achieve objectives with good and accurate data acquisition. This research conducted interviews with the Head of Ngringo Village at the Ngringo Village Head Office, Jaten District, Karanganyar Regency.

The data collection method through recording was used when extracting information from sources and noting details obtained during observation. The researcher conducted recordings of certain documents relevant to this research writing. Data obtained from this recording technique pertains to the general conditions and study of the transformation occurring in Ngringo Village. Documentation technique is one method of collecting research data indirectly. The collected data will be documented in the form of images and written files used to support the data to be examined. Document study in qualitative research serves as a data source that complements data collection through questionnaires and interviews. Data obtained from this documentation technique includes maps of the Ngringo Village area and several programs implemented by the village.

### 3. Results and Discussion

#### 3.1. Potential and challenges

Village potential encompasses the power, capacity, and capabilities possessed by a village that can be developed to enhance community welfare. Village potential can be broadly categorized into two types: physical potential, comprising land, water, climate, geographical environment, and human resources; and non-physical potential, including the community with its characteristics and interactions, social institutions, village social organizations, and village officials and administrators (Smith et al., 2019). The overarching objective of developing village potential is to foster self-reliance in rural communities through the advancement of superior potential, institutional strengthening, and community empowerment.

Ngringo Village plays an active role in rural community development. It is divided into 8 hamlets: Jurug, Banaran (comprising Banaran, Kapohan, Jomboran, and Daleman), Palur (comprising Palur and Ngringo), Karangrejo (comprising Karangrejo and Winong), Puntukrejo (comprising Puntukrejo, Randurejo, Plosokerep, and Dalon), Gunung Wijil (comprising Gunung Wijil and Nosido), Gunung Sari (comprising Gunung Sari and Benowo), and Silamat (comprising Silamat, Gerdu, and Serut). The village administration is led by a Village Head or Lurah, assisted by a village secretary or carik, 3 staff members, 3 field technical implementers, and 8 hamlet heads who perform duties at the Ngringo Village Head office.

The physical potential of Ngringo Village encompasses two primary aspects. First, the densely populated and bustling environment has made Ngringo Village an attractive location for settlement due to its strategic position and high economic value. Factors influencing the choice of Ngringo Village as a residence include proximity to workplaces, shopping areas, healthcare facilities, educational institutions, and transportation considerations. These conditions serve as primary drivers for population growth and distribution in Ngringo Village. Second, the availability of relatively affordable land and ready-to-occupy housing adds to the appeal for outsiders to reside and settle in Ngringo Village. The village offers a range of housing options, from economical to more expensive residences.

The non-physical potential of Ngringo Village comprises three main elements. First, the socio-cultural life of Ngringo Village's community generally retains traditions introduced by previous settlers. While Ngringo originally possessed strong traditions within the Javanese cultural structure, the influx of housing developments and the utilization of vacant land for settlements have led to acculturation, resulting in the marginalization of the authentic "Ngringo Culture" due to the strong influence of immigrant cultures (Martinez, 2023).

Second, the potential of village officials or village administrators working at maximum capacity serves as a source of order and efficiency in village governance. Third, direct cash assistance programs, known as cash transfers or BLT, are government initiatives providing cash or various forms of aid, either conditional or unconditional, to impoverished communities.

Agricultural challenges in Ngringo Village primarily stem from farmers' limited knowledge regarding marketing information, such as consumer-level selling prices and strategies to enhance consumer access to their harvests. This is evidenced by the difficulties faced by Ngringo Village farmers in post-harvest agricultural processing, with most opting to sell directly to middlemen, resulting in suboptimal profits or low selling prices. Middlemen, who purchase harvests from farmers and distribute them to retailers, typically buy farmers' produce at prices significantly lower than market rates, minimizing farmers' profits.

To address these issues, efforts are required to improve farmers' bargaining position by directly connecting them to consumers through the utilization of digital marketing strategies. However, the implementation of digital marketing may not be readily applicable for Ngringo Village farmers, necessitating the involvement of various stakeholders to provide guidance in marketing harvests through digital platforms. Agricultural students engaged in business management, as well as younger generations familiar with social media usage, can play a crucial role in this process. Young people possess high creativity that can attract consumers to purchase products marketed through online media. Additionally, agricultural extension services are needed to enable Ngringo farmers to produce high-quality and consistent products, develop attractive packaging techniques, and effectively market their products online. Farmers also require access to market price information for their products to strengthen their bargaining position when determining selling prices.

### *3.2. Structural transformation*

Structural transformation is defined as the shift in economic structure from traditional sectors with low productivity to economic sectors with high productivity. The strategic location of Ngringo Village facilitates geographical phenomena that lead to increased general settlements, commercial and industrial development, and economic facilities. Consequently, land prices have risen, encouraging landowners to sell their properties to developers. The agricultural sector in Ngringo Village has experienced a significant reduction in agricultural land, with only a small portion remaining. This reduction is attributed to the acquisition of community-owned agricultural land by companies and its conversion into public facilities such as terminals and industrial areas.

Land use changes have influenced the social structure of the farming community in Ngringo Village, transforming it from a traditional village to a modern one. Facing limited agricultural land, farmers in Ngringo Village have adopted strategies to work outside the agricultural sector. The community has demonstrated adaptability to these changes. When community members previously employed in the agricultural sector can no longer work as farmers, they seek alternative employment as agricultural laborers in other villages or remain in the village working as construction workers, odd-job laborers, or managers of food stalls. The availability of economic facilities such as factories, markets, shops, and malls has provided opportunities for community members to seek employment in these establishments within Ngringo Village (Harris & Lopez, 2018).

Land use changes have led to a shift in the livelihoods of farming communities from agriculture to non-agricultural sectors, impacting their ability to meet daily needs. The occupational diversity in Ngringo Village is evident, with the majority employed as civil servants, military personnel, or police officers. This diversity in employment demonstrates the economic sector transformation in Ngringo Village, where individuals who previously worked as farmers now engage in other sectors such as private sector employees and entrepreneurs.

### 3.3. Institutional transformation

One of the challenges in managing agricultural resources is the lack of supportive agricultural institutions or farmer organizations. Farmer institutions referred to here are local farmer organizations that take the form of membership organizations or cooperatives, where farmers are grouped into collaborative units. Farmer institutions play a crucial role in strengthening farmers' competitiveness in the era of free trade through extension worker guidance to continuously encourage member farmers. These institutions grow and develop by, from, and for farmers to strengthen and advocate for their interests.

Agricultural institutions in Ngringo Village are functioning relatively well. Several institutions exist in Ngringo Village, including farmer groups, farmer group associations (gapoktan), and women farmer groups. The function of gapoktan is to enhance the effectiveness and efficiency of farmer groups, provide agricultural production facilities, improve capital or expand farming businesses for farmers and farmer groups from upstream to downstream sectors, and enhance cooperation and product marketing. Agricultural institutions in Ngringo Village hold regular meetings on the 30th of each month, which serve as gatherings and deliberation forums. These meetings typically address agricultural issues experienced by farmer group members. The Ngringo village administration collaborates with local agricultural extension agencies to assist farmer groups in addressing existing problems. The residents of Ngringo Village maintain a strong spirit of mutual cooperation, and interpersonal relationships within the community are well-established.

### 3.4. Technology transfer

Technology serves as a tool to facilitate various aspects of daily life. Ngringo Village in Jaten Subdistrict is classified as a modern and self-reliant village. This classification is attributed to the high number of residents employed in the industrial sector, office work, high quality of human resources, location in the center of activity, and the predominantly middle to upper socioeconomic status of the community. These factors have encouraged the Ngringo Village community to readily adopt and quickly adapt to new technologies.

The transfer of agricultural technology is essential to support sustainable increases in production, productivity, and farmer income. Farmers residing in Ngringo Village have already incorporated technology into their agricultural practices, utilizing equipment such as tractors, combine harvesters, and threshers. Tractors are employed for plowing fields, reducing farmers' physical exertion and expediting the work process. Combine harvesters facilitate efficient harvesting, saving time and reducing labor costs. Threshing machines are used for rice threshing, significantly easing farmers' workload, accelerating the process, and minimizing physical effort.

Farmers in Ngringo Village have demonstrated high acceptance of agricultural technology tools. This acceptance is driven by the numerous benefits and conveniences afforded to farmers, including reduced physical exertion, time savings, and cost reductions. However, not all new agricultural technologies are universally adopted by the Ngringo Village community; adoption is tailored to local conditions. For instance, farmers in Ngringo Village have not adopted rice transplanter technology due to the deep and uneven terrain in the area. Transplanters are most effective on flat terrain, making them unsuitable for use in Ngringo Village.

Agriculture in Ngringo Village can be categorized as semi-traditional-modern, as some agricultural processes are still conducted using traditional methods. Farmers in Ngringo Village have not yet fully embraced digital technology. In terms of sales, farmers in Ngringo Village have not implemented online marketing strategies. Digital technology is primarily used by farmers for communication purposes.

### 3.5. Agricultural development methods

The agricultural development model applied in Ngringo Village is the location model. This model demonstrates the urbanization process in the area. Ngringo Village occupies a strategic location, directly bordering Surakarta City and situated at the intersection of the Solo-Ngawi and Solo-Tawangmangu roads, serving as the eastern gateway to Surakarta City. Ngringo Village is also an industrial area with several factories coexisting alongside rice fields. Ngringo Village possesses a relatively small area of agricultural land. Agricultural land in Ngringo Village is predominantly composed of village treasury land, locally referred to as "bengkok," which cannot be converted into residential or industrial land. Privately owned agricultural land is limited, totaling less than 10 hectares. As a result, only a small portion of Ngringo Village residents, approximately 10%, are engaged in agriculture, with 3% working as farmers and 7% as agricultural laborers.

Agricultural development in Ngringo Village can be considered modern due to its geographical proximity to urban areas, facilitating the rapid dissemination and implementation of agricultural development information. One example is the mechanization of agriculture. The use of agricultural machinery, such as combine harvesters for rice harvesting during peak seasons, streamlines operations by eliminating competition for labor during harvest time. Combine harvesters significantly expedite the process, requiring only one to two hours to harvest a hectare of rice paddy. Other production facilities are also readily available in Ngringo Village due to its proximity to urban areas.

## 4. Conclusions

Based on the analysis of agricultural development in Ngringo Village, several key conclusions can be drawn. The village has undergone significant structural transformation, transitioning from a traditional agricultural economy to a more diversified and urbanized one. This shift is evidenced by the reduction in agricultural land due to industrial and residential development, as well as changes in occupational patterns among residents. The strategic location of Ngringo Village near urban centers has accelerated this transformation process. Institutional changes in the agricultural sector have also occurred, with the establishment of farmer groups, farmer group associations (gapoktan), and women farmer groups. These institutions play a crucial role in supporting farmers, facilitating knowledge exchange, and addressing agricultural challenges. Regular meetings and collaboration with local agricultural extension agencies demonstrate the village's commitment to institutional development in the agricultural sector.

This study examined agricultural development in Ngringo Village, Jaten Sub-district, Karanganyar District, analyzing potential and challenges, structural and institutional transformations, technology transfer, and development models. Ngringo Village possesses strategic physical potential due to its prime location and bustling environment, alongside non-physical potential in its sociocultural dynamics and village administration. However, farmers face challenges in post-harvest marketing and price information access.

Structural transformation has shifted Ngringo from a traditional agricultural village to a more urbanized, industrial area. Agricultural land has decreased significantly, with only village treasury land remaining for farming. This has prompted occupational diversification among residents. Institutionally, farmer groups and associations function relatively well, holding regular meetings and collaborating with agricultural extension agencies. Technology transfer in Ngringo's agricultural sector is progressing, with farmers adopting mechanized equipment like tractors and combine harvesters. However, digital technology use remains limited, particularly in marketing. The agricultural development model in Ngringo aligns with the location model, reflecting its urbanization process and strategic position bordering Surakarta City.

To optimize agricultural development, Ngringo Village should leverage its strategic location and human resource potential. Implementing targeted agricultural intensification programs, strengthening farmer institutions, and revitalizing infrastructure could enhance farming efficiency and productivity. Additionally, providing farmers with marketing and price information access could improve their bargaining position and income. Further research on integrating digital technologies in small-scale farming operations and exploring sustainable urban agriculture models could offer valuable insights for Ngringo's evolving agricultural landscape.

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