

Application of Technological Innovation in the Agricultural Sector to Promote Food in Indonesia

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ABSTRACT

The main problems faced in agricultural development are low productivity on a micro scale, total production on a macro scale, and the welfare of agricultural business actors themselves. In the short term, agricultural development aims to increase growth, but in the long term, the aim of agricultural development aims to provide price stability for business actors. In general, the direction of agricultural policy is to provide certainty for business continuity, both in the short and long term. The study was carried out using secondary data which was analyzed qualitatively using the Desk Research Method. The literature materials used in writing this research are several references originating from the results of research, studies and reviews of several papers which are then summarized into a work of scientific writing. That the type of agricultural technology innovation developed or implemented by farmers depends on the agrosystem conditions of the local area. There is a relationship between the application or adoption of agricultural technology innovation and the level of resilience of farming households. Farmers who more intensively implement technological innovation based on innovative agricultural business systems have a better level of food security compared to farmers who do not implement technological innovation based on innovative agricultural business systems

Keywords: Innovation, Technology, Agriculture, Food.

A. Introduction

The current condition of Indonesian agriculture cannot be separated from the long history of Indonesian agriculture and also the condition of the country in general and the world in general. Indonesia's agricultural sector plays an important role in advancing the community's economy. There are two main actors in agricultural development. First are farmers or producers (agricultural business actors) and the government as regulator of the sustainability of farming carried out by business actors.¹

Strengthening food security is one of the main goals of agricultural development. Strengthening food security forms an agricultural technology innovation. Agricultural technology innovation plays an important role in increasing agricultural productivity. Agricultural technological innovation is not just a new technology, but something that can encourage renewal in agricultural society. Thus, agricultural technological innovation is interpreted as more than technological innovation, namely the implementation of new

¹ Nurmala, dkk. *Pengantar Ilmu Pertanian*. (Yogyakarta: Graha Ilmu, 2012), hlm 35.

agricultural ideas, practices and ideas which become new avenues of commercial value and effectiveness for improving the standard of living of farmers.²

The main problems faced in agricultural development are low productivity on a micro scale, total production on a macro scale, and the welfare of agricultural business actors themselves. In the short term, agricultural development aims to increase growth, but in the long term, the aim of agricultural development aims to provide price stability for business actors. In general, the direction of agricultural policy is to provide certainty for business continuity, both in the short and long term.

Agricultural technology innovation plays an important role in increasing agricultural productivity, considering that increasing production through land expansion (extensification) is very difficult to implement in Indonesia, when the conversion of productive agricultural land to non-agricultural land is increasingly widespread.³ The use of innovative agricultural technology is needed to increase farmers' farming productivity. Farmers as the spearhead of agricultural development have a very important role in increasing the productivity of agricultural products, because farmers are the main actors in the agricultural sector. If farmers do not adopt it, agricultural technological innovation will have no benefits. Thus, if farmers' income increases, their household food security conditions will become stronger.

To build and develop an innovative agricultural business system based on agricultural technology innovation in order to increase farmers' income and welfare, it is necessary to use a new approach that accommodates the successful implementation of previous models and corrects their weaknesses. In response to this, the aim of writing this paper is to determine the extent to which agricultural technology innovations based on innovative agricultural business systems are implemented in supporting food security.

B. Research Methods

A study cannot be said to be research if it does not have a research method.⁴ Research methods are one of the factors of a problem that will be discussed.⁵ The study was carried out using secondary data which was analyzed qualitatively using the Desk Research Method. The literature materials used in writing this research are several references originating from the

² Schilling, M.A, *Strategic Management of Technological Innovation Fifth Edition*. (New York: Mc Graw Hill Education, 2017), hlm 78.

³ Praptono, B, Kajian pola bertani padi sawah di Kabupaten Pati ditinjau dari sistem pertanian berkelanjutan: (Studi Kasus di Kecamatan Pati). Tesis Program Magister Ilmu Lingkungan, Pascasarjana Universitas Diponegoro, Semarang Tahun 2010.

⁴ Ismail Koto, "Perlindungan Hukum Terhadap Korban Tindak Pidana Terorisme", *Proceeding Seminar Nasional Kewirausahaan*, 2.1, (2021): 1052-1059.

⁵ Ida Hanifah, Ismail Koto, "Problema Hukum Seputar Tunjangan Hari Raya Di Masa Pandemi COVID-19", *Jurnal Yuridis* 8.1, (2021): 23-42.

results of research, studies and reviews of several papers which are then summarized into a work of scientific writing.

C. Analysis And Discussion

Innovative Agricultural Business Systems to Promote Food in Indonesia

Farmers as the spearhead of agricultural development play a very important role in increasing the productivity of agricultural products, considering that farmers are the main actors in agriculture. Agricultural technological innovation will be of no benefit if farmers do not use it. Therefore, the adoption of this technological innovation by farmers is important to increase farming productivity. From a macro perspective, the government has an interest in increasing agricultural production, because so far the food needs of all Indonesian people still depend on imports. In fact, the value of food imports is increasing from year to year.

Food is the most important basic human need and its fulfillment is part of human rights guaranteed in the 1945 Constitution of the Republic of Indonesia as a basic component for creating quality human resources. Law No. 18 of 2012 concerning Food has mandated the realization of independent and sovereign food security. National food availability is influenced by production factors from the farmers' side and demand factors from the community side. On the production side, there are challenges faced such as reduction in area due to infrastructure development, damage to irrigation networks, post-harvest yield loss and limited or expensive labor. Meanwhile, food demand continues to increase due to population growth.

An innovative Agricultural Business System (SUP) is a biological industry that utilizes biological materials and processes to obtain a decent profit for the perpetrators which is packaged in various subsystems starting from pre-production, production, harvest and post-harvest subsystems as well as distribution and marketing. The SUP nodes are interrelated and influence each other. Aspects of resources, culture (customs), technology and institutions are elements that cannot be separated in efforts to implement an innovation. Culture and institutions are social elements, while technology is a technical element that cannot be separated from economic elements. These three elements (social-technological-economic) interact with each other within the framework of an innovation system, which will influence each other so that they are the main elements for growing farmer independence.⁶

Increasing agricultural production can be achieved through the application of technological innovation by developing farming patterns based on sustainable agricultural

⁶ Setiawan, I, *Dinamika pemberdayaan petani: sebuah refleksi dan generalisasi kasus di Jawa Barat*. (Bandung: Widya Padjadjaran, 2012), hlm 65.

systems. The general strategies in designing innovative SUPs are (1) Applying appropriate innovative technology in a participatory manner, 2) Building a pilot LSO agricultural development based on innovative technology that integrates innovation and institutional systems with agribusiness systems, (3) Encouraging the process of diffusion and replication of system models innovative agricultural businesses through exposure and field demonstrations, information systems, advocacy and facilitation/mentoring, and (4) Developing rural agro-industry based on the characteristics of the LSO area and local socio-economic conditions. Components and innovative technology packages for each commodity based on recommended technology from Balai Vegetable Research. This innovative technology includes soil processing, fertilization, seed treatment, planting, irrigation (drip irrigation), maintenance including controlling pests and diseases as well as weeds and harvesting, and farmer institutions. Watering using drip irrigation techniques gives the best results. The results of the study show that using drip irrigation technology is better, both in terms of water use efficiency and in terms of agronomic aspects.

One of the innovative SUP technological innovations is the use of environmentally friendly pesticides such as biopesticides/biological pesticides, namely pesticides that have the ability to control plant pest organisms but these pesticides decompose more quickly, have relatively low toxicity to animals, leave no residue in the environment or products so they are relatively safer. on humans and the environment. Several biological pesticides that have been developed by the Agricultural Research and Development Agency include vegetable pesticides from neem seeds or leaves which have the active ingredients azadirachtin, brotowali, tegari, tobacco stem waste. Registration requirements for natural pesticides are relatively fewer than chemical pesticides. Requirements for natural pesticides include quality testing, efficacy testing, and government agencies. Government agencies that have duties and functions related to plant protection have the opportunity to register natural pesticides produced for the implementation of government programs.

In the life of farming communities, the position and institutional function of farmers is part of the social institutions that facilitate social interaction within a community. Efforts to institutionally empower farmers to increase attention and motivation for farming will produce more results if they utilize the meaning and potential of 3 (three) main keywords in the institutional context, namely: norms, behavior and social conditions and relationships. Efforts to empower farmers' institutions require a reorientation of understanding and action for facilitators of change as agents of change in implementing agricultural development programs. The involvement of development facilitators who have commensurate communication skills is

one of the keys to the success of the process of dissemination and transfer of agricultural technology. The technology dissemination process will run smoothly if it is accompanied by understanding and utilizing the potential of institutional elements and farmer status in a process of technology transfer or dissemination of new technology.

The process of adopting innovation can essentially be interpreted as a process of changing a person's behavior and thought patterns so that they are able to make their own decisions after receiving the message conveyed to them by the instructor. Acceptance here means not just knowing, but actually being able to implement or apply it correctly and live it in life and farming.⁷

Changes in attitudes, knowledge and behavior are the beginning of improving farming business management. This is expected to encourage the effectiveness and efficiency of technology adoption so that it can increase farming productivity. The farmer's decision to apply technology is mainly determined by internal factors within the farmer, including his attitude and goals in carrying out farming business. Farmers' attitudes in this case really depend on the characteristics of the farmers themselves which include socio-economic characteristics, personality characteristics and communication characteristics. Meanwhile, the aim of farmers in carrying out their farming business is not only to increase income, but there are also those who simply fulfill their needs (subsistence). The low level of technology adoption by farmers is influenced by many factors, including capital issues, input prices and output prices.

The strategy for disseminating agricultural technology innovation to increase farmers' access to agricultural technology innovation can be carried out through three main stages, namely the first stage, users and intermediate users (operators, extension workers and facilitators) can access agricultural innovation information available at the agricultural information center properly and correctly. ; the second stage, the information that has been obtained is managed, assembled and simplified into a form that is easily accepted by users, namely farmers, according to the user's characteristics at a low and affordable cost; and the third stage, it is hoped that information that has been packaged in various media can be disseminated to users through a combination of the latest media (digital media), conventional media, and including traditional media that are popular at the community level. At this stage, it is hoped that the role of officers as facilitators can synergize with community leaders to support the operationalization of agricultural innovation dissemination information through

⁷ Sulisworo, D, *Mendorong inovasi dalam bidang iptek guna meningkatkan daya saing bangsa dalam rangka ketahanan nasional*. (Jakarta: Kertas Karya Perorangan Lembaga Ketahanan Nasional, 2010), hlm. 76.

potential media that can reach users (radio broadcasts, cell phones, village notice boards and personal media) up to the village level. This needs to be optimized to speed up information on dissemination of agricultural innovations down to the farm level.⁸

D. Conclusion

The type of agricultural technology innovation developed or implemented by farmers depends on the agrosystem conditions of the local area. There is a relationship between the application or adoption of agricultural technology innovation and the level of resilience of farming households. Farmers who more intensively implement technological innovation based on innovative agricultural business systems have a better level of food security compared to farmers who do not implement technological innovation based on innovative agricultural business systems.

⁸ Indraningsih, dkk, *Kajian kebijakan dan implementasi diseminasi inovasi pertanian*. Laporan Akhir. Bogor (ID): Pusat Sosial Ekonomi dan Kebijakan Pertanian, Tahun 2014.

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