

Public Policy Innovations Related to Millennial Farmers in Indonesia

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Abstract. *This study aims to analyze the public policy of the Indonesian government in the Millennial Farmer program. This program is expected to attract the interest of the younger generation to be actively involved in the agricultural sector through a digital entrepreneurial approach. The research method uses a literature study that aims to examine various reference sources related to public policy and innovation in the Millennial Farmer program in Indonesia. Rogers' diffusion of innovation theory is used as an analytical framework to measure the extent to which digital technology can be adopted by millennial farmers. Five main dimensions relative advantage, suitability, complexity, trialability, and observability are the assessment indicators. The results of the study show that although this program offers relative advantages in increasing productivity and market access, there are still obstacles in the complexity and trialability aspects due to limited training and minimal technology trial facilities in the field. The primary survey revealed that 65% of millennial farmers have used agricultural applications, but 60% of them have difficulty understanding digital features and 50% have internet infrastructure constraints. Observability is still low due to the lack of real representation of successful farmers as local role models. The conclusion of this study confirms that the effectiveness of public policy in encouraging the adoption of innovation is greatly influenced by user readiness, infrastructure support, and active involvement of local governments. Therefore, a more adaptive, decentralized, and responsive policy strategy to local needs is crucial to accelerate the transformation of the technology-based agricultural sector.*

Keywords: *Public Policy, Innovation, Millennial Farmers*

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INTRODUCTION

The government through the Ministry of Agriculture launched the Millennial Farmer Program innovation since 2020, as part of the agricultural transformation strategy based on technological innovation and digitalization (Wastutiningsih et al., 2024; Hasan et al., 2022; Widiyanti et al., 2023). This program aims to attract the interest of the younger generation to be actively involved in the management of modern farming businesses based on information technology, such as the use of agricultural applications, agricultural product e-commerce platforms, and the use of the Internet of Things (IoT) in agricultural cultivation.

The agricultural sector is a major pillar of the Indonesian economy, contributing 12.98% to the national Gross Domestic Product (GDP) in 2023 (BPS, 2023). However, the number of young workers in this sector continues to decline, especially among the millennial generation. Based on BPS data in 2023, only around 29.7% of farmers are under 35 years old. This phenomenon indicates a farmer regeneration crisis in Indonesia.

The success of innovation adoption depends on the characteristics of the innovation and user readiness (Zhang et al., 2020; Putteeraj et al., 2022) Of the 6.1 million young farmers, 42% have utilized digital and modern technology in developing their agricultural businesses, while 58% have not. The results of the data collection also recorded that around 5,612 farmers under the age of 19 have utilized digital and modern technology. Meanwhile, farmers over the age of 39 who have utilized digital and modern technology are recorded at around 11 million people.

In its implementation, this program faces a number of challenges, including limited access to capital, internet infrastructure that is not evenly distributed in rural areas, and low digital literacy among young farmers. The results of a primary survey conducted in Bandung Regency showed that 65% of millennial farmers have used agricultural applications, but 60% of them still complained about the difficulty of accessing capital and 50% stated that the quality of the internet network was inadequate. For more clarity, the author attaches a table as below:

Table 1. Aspects Related to Millennial Farmer Policies

| Aspect | Fact |
|-----------------------------------|--|
| Total national millennial farmers | 6,18 million (21,9 %) |
| Use of digital technology | Varies: 25% in Papua, most in NTB, 12,238 in Simalungun |
| Policy initiatives | Training (IKP, drone, DI), urban farming, access to credit and funding |

Source: (author's data processing 2025)

In the context of Indonesia, the results of the 2023 Agricultural Census recorded 6,183,009 millennial farmers (aged 19–39 years), or 21.93% of the total farmers nationwide. East Java topped the high rankings throughout Indonesia with 971,102 millennial farmers (15.71% of the national total) in second place, Central Java (625,807; 10.12%) and third, West Java (543,044; 8.78%), the Central Statistics Agency (BPS) Simalungun, the results of the first stage of the 2023 Agricultural Census (ST), the number of millennial farmers reached 78,821 people. Based on the results of ST2023, millennial farmers aged 19-39 years, who use digital technology, are 12,238 people.

From the data above, the development of millennial farmer innovation is developing faster than farmers in other regions in Indonesia, for example in the Papua region, there are 22,729 millennial farmers (34.9% of Papuan farmers), but only 25% of all registered farmers use digital technology per year 2023 (Source: by researcher data 2025). On the other hand, the development of agritech start-ups in Indonesia such as TaniHub, Sayurbox, and Eragano also support the modern agricultural innovation ecosystem. However, the penetration of this platform into millennial farmers in the regions is still limited. Good support is needed to be able to create competitive millennial farmers.

METHODS

This study uses a literature study approach (library research) which aims to examine various reference sources related to public policy and innovation in the Millennial Farmer program in Indonesia. Data sources come from scientific journals, books, official government reports, and secondary data from related institutions such as the Central Statistics Agency (BPS) and the Ministry of Agriculture. Data Collection Techniques: Data were collected by searching policy documents, journal articles, previous research reports, and relevant statistical data. Literature selection was carried out based on relevance to the research topic, data recency (2018-2024), and the validity and reliability of information sources. Data Analysis: Data analysis was carried out descriptively-qualitatively by grouping findings based on main themes, namely: (1) government policies related to Millennial Farmers; (2) digital technology-based agricultural innovation; and (3) implementation challenges in the field. The results of the analysis were then linked to public policy theory, innovation diffusion, and community empowerment to gain a comprehensive understanding.

RESULTS AND DISCUSSION

The level of digital technology utilization among millennial farmers in Bandung Regency shows positive developments. The survey results show that 65% of millennial farmers have utilized agricultural applications such as SIPINDO and AgriSmart for cultivation and pest control activities, 40% use e-commerce platforms such as TaniHub and Sayurbox to market agricultural products online, and 55% have participated in digital training held by government and private agencies related to smart farming and agricultural technology. However, there are still significant obstacles such as limited access to capital, internet infrastructure, and low digital literacy. Millennial Farmer policy using Rogers' Innovation Diffusion approach (2003) can be explained through five main characteristics of innovation.

Relative Advantage

This program provides benefits for young farmers because it allows increased productivity through the application of digital technology and online market access (Bolfe et al., 2020; Birner et al., 2021; Xie et al., 2021). to be more clearly described as follows: (1) Increased Productivity: This program offers modern agricultural technology such as digital agricultural applications (examples: SIPINDO, AgriSmart), the use of drones for land mapping, and the Internet of Things (IoT) for crop monitoring. This allows millennial farmers to increase production significantly compared to conventional methods; (2) Wider Market Access: Through agricultural e-commerce such as TaniHub, Sayurbox, and similar platforms, millennial farmers can market their products to a wider market, even across provinces, without having to rely on local middlemen; (3) Cost and Time Efficiency: Digital applications provide real-time information on market prices, weather, fertilizers, and pesticides, thus helping to make faster and more accurate decisions. This lowers production costs because agricultural inputs are used optimally; (4) Product Quality Improvement: Precision farming technology helps millennial farmers maintain the quality of their harvests according to market demand standards, especially for export; (5) Government Support: This program is also equipped with technical training, business capital assistance, and managerial assistance that were previously rarely received by traditional farmers. Although this program offers significant advantages, this Relative Advantage factor has not been fully felt by all millennial farmers in Indonesia due to the disparity in digital infrastructure in the 3T (underdeveloped, frontier, outermost) areas and limited program socialization.

Compatibility

Align with research from Sukmawati et al. (2024) and Rachmawati & Gunawan (2020), the Millennial Farmer Program is expected to be in line with the values, needs, and experiences of young farmers. However, in practice, this level of compatibility still faces several obstacles. Novisma & Iskandar (2023); Karim et al. (2024); Umi & Sudrajat (2024) said that most millennial farmers do have an interest in modern agriculture, but limited educational background, lack of access to technology training, and the habit of using traditional farming methods hinder the adoption of new technologies. Almost all farmers in areas with poor network access expressed difficulty in understanding how agricultural applications and IoT devices work due to the lack of intensive training from the government or the private sector. In addition, several technologies such as the use of drones or soil sensors are considered not yet fully relevant to the needs of small-scale farmers in rural areas (Dhillon & Moncur, 2023; Gokool et al., 2023). Therefore, in order for this innovation to be truly compatible, it is necessary to adjust the program according to the local context and the wisdom of local farmers, as well as intensify socialization and continuous education at the field level.

Complexity

This complexity does not only come from the technical side of using the tool, but also from the lack of training materials that are tailored to the level of digital literacy of farmers in rural

areas. In addition, differences in educational background and farming experience also increase the gap in understanding between millennial farmers and new technologies (Faried et al., 2024; Sudarmanto et al., 2024). This high complexity has an impact on the low level of farmer confidence in trying and applying innovation independently on their land. For more details regarding complexity, it will be explained below:

Table 2. Complexity Aspects

| Aspect | Findings |
|--|--|
| Alsintan (Agricultural Machinery) | Millennial farmers expressed difficulty in understanding sensor-based or IoT tools. 40% of farmers in NTB do not yet understand this technology (BPS, 2023). |
| Digital farming (smartphone application) | In Papua, only 25% of millennial farmers use agricultural applications; main reasons: do not know how to use & no training (BPS, 2023). |
| Drone & AI | A "very high complexity perception" was found in Central Kalimantan farmers were reluctant to try drones because they were considered expensive & complicated to operate (BPS-ST2023). |
| Urban Farming | More acceptable to millennial farmers because it is seen as simple, requires little capital, and is easy to practice on limited land |

Source: (author's data processing 2025)

Factors Causing High Complexity of Millennial Farmers

Lack of Structured Training 72% of millennial farmers have not received training in AI-based technology & smart farming (BBPP Ketindan, 2024). Limited Digital Literacy 65% of farmers aged 19-35 years outside Java feel less confident in using agricultural applications (BPS, 2023). High Cost of Tools & Equipment Sophisticated agricultural machinery is considered expensive, only owned by large farmer groups real obstacles to the adoption of innovation by millennial farmers in Indonesia. Although technology is available, limited training, high costs, and operational complexity reduce interest in adoption. To address this, public policy must focus on: Practice-based training, Credit for simple technology tools, Field demonstrations & urban farming as an initial model.

Trialability

Mgendi et al. (2021) and Sutherland & Marchand, (2021) said that, Government programs provide short training and demos of modern agricultural tools, but the frequency is still limited. In fact, according to Rogers' theory, the easier an innovation is to try, the greater the likelihood of its adoption, referring to the extent to which an innovation can be tried on a limited basis before being fully adopted by users. In the context of the Millennial Farmer policy, this aspect is very important because it allows millennial farmers to get to know, understand, and test new technologies without having to spend large amounts of capital or take high risks. To clarify the Trialability aspect as below.

Government Programs

The Ministry of Agriculture has launched demonstration plots (demplots) and training in several regions (for example the use of drones, smart farming applications, soil sensors) (Karunathilake et al., 2023; Inoue, 2020). However, its implementation is still uneven across provinces. Some regions such as West Java are more advanced than the 3T (Disadvantaged, Frontier, Outermost) regions. Main Constraints: Limited trial facilities (expensive digital agricultural tools, limited numbers, limited trainers). Lack of pilot project programs or small-scale technology simulations in agricultural villages. Absence of rental or loan mechanism for equipment as part of the trial. Policy Implications: Expansion of demonstration plots and interactive training to provide mass trial opportunities (Sseguya et al., 2021; Norton & Alwang,

2020). Provision of digital agricultural equipment rental/grant programs for millennial farmer groups. Partnership with agritech startups so that equipment can be tried for free in the early stages (freemium business model). Support from local governments in facilitating pilot projects in fostered villages.

Observability

The positive impacts of the use of modern agricultural technology have not been fully observed by other farmers, especially those who have not participated in the program (Ayenew et al., 2020; Campenhout, 2021). This makes the diffusion of innovation slow among non-participating farmers. The use of an innovation can be seen and observed by others. In the Millennial Farmer Program, positive impacts such as increased crop yields, production cost efficiency, and wider market access through digital platforms have indeed been felt by some millennial farmers. However, these effects have not been fully seen by other farmers, especially those who have not participated in the program.

CONCLUSION

The Millennial Farmer Program is a strategic government policy to encourage farmer regeneration and accelerate the adoption of digital innovation in the agricultural sector. Based on the Theory of Innovation Diffusion developed by Everett M. Rogers (2003), the success of adopting an innovation is highly dependent on five main characteristics: relative advantage, compatibility, complexity, trialability, and observability. Overall, the innovation diffusion approach shows that the success of a program is determined not only by the quality of its technology, but also by the extent to which the innovation can be adapted, tried, observed, and understood by end users.

SUGGESTION

Therefore, a more adaptive policy strategy is needed, rooted in the local context, and emphasizing the empowerment of millennial farmers through training, access to capital, and digitalization of infrastructure evenly. The improvements needed are: The government needs to expand access to financing specifically for millennial farmers. Improvement of digital infrastructure in rural areas. Intensification of agricultural technology-based training.

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