

The Agricultural Innovation and Capacity Building for Social Welfare of Farmers in Indonesia

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Abstract

This research aims to understand the agricultural innovation and capacity building for social welfare of farmers in Indonesia, which is an interesting topic to study considering the ontological level and sociological level based on public policy perspective. It is interesting to analyze the problem using a qualitative study. The data were collected through observation and documentation. The data analyzed using interactive steps were data reduction, data display, and data verification, supported by triangulation. The results indicated that agricultural innovation and capacity building in Indonesia and its implementation are needed for providing information to stakeholders. This result provides inputs for making better regulations and policy for state agencies as public officials and practitioners in managing agricultural innovation and capacity building in Indonesia.

Keywords: Public Policy, Agricultural Innovation, Capacity Building, Social Welfare, Farmers.

INTRODUCTION

In recent years, there has been increasing recognition of the importance of agricultural innovation in improving the social welfare of farmers. Agricultural problems and the powerlessness of farmers in developing their farming businesses are one of the causes of weak capacity building and farmer institutions (Manoppo, Malia, & Matindas, 2022). The low welfare of farmers caused by the low ability of farmers. Agricultural development is still constrained by the low ability of farmers which directly leads to the difficulties of farmers in improving their welfare (Bakari, Managanta, & Tambingsila, 2021). Therefore, it is very important to focus on agricultural innovation and capacity building as means to improve the social welfare of farmers in Indonesia. One way to achieve this is through a knowledge management approach, which has been proven to have a positive impact on the lives of farmers and the development of small farmers and their institutions in agricultural cluster areas (Veronice, Helmi, Henmaidi, & Arif, 2018). By leveraging knowledge management, farmers gain access to valuable information, resources and expertise that can improve their farming practices and productivity. This approach can also assist them in overcoming challenges, such as limited access to capital and information, low levels of education, and weak bargaining power with other stakeholders in the agricultural sector. Through capacity building, farmers can acquire the necessary skills and knowledge to adopt new technologies and sustainable agricultural practices, increasing their productivity and ultimately their long-term well-being. In addition, capacity building within farmer organizations can strengthen their collective bargaining power and enable them to advocate for their rights and interests more effectively. Furthermore, increasing the capacity of farmer managerial skills is very important in increasing farming productivity and farmer welfare. Increasing farmer access capacity and land ownership and management structures can also contribute to farmer welfare (Sulistiawati, Kusri, & Imelda, 2021).

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Capacity building plays an important role in improving the welfare of farmers (Bakari et al., 2021). Improving farmers' capacity in various aspects, such as knowledge management, farmer organization, managerial skills, access to resources, and adoption of sustainable practices can have a significant positive impact on their productivity and overall well-being. One of the key factors that determines the welfare of farmers is the capacity and the ability to adapt to agricultural technology (Sulistiawati et al., 2021). By strengthening their capacity on farmer organizations, farmers can increase their ability to advocate for their rights and interests, which will lead to increased welfare. In addition, building farmers' capacity in terms of their managerial skills can increase their ability to manage their farming operations effectively, resulting in increased productivity. In addition, capacity building programs aimed at increasing farmers' access to information, resources and technology can contribute to their well-being. By providing farmers with access to relevant information and resources and equipping them with the necessary skills and knowledge, they can make informed decisions about their farming practices, leading to increased productivity and incomes. In addition, capacity building programs that focus on improving land tenure and management structures can give farmers greater control over their resources and land. This, in turn, can improve their well-being as they have the autonomy to make decisions that best suit their farming operations (Byrd et al., 2019). In addition, implementing sustainable agricultural practices through capacity building initiatives can provide long-term benefits for farmers' welfare. By promoting the use of sustainable practices, farmers can reduce their dependence on hazardous chemicals and inputs, leading to increased soil fertility, decreased environmental degradation, and increased long-term productivity (Vogl, Vogl-Lukasser, & Walkenhorst, 2016).

Governmental organizations can enhance their rules by putting in place a performance accountability framework. Job consideration is required in order to create stronger regulations and policies. The Performance Accountability System can assist them in improving regulation. Leadership and service are broken down into different categories in order to improve policy and practice. User satisfaction has a positive and significant impact on the organization's success. Workplace spirituality mediates the effects of information technology on creative work practices, whereas creative work environments moderate the effects of transformational leadership, and cooperation between civilians and military people is required to develop better rules. According to the state constitutions and legislation, the maintenance of checks and balances, the rule of law, and the rule of justice will be carried out. Even the outcome of the proceedings demonstrates how lenient Indonesia's criminal justice system is. The extent of the conflict of interest, which frequently causes agreements to be reached through political wrangling, abuse of power, and interests. The abundance of natural resources in Indonesia must remain under the state control (Hermanto & Riyadi, 2020; Priyambodo, Wijaya, Wike, Sujarwoto, & Riyadi, 2023b, 2023a; Purbiyantari, Zauhar, Suryadi, Hermawan, & Riyadi, 2023a, 2023b; B. S. Riyadi, 2017, 2020a, 2020b; B. S. Riyadi, Atmoredjo, & Sukisno, 2020; B. S. Riyadi, Wibowo, & Susanti, 2020; Sinulingga et al., 2023; Susilo, Astuti, Arifin, Mawardi, & Riyadi, 2023; Syahrudin, Wijaya, Suryono, & Riyadi, 2023; Tjahjono, Suryono, Riyanto, Amin, & Riyadi, 2023; Toruan, Gusti, & Riyadi, 2023).

The impact of Public Service on Job Competency, specifically in relation to the Performance Accountability System, is notably favorable. The concepts of leadership and service can be classified into various thematic categories that offer valuable insights for enhancing policy and practice. The impact of user satisfaction on organizational performance is both positive and statistically significant. The impact of transformational leadership on innovative work behavior is mediated by an innovative climate, while the influence of information technology on innovative work behavior is mediated by workplace spirituality (Chandra & Riyadi, 2024; Nur, Riyadi, Saleh, & Hermanto, 2024; Priyambodo et al., 2023a, 2023b; Purbiyantari et al., 2023a, 2023b; Purboyo, Riyadi, Irawan, & Inkiriwang, 2024; B. S. Riyadi, 2024; Sinulingga et al., 2023; Susilo et al., 2023; Syahrudin et al., 2023; Tjahjono et al., 2023; Toruan et al., 2023). The extent of the conflict of interest, which frequently results in resolutions, is determined by political negotiations, misuse of authority, and personal interests. It is imperative for the state to maintain its authority in managing Indonesia's copious natural resources (Hermanto & Riyadi, 2020; B. S. Riyadi, 2017, 2020b, 2020a; B. S. Riyadi, Atmoredjo, et al., 2020; B. S. Riyadi, Wibowo, et al., 2020). There is also a study examines white-collar crime in Indonesia during the reform period, focusing on state officials, parliament, and political parties, found that white-collar crime has reached alarming levels, potentially forming state organized (Chandra & Riyadi, 2024; Purboyo et al., 2024; B. S. Riyadi, 2024; B. S. Riyadi, 2024)

Along with cooperation, competence, and performance, deeper investigation is still required on the causes, practices, and results of conflict management. The effects of intrapersonal, interpersonal, and production resulted in social and monetary losses. Both sides will require interventions. Performance, competence, and partnership are all interwoven. Capabilities must act as a comprehensive mediator between performance and partnership relationships. If capability, cooperation, and information sharing are effective and have significant influences, conflict resolution must be utilized to manage them. Job satisfaction has favorable and considerable impacts on work performance (Assery, Tjahjono, Sobirin, & Hartono, 2017; Feriyanto, Assery, Saleh, & Suryaningsum, 2017; Hendriarti, Othman, Arif, Assery, & Jamal, 2022; Saleh, Assery, & Dzakiyullah, 2018; Saleh, Assery, Sabihaini, & Suryaningsum, 2017). Innovation plays an important role in increasing agricultural productivity and, in turn, the social welfare of farmers. Through innovations, farmers can access new technologies, practices and techniques that can significantly increase their productivity and income levels. By increasing their capacity and capability, farmers can manage their agricultural land well and increase agricultural production. Not only does this increase in production benefit farmers financially, but it also contributes to the social welfare of society as a whole. By increasing agricultural productivity, innovation can help alleviate poverty among farmers, as they are able to generate more income from their farms. In addition, innovation can also contribute to the sustainability of agricultural practices. The benefits of innovation in agriculture are well documented. The application of technology has a positive impact on farmers' income and national welfare (Permadi, 2019).

Continuous innovation for sustainable agriculture is an important trend in today's modern era. Farmers are consistently demanded to apply key technologies to improve key agricultural practices, regardless of age. It is necessary to carefully examine the information needs and search behavior of the two main farmer groups, called millennials and progressives. As a result, various trends in information needs and search behavior were discovered. The results show that millennial generation farmers are more likely to seek access to technology materials and marketing partnerships from diverse communities. Meanwhile, those who are progressive are known to dig up data related to technology and efforts to improve the quality of agricultural products as well as market insights from close networks (Widiyanti, Karsidi, Wijaya, & Utari, 2021). The agricultural sector utilizes information and communication technology to increase productivity, farming efficiency, and search for agricultural information. Increasing the number of young farmers who master ICT is very important. The attitude of young farmers toward the sustainability of ICT-based farming business shows that the behavior of young farmers in seeking agricultural information affects the success of the search activity. The success of searching for agricultural information influences the attitude toward sustainability of on-farm activities. Agricultural information seeking behavior influences the attitude of young farmers toward the sustainability of on-farm work through successful agricultural information search (Salampessy, 2022). Studies on the desire of the millennial generation to pursue career as farmers show that in order to increase the interest of the younger generation in agriculture, it requires considerations on individual characteristics, external factors and social roles (Effendy, Widyaastuti, & Lastri, 2022). Despite the fact that Indonesia is an agricultural country, there has been a decrease in the number of young farmers. Need to improve welfare and create digital technology innovation is the role of young entrepreneurs in agricultural communities (Zulpardiasyah & Eko, 2022).

The strategy of preparing young farmers to achieve food sovereignty is concerned with the role of every agricultural person in preparing young agricultural generations to achieve food self-sufficiency. This strategy starts with changing the mindset of the younger generation about agriculture, starting with providing correct information about agriculture and the world of agriculture. Universities are required to have land for agriculture and instructors in agriculture. Every village has agricultural potential and scholarships for those who can't afford it but excel. Activities are needed to promote the program to build villages and prepare supporting facilities and infrastructure as well, encourage the formation of community groups to encourage sustainable food programs (Konyep, 2021). There was research on the interest of young farmers in agriculture. Factors of education of young farmers, parents' occupations, parents' land area and parents' income on the interest of young farmers. The results showed that the interest of young farmers to work in the agricultural sector was 85%. The interest of young farmers to work in the agricultural sector, namely as full-time and part-time farmers. Factors that positively influence the interest are parents' land area and parents' income. The education of young farmers and

their parents' occupations did not affect the interest of young farmers to work in the agricultural sector. In such conditions, it is necessary to socialize agriculture to young farmers in order to create sustainable agriculture and increase the number of young workers in agriculture. Conditions related to increasingly narrow agricultural land, it is expected that farmers will not sell their agricultural land, but give it or pass it on to farming families (Afista, Relawati, & Windiana, 2021).

The main problem regarding agricultural employment is a change in the demographic structure that is unfavorable for the agricultural sector which leads to the aging of farmers. The number of old farmers (more than 55 years) is increasing, but the number of young farmers is decreasing. The higher the education level of youth in rural areas are, the more selective they are in choosing a job. They feel reluctant to work in rural areas because of a mismatch between their skills and level of education and the availability of jobs in rural areas. Whereas Indonesia needs productive farmers to maximize food production. Structural changes in the agricultural workforce can be seen from the aging farmer phenomenon and the declining number of young workers in the agricultural sector in Indonesia. Various factors have caused structural changes in the agricultural workforce and the reluctance of young workers to enter the agricultural sector, therefore policies are needed to support young workers to enter to the agricultural sector. The problem of the crisis of young farmers must be addressed immediately so that it does not threaten food security in Indonesia (Arvianti, Masyhuri, Waluyati, & Darwanto, 2019). Power full to be identify the level of motivation of young farmers in applying organic lowland rice cultivation techniques and to find out the factors related to the motivation of these young farmers in applying organic lowland rice cultivation techniques. The relationship between the internal and external factors of young farmers and their motivation to apply the lowland rice cultivation technique indicates that the motivation level of young farmers to apply the lowland rice cultivation technique is in the high category. The internal factors of young farmers that are significantly related to their motivation in implementing the lowland rice cultivation techniques are the age of the farmers, non-formal education and access to information, while the external factors are the availability of production facilities and infrastructure, as well as the innovative characteristics of the lowland rice cultivation techniques (Fathurrahman & Trimo, 2018). The characteristics of millennial farmers have generally individual characteristics with a relatively high level of education and have quite good farming experience. The technical competence of millennial farmers that stands out is the ability to select commodities based on the planting calendar, market demand, land fertility and land typology, while the managerial competence that is lacking in millennial farmers is in terms of the ability to manage conflicts that may occur during the progress of their business, while the social competence as the strength of social capital of millennial farmers is still weak. Factors that have a real positive influence in shaping the character of millennial farmers are individual characteristics, technical competence and managerial competence while social competence has a negative influence (Haryanto, Effendy, & Yunandar, 2022).

Agricultural development policies are carried out consistently and sustainably to increase the production of various food commodities through the application of various innovations and technologies. Agricultural development policies are the efforts to increase the production of strategic agricultural commodities and farmers' income support food security. By implementing technological innovation-based agricultural development policies, it can be concluded that technological innovation has benefited farmers in terms of increasing production, increasing farmers' income, and increasing the ability of farmers to apply technological innovations so that the level of food security increases. The welfare of farmers in Indonesia is currently low due to various factors, including agricultural problems and the limited ability of farmers to develop their farming businesses and advocate for their interests. These factors contribute to the disempowerment of farmers and hinder their ability to improve their welfare. In addition, the lack of sustainable land management practices in Indonesia also has an impact on the welfare of farmers. The lack of capacity building and farmer institutions results in weak agricultural development and subsequently, low farmer welfare. To overcome these challenges, it is important to prioritize agricultural innovation and capacity building for the social welfare of farmers in Indonesia. One way to improve the social welfare of farmers in Indonesia is through agricultural innovation. Agricultural innovation refers to the development and application of new and improved practices, technologies and approaches in agriculture. Agricultural innovation plays an important role in improving the welfare of farmers in Indonesia by increasing their productivity, income and overall well-being (Sihombing, 2022).

Based on the results of the research above, it shows that increasing innovation is a very important thing to do. Nevertheless, previous research is still unable to clearly explain the agricultural innovation and capacity building for social welfare of farmers in Indonesia. Meanwhile, this research is currently trying to explore it deeper. It can identify the problems that occur the agricultural innovation and capacity building for social welfare of farmers in Indonesia. Referring to the problem identification, the research question formulated is how is the agricultural innovation and capacity building for social welfare of farmers in Indonesia?

LITERATURE REVIEW

Agricultural Innovation

Innovation in public sector management can be defined as the development of new policy designs and new operating standards produced by organizations that address public policy issues. An innovation in public administration is effectiveness, creativity, and unique answers to new problems or new answers to old problems. An innovation does not have to be a perfect solution or a final solution, but an open solution that can be transformed by those who adopt it. Innovation that is appropriate for the public sector, namely a change in policy or management practice that leads to recent improvements in service levels or the quantity or quality of output by an organization. Innovation will direct government organizations to organizational change in a dynamic environment. Developing a culture of innovation will lead to organizational flexibility with a particular interest in modernizing programs in the public sector. Innovation is not about technology itself but more about how we adapt our organizations, employees and places of learning to build a better future for our employees. At present where the era of technological changes occur, the changes will never stop, therefore the government must have the courage and ambition to encourage and implement changes (Bartos, 2003). Innovation in the study of public administration can be distinguished into several types, which include: a. Institutional innovation, that focuses on renewing existing institutions or creating completely new institutions; b. Organizational innovation, related to introducing new management procedures or techniques; c. Process innovation, that focuses on improving the quality of public service delivery; And d. Conceptual innovation, directed at the introduction of new forms of governance, for example interactive policy-making, engaged governance, people's budget reforms, horizontal networks (UN, 2006).

Innovation plays an important role in revolutionizing the agricultural sector. This digital era requires traditional agricultural management approaches to be radically transformed so that smart technologies can contribute to innovation and redesign the entire value chain, ensuring the sustainability of the agricultural sector. The agricultural sector has witnessed significant progress in recent years. This phase of the agricultural revolution, driven by digital innovation and advanced biotechnology, presents new opportunities for the sector to address challenges and optimize productivity. One area where innovation has the potential to revolutionize agriculture is access to markets for smallholder farmers. Digital technology has provided a solution to this challenge, enabling smallholder farmers to access markets more effectively. This technology has facilitated direct communication between farmers and buyers, reducing the need for intermediaries and increasing price transparency. In addition, online platforms and mobile applications have been developed to connect farmers directly with consumers, enabling the sale of products without the boundaries of physical markets and geographical constraints. To overcome this, appropriate measures need to be implemented to ensure the protection of farmers' data and information. Equally important is the need to empower smallholder farmers with the necessary digital skills and knowledge to fully participate in offering the enormous innovation potential in the agricultural sector, particularly in developing countries (Manyuen, Boonlue, Nanchaleay, & Nittayathamkul, 2022).

In developing countries, where the level of technology may still be low, the 4.0 agricultural revolution is the key to unlocking the potential of small farmers. These farmers often face various challenges, including limited access to information, market inefficiencies, and financing constraints. Agriculture 4.0 can overcome this challenge by leveraging smart technology and digital innovation. Through Agriculture 4.0, small farmers can gain access to real-time weather forecasts, which can significantly influence their decision-making process. By knowing when to plant and harvest crops based on weather patterns, farmers can optimize crop yields and reduce losses due to unpredictable weather events. In addition to weather forecasts, Agriculture 4.0 can also provide access to

market information for small farmers, such as price and demand trends. This allows farmers to make informed decisions about what crops to grow and when to sell them, ensuring that they can maximize their profits. In addition, the application of smart farming technologies in Agriculture 4.0 can greatly improve the accuracy and efficiency of providing inputs for crops and agricultural land. For example, the use of sensors and IoT devices can monitor soil moisture levels, nutrient levels and pest infestation, allowing farmers to use fertilizers and pesticides only when needed. The integration of artificial intelligence and machine learning algorithms in Agriculture 4.0 can enable predictive analytics for disease detection and crop management. By analyzing large amounts of data from sensors and historical patterns, these technologies can identify early signs of disease or nutrient deficiencies, enabling farmers to take proactive actions to prevent or reduce crop losses (Almadani & Mostafa, 2021; Yadav, Kaushik, Sharma, & Sharma, 2022).

Based on epistemological and sociological description of several definitions of innovation theory for refining the research, it can be stated that making of multi-policies on the agricultural innovation and capacity building for social welfare of farmers in Indonesia is a part of innovation theory.

Capacity Building

The definition of capacity building theory has variations among various experts where this diversity is caused by this capacity building theory being a multidimensional study which can be seen from various sides so that various understandings and various definitions emerge. Many experts provide understanding and understanding related to Capacity Building which can be used as a reference in understanding capacity development in the perspective of development administration, which then leads to an understanding of capacity building. Capacity building is the ability to perform appropriate tasks effectively, efficiently and sustainably which refers to their understanding of improvement in the abilities of public sector organizations. Capacity building is a process that increases the abilities of persons, organizations or systems to meet its stated purposes and objectives which leads to the process of developing capacity by increasing capabilities. Capacity building tends to address problems and usually depends on the area and interests of the capacity builder. By definition, capacity measures an organization's survivability, its strategic ability to successfully perform actions intended to influence long-term growth and development. Some views of capacity focus on qualities such as informal processes and participation (Honadle, 2018).

Capacity building is a process in which individuals, groups, organizations, institutions or communities attempt to increase their ability to (a) produce performance in carrying out their main tasks and functions, solve problems encountered, formulate and realize the achievement of predetermined goals; and (b) understand and meet development needs in a broader context in a sustainable way. Capacity building is a process that increases the ability of persons, organizations or systems to meet its stated purposes and objectives that lead to a capacity building process by increasing the ability of an institution or an administrator, especially in the context of development administration which requires development institutions and mechanisms as the process. This concept then gave birth to a concept called institutional development which is based on the process of institutionalization. Because, in the context of development administration, especially public sector institutions, to create a good capacity building requires an institutionalization process (Matachi, 2006).

The explanations from some of these experts imply a meaning of capacity building as a development or capacity building dynamic process. As a capability, development capacity certainly needs to be developed or built in several dynamic process orientations, namely: 1. Process-oriented capacity building. 2. The orientation of the capacity building process must be carried out at three levels, namely individuals, groups and institutions. 3. The process is used to ensure the continuity of the organization in achieving the goals and objectives of the organization concerned. The meaning of the orientation that leads to a dynamic process above further emphasizes the need for capacity building as a strategy or method carried out by the government regarding capacity building, which is a series of strategies shown to increase efficiency, effectiveness and responsiveness from government performance, by focusing on the development dimensions, human resources, and organizational strengthening (Thoenig, 2012).

Based on the epistemological and sociological description of several definitions of capacity building theory for refining the research, it can be stated that the making of multi-policies on the agricultural innovation and

capacity building for social welfare of farmers in Indonesia can be analyzed by the concept of capacity building theory.

Social Welfare

The positive or normative aspect of economics and ethics in economic analysis is constantly called into question by welfare considerations. In fact, measuring a person's level of well-being has compelled economics to once again incorporate moral and ethical standards. The result is welfare economics' stormy history. The departure from welfare economics is due to disagreement among economists over the role of welfare. The foundation of the paradigmatic welfare economics is the evaluation of both individual and social well-being. However, in terms of contemporary social welfare, the options for collective welfare are plausible. Social fairness and economic effectiveness can coexist under specific circumstances. Welfare strategies that are relevant, like the expanded capabilities strategy. An investigation using the general equilibrium model has been conducted in Ethiopia to determine the macroeconomic effects of agricultural policies on agricultural growth and farmer welfare. Creating simulations based on economic presumptions and evaluating their impacts on agricultural output and farmer welfare will provide the data necessary to carry out policy simulations. The first focuses on irrigation policies that alter the level of agricultural commodity output, and the second on boosting agricultural productivity through the application of technology. Increased irrigation has a favorable effect on farmers' social welfare and agricultural output. Agriculture productivity, production, farm household income, and consumption are all significantly and favorably impacted by the adoption of precision agriculture. These findings suggest that policies for the agricultural sector must be undertaken in conjunction with unidirectional macro policies. Countries all over the world are being impacted by the difficulties of modern society combined with global crises, and many people are going through financial troubles of varied degrees of severity. A study led by the Centre for Urban Resilience Research at Osaka University in Japan may help to improve the situation by tying labor shortages in agriculture to social welfare. The concept is that the agricultural industry, which requires labor, might provide employment chances to individuals who are left out of the current labor market. The Japanese government now aims to strengthen the relationship between agriculture and welfare. While farmers are the practitioners, people with other forms of social adversity make up the target demographic. After that, this client can perform farm work while being overseen by an employee of a social welfare organization. It entails the process of developing independent abilities related to agricultural activity (Aguenane, 2019; Shikur, 2020; Tsunashima, 2022).

Based on the epistemological and sociological description of several definitions of social welfare theory for refining the research, it can be stated that the agricultural innovation and capacity building for social welfare of farmers in Indonesia can be analyzed by the concept of social welfare theory.

METHODOLOGY

The qualitative approach was chosen because it is in accordance with the aims of the research to describe and understand the phenomena, events, social activities, attitudes, beliefs, and perceptions of people. Qualitative research can be applied when research problems need to be explored deeper since a previous theory or concept that is still considered unable to capture the complexity of the problem under study. A qualitative research approach produces descriptive data in the form of words or writings and behaviors that can be observed from the subject and object of the study itself (Creswell, 2013). Data collection in this research were observation and documentation. Related documentation was gathered from many sources such as internet media and library documents. There were 3 steps of data analysis used, which were data reduction, data display and data verification refer to the interactive model. Data reduction is to sort out the main data, data display is to present the data, and data verification is to conclude the main themes of the results (Miles & Huberman, 1994). Validity and reliability used triangulation based on the observation and documentation analysis to obtain valid and reliable data coping credibility, transferability, auditability, and confirmability. Credibility was related to the truth aspect by means of triangulation to compare the results. Transferability shows the applicability of research to other studies that readers can understand the results of qualitative research. The report is made in a detailed, clear, and systematic manner. Auditability means that it can be tested by examining the entire research process, since designing case studies, determining data sources, data collection, data analysis, making conclusions, can

be traced and showing the processes and results. Confirmability relates to the objectivity that the research results are agreed and accepted (Creswell, 2009).

FINDINGS

Result analysis was conducted based on observation and related documentation. The study used the interactive model comprised of data reduction, data display, and data verification to obtain several themes as follows. Indonesia is a country with good natural conditions for farming. This can be proven by the development of productive agricultural land. The development of productive agricultural land in Indonesia reached 25 million/ha in 2019. In terms of quantity, the existence of farmers in Indonesia is currently in a crisis condition. Based on the data in 2018, it confirmed that out of 17 million national farmers, as many as 83% were aged 35-54 years. This means that the majority of farmers in Indonesia today are middle and old class farmers. Furthermore, as many as 7.8 million people were the older generation, which is around the age of 44-54 years. Meanwhile, farmers from the young group, namely aged <25-34 years, were 2.9 million people. From the description of the data for the old and young groups, it can be concluded that there is a big difference, causing a gap in the regeneration of farmers. The stark comparison between the young and old groups also has an impact on the regeneration of farmers in the future. Then from the quality of farmers in Indonesia, the majority still apply traditional methods. Application in the traditional way depends on weather conditions and the effects of the weather. As at this time, based on observations that currently, the weather tends to be unpredictable, such as the coming of the dry and rainy seasons. In addition, if one of these seasons arrives, it will have an impact on crop yields caused by the indirect effects of that season. This can be explained through the phenomenon of flooding during the rainy season which causes crop failure or drought during the dry season which affects harvests. The point is that the traditional agricultural system in Indonesia is deemed incompatible with current conditions, in fact this system can have a negative impact on agricultural production.

The first theme. The government is trying to maintain and maximize the potency of agriculture and farmer resources in Indonesia. For example, Law 41/2009 considers that the government guarantees the availability of sustainable supply of agricultural land as a source of work and a decent livelihood for humanity. This is done by prioritizing the principles of togetherness, efficiency, justice, sustainability, environmental insight, and independence, as well as by maintaining balance, progress, and national economic unity. Then from the farmer's point of view, for example, through Law 19/2013 it is considered that there is an increasing trend of world change such as climate change, business risks, globalization and global economic turmoil, as well as a market system that is not in favor of farmers, so farmers need protection and empowerment. The intended protection and empowerment must be comprehensive, systemic and holistic. The considerations for Law 41/2009 and Law 19/2013 were then embodied in Articles 3 and 4 of the Law respectively. The two articles respectively discuss the government's efforts through the objectives and scope of the agricultural land protection program and the protection and empowerment of farmers. Meanwhile, the improvement and development of agricultural cultivation is attached through Law 22/2019 emphasizing that a sustainable development system needs to be developed in the agricultural sector through an agricultural cultivation system to achieve food sovereignty by taking into account the carrying capacity of ecosystems, mitigation and adaptation to climate change in order to realize the system of advanced, efficient, resilient, and sustainable agriculture. Law 22/2019 regulations become the main rules in sustainable agricultural development with the objectives of: a) increasing and expanding the diversity of agricultural products, to meet the needs for food, clothing, shelter, health, domestic industry, and increasing exports; b) increasing the income and standard of living of Farmers; and c. encouraging the expansion and equity of business opportunities and employment opportunities (article 3 of Law 22/2019). Related to some of the regulations above, it is expected that Indonesian agriculture can be optimal and make farmers prosperous. But in terms of implementation, the three regulations above have not been able to optimize agricultural production and the welfare of farmers in Indonesia. In general, an increase in agricultural production and farmer welfare must be combined with the development of knowledge and technology that will produce an agricultural innovation. Therefore, to maximize knowledge and technology in agricultural development, it is realized through Law number 11 of 2019. The purpose of this regulation is to strive to improve the quality of education, research, development, study and application of science and technology that results in inventions and innovations

The second theme. Agricultural innovations include: 1. Integrated Farming. Integrated agriculture is an agricultural activity that is able to maintain the balance of the ecosystem in it so that the flow of nutrients and energy occurs in a balanced manner. This balance will result in high productivity and production sustainability that is maintained effectively and efficiently. One of the integrated agricultural buildings that has been built is the Agropark built in 2017 which has the crop production, livestock and fisheries sectors. The existence of these sectors will result in the area having a complete ecosystem and all production components will not become waste because other components will definitely be utilized. Besides, there will be an increase in production yields and a reduction in production costs so that production effectiveness and efficiency will be achieved. Apart from saving energy, another advantage of integrated farming is that farmers will have various sources of income. The integrated farming system pays attention to crop diversification and polyculture. A farmer can grow rice and can also raise goats or chickens and grow vegetables. Manure produced by livestock can be used as fertilizer so that farmers do not need to buy fertilizer anymore. If the harvest fails, farmers can still rely on chicken meat or eggs, or even selling goats for income. 2. Rice Farming Business Insurance. Crop failure is still a serious threat to farmers, starting from the arrival of the long dry season and flooding. Responding to this, the government is required to continue to make maximum efforts in solving the problems faced in a sustainable manner. At this time, many efforts have been made to deal with crop failure, such as the AUTP program. The implementation of the AUTP program has been socialized to lesser Farmer Groups. Through the AUTP program, it is hoped that farmers will no longer worry about the risk of failing to plant rice. 3. Planting Index. The Planting Index is an action to increase national rice production without the need for additional irrigation facilities and opening of new land. The concept is that in one year in a stretch of rice fields that have year-round irrigation, rice can be planted four times. The land is planted with rice with premium quality rice as a trial application for the agricultural index of 400. Innovations in farming to optimize land use so that planting and harvesting can be carried out 4 times a year are carried out with the aim of increasing the welfare of farmers.

The third theme. The increasing need for higher agricultural output, coupled with better environmental quality protection, has given rise to the movement to increase yields with lower impact. This movement is known as smart farming or agriculture 4.0. The idea of agriculture 4.0 attracts the attention of agricultural actors in supporting the development of modern agriculture. Agriculture 4.0 is precision agriculture combined with digital information technology which is mainly supported by big data, mobile internet and cloud computing, so that the terms fast and smart will beat the slow and ordinary while the big ones may not necessarily beat the small ones will apply in the industrial era 4.0. Precision agriculture is an integrated farming system based on information and production, to increase the efficiency, productivity and profitability of end-to-end agricultural production in a sustainable, site-specific manner while minimizing undesired impacts on the environment. Precision agriculture uses approaches and technologies that allow precision treatment at every node of the agricultural business chain process from upstream to downstream according to conditions, requiring the right inputs and techniques so there is no wastage of resources. as the name implies precision, namely precision or precise, farmers carry out cultivation actions precisely based on the information they receive. Smart Farming, Agriculture currently and in the future is facing a big challenge, namely climate change. In addition to the impacts of climate change, agriculture has to deal with the challenges of increasingly narrow land, increasing population, which require the use of smart technology. Smart farming needs to be developed in Indonesia to increase the efficiency of natural resources, water and environmental sustainability, increase the efficiency of human resources by utilizing agricultural machinery and technology and to attract the interest of the younger generation to engage in agriculture. Agricultural progress needs to be supported by the millennial generation because they have high enthusiasm for innovation to carry out new ways of handling agriculture that are advanced, independent and modern.

DISCUSSION AND CONCLUSION

Agricultural innovation and capacity building play an important role in promoting the social welfare of farmers. Innovation in agriculture is widely recognized as a driving force for agricultural development. The key role of innovative farmers and their experiments and innovations for agricultural development and agricultural system resilience. Traditionally, farmers are seen as passive recipients of technological advances. However, new approaches based on community participation have started to emerge, which aim to bring agricultural

technologies to a wider audience. These approaches promote smallholders as key actors of change in their communities and focus on enhancing their learning processes and capacity building. By increasing farmers' capacity to adapt, innovate, make better decisions, and influence decision-making authority, this approach empowers farmers to contribute to their own socio-economic well-being and overall social well-being. The adoption of new agricultural technologies or practices has a significant impact on the welfare of farmers and the productivity of agricultural production. Agricultural innovation has shaped agricultural production systems and has the potential to improve farmers' welfare. Furthermore, the welfare of farmers plays an important role in maintaining and increasing agricultural production. An advanced agricultural sector can promote faster economic growth and reduce poverty, highlighting the importance of increasing the welfare of farmers. In order to improve the welfare of farmers and maximize the benefits of agricultural innovation, it is important to focus on capacity building and empowerment of farmers. In addition, capacity building and empowerment also encourage inclusivity by involving farmers in the innovation process.

Agribusiness growth, like any other sectors, requires a high degree of skill and capacity development. Many authors have examined the role of capacity building in the agribusiness sector. Their study focuses on strengthening capacity for agribusiness development and management in Sub-Saharan Africa. In their findings, Babu et al. revealed that in order to build the necessary capacities effectively, the skills built by agribusiness education and training must match the needs of the agribusiness sector. Education is an important component in capacity building in agriculture. It has been emphasized that capacity building through formal agricultural education is necessary for the production of skilled manpower to function optimally in several areas of the agricultural sector. By participating in agricultural education, graduates are equipped with the necessary knowledge and skills to contribute to agriculture and agribusiness, thereby driving the growth and development of the agricultural sector. Not only does capacity building through education improve individual abilities, but it also increases the productivity and efficiency of the agricultural sector as a whole.

Agricultural problems are problems that often arise. The key to overcoming these problems is the application of innovation which can eventually be used as an agricultural improvement policy. However, the implementation of policy innovations in the agricultural sector experienced many problems. The problems of agricultural sector policy innovation are: a. Limited farmers' access to modern agricultural technology and adequate infrastructure, such as efficient irrigation systems, transportation networks, or access to markets. b. Lack of skills and knowledge of farmers in implementing agricultural technological innovations, such as using organic fertilizers, managing pests and diseases, or using efficient irrigation systems. Inadequate education and training can also be a barrier. c. Lack of integration and coordination between various parties involved in the agricultural supply chain, from farmers, distributors, to consumers. This can hinder the adoption of innovations and the adoption of sustainable agricultural practices. d. Challenges in finding stable and profitable markets for agricultural products, as well as the lack of efforts to create added value through product processing and diversification. e. Climate change can affect agricultural productivity and increase the risk of natural disasters, such as floods or droughts. Therefore, agricultural policies need to consider climate change adaptation strategies. f. policies and regulations that do not support agricultural innovation and development, such as complicated bureaucratic procedures, lack of incentives, or legal uncertainty.

The decline in the quantity and quality of farmers is a serious problem that needs to be solved immediately. The decline in farmer regeneration and productivity is the main issue faced by the Indonesian government and until now it has not been optimally resolved. Actually, in agriculture there is a way to maximize agricultural productivity, namely by agricultural development. Agricultural development emphasizes the dimensions of agricultural development. However, these dimensions still require appropriate techniques and policies. There are 3 important dimensions in agricultural development, namely the dimension of agricultural growth, the dimension of poverty alleviation and the dimension of environmental sustainability. To achieve these three dimensions requires extra careful steps through several dimensions of agricultural development. The dimensions of agricultural development consist of 3 main dimensions, namely: a. The Broad-Based dimension, with its strategy, includes innovation, infrastructure, inputs, institutions and incentives. b. The dimension of Equality and Poverty Alleviation, is a dimension that was used in the 1970s-1980s. The strategies used in this dimension include: promotion of broad-spectrum agricultural development; implementation of land-reform

with a market-based redistribution program; investment (HR) in rural areas; the role of women in farming and household activities; rural community participation in decision-making and active development of the non-agricultural rural economy. c. Dimensions of Sustainability and Environmental Preservation, this dimension took place in 1990-now, while the strategies used include: giving priority to underdeveloped areas; prioritizing research based on environmental sustainability, particularly on newly developed agricultural technologies; increase the rights and ownership of farmers to natural resources; improve the management of common property resources and so on. The three main dimensions in agricultural development above are a depiction—especially in Indonesia—of the attempts of keeping agriculture exist and develop according to the demands of the times. But in fact, agriculture in Indonesia remains less developed than other developed countries (Arifin, 2005).

Farmer inequality can be seen from the number of age groups. This, of course, has a negative impact on farmer regeneration and crop production. The presence of young farmers is urgently needed, because currently the number of active farmers is decreasing and most of the active farmers are elderly farmers. The mindset of farmers is also a problem and an obstacle to further agricultural development, especially in rice. There are 2 mindsets that hinder agricultural development. Farmers are still reluctant to protect their agriculture. The agricultural protection in question relates to insurance for their agricultural crops. Agricultural insurance is a government program that aims to prevent farmers from losing money when their crops are hit by disasters, such as pests or natural disasters. This program requires its members (farmers) to pay insurance costs. The amount of fees that must be paid is still relatively affordable compared to post-disaster costs. One of the advantages of this insurance is that insurance members will get appropriate compensation if their agricultural land is affected by a disaster. This program should be quite helpful for farmers, because with insurance at least the cost of crop failure losses can be minimized. However, the conditions that occurred were different from the conditions expected by the government. The majority of farmers are still reluctant to join the agricultural insurance program. Only a few farmers took part in the program, even though the premiums to be paid are fairly affordable and these costs have received subsidies from the government. The calculation of the premium is also based on the area of land owned by the farmer. Therefore, the narrower the land area, the cheaper the premium that must be paid. In fact, if the majority of farmers take part in the agricultural insurance program, the farmers will get many benefits from the insurance. The higher the person's education, the more reluctant they are to farm. The relationship between the level of education and the farming profession is another problem in the world of agriculture. The higher the education of the people in the village, the more reluctant the people are to farm. The reason is because they think that working in agriculture cannot be a guarantee of welfare in the future. This can be seen in the large number of young people who migrate to cities in search of job vacancies. Of course, these conditions have an impact on the availability of a generation of young farmers. What's more, the ratio of young farmers to old farmers is very low which has an impact on farmers' crisis in the future. Apart from the mindset, another agricultural problem is related to smallholders. Smallholders are farmers who only have narrow land. Based on the results of monitoring in the field, most of the farmers are smallholders. This means that farmers only have narrow and inadequate land to produce food crops, especially rice with large production quantities. This of course can affect the productivity of rice plants and have an impact on increasing the amount of production which tends to remain the same or even decrease.

In addition to the scarcity of fertilizers, the issue of farmer exchange rates is also an obstacle for agriculture. The terms of trade between agricultural products and consumer goods and production factors needed by farmers are expressed in percent, closely related to the increase in farmers' income. Therefore, it becomes a benchmark for the welfare of farmers. The costs incurred by farmers consist of: production capital requirements, seed needs, fertilizers, medicines, other operational needs and needs for workers. While farmers' profits are seen from the profits earned, the ratio between profits and losses is still too thin. The profit value is also influenced by the amount of production, the presence of pests, the availability of fertilizers, natural conditions, and the selling price of the harvest. The increase in the value of the farmer's term of trade is not significant due to several reasons, namely the inadequate distribution of fertilizers, the presence of pests (hoppers and rats), and erratic weather factors affecting the demand for agricultural goods indirectly affecting the production value of food crop commodities. Another problem is related to natural disasters. Indonesia is

one of the most natural-disaster-prone countries in the world. The disasters that often occur are floods and landslides. Uncertainty in weather causes the more frequent occurrence of natural disasters. This impact can, of course, lead to mass crop failures and have an impact on decreasing rice production rates and threatening food security.

Through capacity building, farmers are provided with the necessary tools and knowledge to actively participate in agricultural development and decision-making processes, leading to more inclusive and sustainable outcomes for the agricultural sector. Agricultural innovation can help farmers increase their productivity; reduce their environmental impact; and address challenges associated with changing soil, weather and market conditions. Promoting innovation often requires government support as a way of incentivizing manufacturers to experiment with adopting cutting-edge practices. Not only does the policymakers play a role in driving innovation, but the consumer preferences and the benefits of learning while adopting new production methods also have important roles. Traditional and innovative production methods and consumers who have higher ratings analyze manufacturers' decisions whether to experiment with new production methods when faced with uncertainty about their production yields and the benefits associated with learning-by-doing. The findings show that subsidies outperform policies involving taxes and subsidies in achieving higher social welfare.

Based on the result analysis and the discussion of the research results above, it can be concluded that the agricultural innovation and capacity building for social welfare of farmers in Indonesia and its implication require policy and regulations in order to reach the best solution. It is suggested that the legislative and executive as the public officials in making multi-policies and regulations have to be involved in managing the agricultural innovation and capacity building for social welfare of farmers in Indonesia. The challenges for future research are to increase agricultural innovation and capacity building to provide added value.

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