Building Sustainability in Agribusiness: Innovation-Based Business Development Strategy

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Abstract

This study aims to explore innovation-based agribusiness development strategies to support sustainability in West Java. The main focus of this study is to identify the innovations implemented, the development strategies carried out, and the supporting and inhibiting factors in the innovation process. The research methods used include in-depth interviews with agribusiness actors, surveys of stakeholders, and case studies on businesses that have successfully adopted innovative practices. The results of the study indicate that technological innovations such as smart irrigation systems, precision agriculture, and the use of drones play an important role in increasing productivity and efficiency. Business diversification strategies and strengthening partnership networks have proven to be able to expand market access and increase economic resilience. There are challenges such as limited access to technology and capital, as well as regulations that are not yet fully supportive, which are the main obstacles to the implementation of innovation. The implications of these findings emphasize the need for cross-sector collaboration, increasing human resource capacity, and adaptive policy support to ensure the sustainability of agribusiness in West Java, the agribusiness sector has the potential to become a driving force for sustainable development that is highly competitive with a holistic and innovative approach.

Keywords: *Sustainable Agribusiness, Technological Innovation, Business Diversification, Economic Sustainability.*

A. INTRODUCTION

Agribusiness plays a vital role in maintaining food security and driving economic growth, especially in developing countries rich in natural resources. More than just a production process, this sector covers the entire value chain from cultivation to distribution, ensuring food availability, price stability, and equitable access for the community. In facing global challenges such as climate change, land degradation, and changing market dynamics, agribusiness is required to continue to innovate (Bissonnette, 2016; Gorman et al., 2020; Mariyono et al., 2022). The use of technology and the implementation of sustainable practices are key to increasing productivity, while maintaining a balance between economic, social, and environmental needs. In other words, the future of food security depends heavily on the ability of agribusiness actors to adapt and build resilient and sustainable systems (Dentoni et al., 2020; Gorman et al., 2020).

This sector also plays an important role in driving economic development, especially by opening up wide employment opportunities, especially in rural areas. Moreover, this sector is a driver for the growth of other interrelated industries, such as transportation, logistics, and agricultural processing (Gholami Jalal et al., 2024;

Soledispa-Cañarte et al., 2023). The development of healthy agribusiness has the potential to create a more inclusive value chain, where small farmers and micro-entrepreneurs are not only part of the production process, but also have access to wider markets and opportunities to obtain added value through the downstream process. At the national level, agribusiness is often the backbone of maintaining the stability of the trade balance through the export of superior commodities (Obayelu, 2018).

Despite its great potential, the development of the agribusiness sector faces challenges that cannot be ignored. Dependence on traditional methods, limited access to technology, minimal supporting infrastructure, and price fluctuations in the global market are some of the factors that often hinder the optimization of agribusiness potential. Innovation plays a key role in supporting more sustainable business development. The application of smart technology, such as digitalization of production processes and data-based monitoring, can increase efficiency while minimizing risk (Banson et al., 2015; Mariyono, 2020b; Mariyono et al., 2022). Strengthening partnership networks between farmers, business actors, research institutions, and the government plays an important role in expanding access to knowledge, capital, and markets (Mariyono, 2020a; Sokolova & Litvinenko, 2020). Another equally important strategy is business diversification, which allows agribusiness to be more adaptive to changes in demand and dynamic environmental conditions.

Limited natural resources are a serious challenge that threatens the sustainability of agribusiness. Increasing land conversion narrows the availability of fertile land, while environmentally unfriendly agricultural practices and excessive water exploitation worsen ecosystem conditions. Land degradation that occurs, such as decreased soil fertility and erosion, has a direct impact on long-term productivity, and limited access to quality agricultural inputs, such as superior seeds, organic fertilizers, and precision technology, makes it difficult for agribusiness actors to adapt to existing environmental challenges (Atosina Akuriba et al., 2021; Banson et al., 2015; Salvini et al., 2018).

Global market dynamics also add to the complexity of the challenges facing the sector. Fluctuations in commodity prices, changes in international trade policies, and uncertainties in global supply chains create risks that are difficult to predict, especially for small and medium farmers. Dependence on export markets increases vulnerability to changes in global demand and shifts in consumer preferences. Limited access to market information and technology makes it difficult for many business actors to respond quickly to these changes, and this combination of environmental and global market challenges requires more innovative and adaptive strategies so that agribusiness can survive and grow sustainably (Ahmad, 2024; Alvarez-Ochoa et al., 2024).

These challenges demonstrate the complexity of building sustainability in agribusiness. Comprehensive and innovative strategies are needed to address these pressures, from implementing technologies that support climate change adaptation to

strengthening farmers' capacity to be better prepared for market dynamics. Agribusiness is not only able to survive the challenges, but also plays an important role in creating a more resilient and sustainable food system (Atosina Akuriba et al., 2021; Salvini et al., 2018). One of the biggest challenges is the limited natural resources such as land, water, and energy that directly affect the sustainability of this sector. Conversion of agricultural land into residential or industrial areas continues to reduce production space, reducing opportunities to increase harvest capacity, intensive agricultural practices without land conservation efforts have led to a decline in soil fertility and crop yields in the long term (Filippi & D'Angelo, 2022; Surya et al., 2021).

The dwindling availability of water due to over-exploitation and the impact of climate change is also a serious threat, especially for areas that still rely on traditional irrigation systems. Another challenge comes from the large energy requirements in the production, processing, and distribution of agricultural products. As long as we still rely on fossil fuels, pressure on the environment will continue to increase, and integrating technological innovation, implementing environmentally friendly practices, and strengthening farmer capacity are key to facing these challenges while encouraging more sustainable agribusiness (Ahmad, 2024; Alvarez-Ochoa et al., 2024).

Market fluctuations are also a significant factor affecting the sustainability of agribusiness, especially in the context of a dynamic global economy, and agricultural commodity prices are highly vulnerable to changes in international trade policies, exchange rate fluctuations, and shifts in consumer demand that continue to evolve. Small farmers feel that this price instability is a major challenge because their bargaining position tends to be low, coupled with limited access to market information (Amin-Chaudhry et al., 2022; Franklin & Oehmke, 2019; Gaffney et al., 2019). Long and often inefficient supply chains increase the potential for losses at the producer level, and without adequate protection mechanisms, such as agricultural insurance or targeted subsidy programs, farmers are in a very vulnerable position to market shocks.

A strategy is needed that not only focuses on increasing productivity, but also on strengthening the resilience of agribusiness actors to global market uncertainty. To face increasingly complex challenges, agribusiness needs to adopt a strategy that focuses on innovation and sustainability, and climate change actually encourages the need for the use of intelligent technology so that farmers are able to manage risks better. One solution that is starting to be implemented is precision agriculture, farmers can determine the most optimal planting time, regulate water use more efficiently through the use of sensors and weather data, and minimize the risk of crop failure (Aji, 2020; Braga, 2016).

It's not just about climate adaptation, efforts to maintain natural resources are also key to building a sustainable agribusiness, the increasingly massive conversion of land and intensive agricultural practices make the soil vulnerable to degradation. One solution that is starting to be implemented is agroforestry, a method that combines agricultural crops with forestry crops, this approach not only helps improve soil quality, but also maintains the balance of the ecosystem. Wiser water management

is also a priority, especially in areas prone to drought, and technologies such as drip irrigation or rainwater harvesting systems provide effective solutions to maintain water availability, ensure production continuity, and support more environmentally friendly agribusiness practices. From an economic perspective, business diversification is an important strategy to deal with market fluctuations that often harm farmers. Farmers can process agricultural products into derivative products that have higher added value by not only relying on one type of commodity, for example cassava which is processed into mocaf flour or bananas which are made into ready-to-sell chips (Brenya et al., 2023; Djuwendah et al., 2018; Pani et al., 2020). Digitalization opens up new opportunities for agribusiness, where e-commerce platforms and agricultural applications make it easier for farmers to market their products directly to consumers, monitor market prices in real-time, and expand distribution networks.

The challenges should not be seen as mere threats, but as triggers for innovation. Data shows that in 2022, national rice production will decline by 1.5% due to a longer dry season. Land conversion and environmental damage have exacerbated this condition, with productive land decreasing by 3.2% from 2019 to 2023. The impact of climate change is increasingly evident when around 18.2% of Indonesia's territory experiences below normal rainfall in 2023, triggering droughts that are detrimental to agricultural areas such as Java and Sulawesi. Pest and plant disease attacks have also increased, causing production to decline by up to 20% in some areas. Despite these challenges, the opportunities to build a more resilient and sustainable agribusiness remain wide open. Adopting technology, strengthening partnerships, and implementing environmentally friendly agricultural practices are important foundations for building a more adaptive sector. Agribusiness in Indonesia has great potential not only to survive global challenges, but also to become a major force in driving an inclusive and sustainable economy.

Limited access to energy resources is also a challenge in supporting the sustainability of agribusiness. Most of the production process to the distribution of agricultural products still relies on fossil fuels, which not only increase operational costs but also contribute to carbon emissions. Limited access to electricity in many rural areas often hinders the use of modern tools that can increase work efficiency, such as crop processing machines or automatic irrigation systems. When energy supplies are unstable, farmers are faced with a difficult choice between increasing productivity with expensive technology investments, or sticking with less efficient traditional methods.

The impact of these resource constraints is increasingly felt in leading export commodities such as coffee, cocoa, and palm oil, which are highly dependent on stable environmental conditions. For example, coffee production in Indonesia fell by around 15% in 2022. The main cause was high rainfall that disrupted the flowering and ripening phases of coffee beans, which ultimately affected the quality and quantity of the harvest. Cocoa faces similar challenges. Excessive rainfall triggers the growth of disease-causing fungi in plants, while higher than normal temperatures accelerate the

ripening process of fruit, reducing the quality of the beans. Palm oil, which is Indonesia's mainstay export, is also not immune to the impacts of climate change. Changes in rainfall patterns and rising global temperatures have led to a decline in land productivity, as well as slowing down the process of plant regeneration (Dal Moro et al., 2023; Ioris, 2018; Pani et al., 2020).

This phenomenon shows that the sustainability of agribusiness cannot be separated from efforts to manage resources wisely and innovatively. The use of renewable energy such as solar power or biogas in agricultural areas can be a solution to reduce dependence on fossil fuels, while reducing production costs, business actors can not only reduce the risks faced by climate change, but also create a more resilient and sustainable agricultural system in the future.

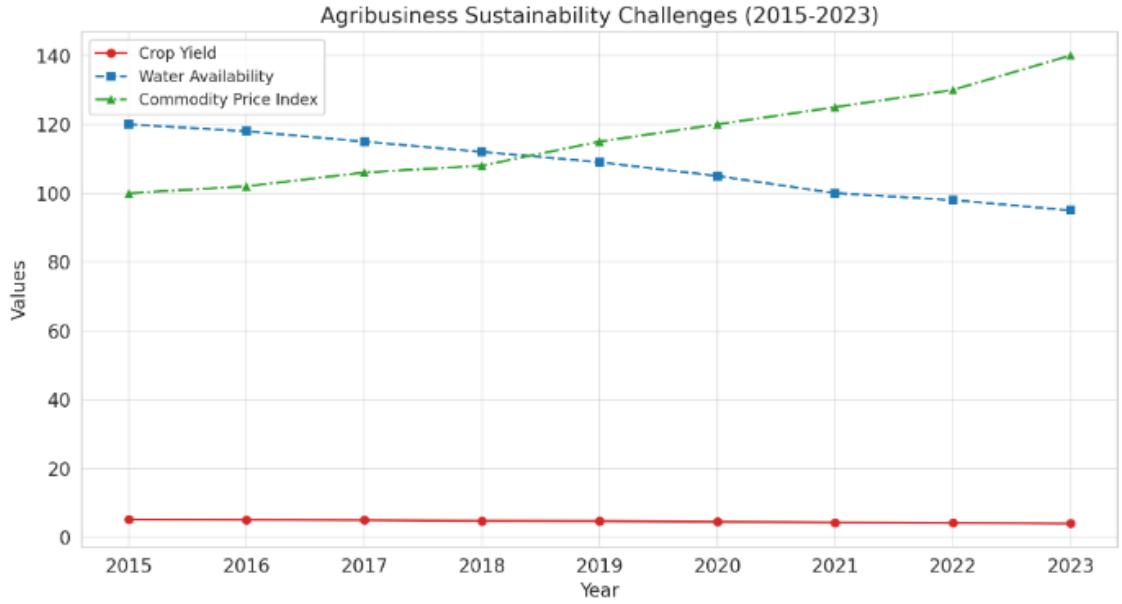

Figure 1. Agribusiness Sustainability Challanges (2015-2023)

Source: data proceed

The data reveals a complex interplay of challenges threatening agribusiness sustainability, with declining crop yields, diminishing water availability, and rising commodity prices painting a concerning picture. Over the past decade, crop yields have steadily decreased from 5.2 tons per hectare in 2015 to 4.0 tons per hectare in 2023. This downward trend highlights the mounting pressures faced by agricultural producers, driven by factors such as shifting weather patterns, increasing pest infestations, and soil degradation. Climate change has intensified these pressures, disrupting planting seasons and reducing harvest quality, particularly for smallholder farmers who often lack access to advanced technology and climate-resilient crops.

Water availability has shown a worrying decline, falling from 120 billion cubic meters in 2015 to just 95 billion cubic meters in 2023, this drop reflects the growing scarcity of freshwater resources, exacerbated by over-extraction for irrigation, urban expansion, and prolonged droughts. For a sector heavily reliant on consistent water supply, these changes pose a significant threat to agricultural productivity. Without adequate water management strategies, farmers face increasing uncertainty in their harvests, further straining their ability to maintain stable incomes and food supply.

As crop yields and water resources dwindle, commodity prices have followed a contrasting trajectory, rising steadily from a baseline index of 100 in 2015 to 140 in 2023. This surge indicates growing market volatility, where supply-side constraints, coupled with rising production costs, push prices upward. and the fluctuation is particularly challenging for small-scale farmers, who often lack the bargaining power to secure fair prices, while consumers face higher food costs.

Market fluctuations are no less a challenge for the sustainability of agribusiness, especially amidst the ever-changing dynamics of the global economy. Agricultural commodity prices are greatly influenced by various external factors, such as international trade policies, changes in consumption trends, and competition with imported products, and this instability has a major impact on small farmers who are often in a weak bargaining position and have limited access to market information. The price of rice in Indonesia increased by 5.2% compared to the previous year, and this increase was caused by a decrease in production due to drought and pest attacks, which forced farmers to sell their crops at prices that were not always commensurate with the production costs they incurred.

Furthermore, long and inefficient supply chains exacerbate the situation, increasing the risk of losses at the producer level. Small farmers often face difficulties in gaining direct access to markets, so they rely on middlemen or brokers who take most of the profits. When protection mechanisms such as agricultural insurance or subsidy programs are not running optimally, many farmers must bear the risk of losses due to price fluctuations, and to address this challenge, various efforts have been made to strengthen the resilience of Indonesian agribusiness. The government through the Agricultural Research and Development Agency (Balitbangtan), has introduced plant varieties that are more resistant to extreme conditions such as drought and pest attacks, which are expected to maintain production stability even in the face of unpredictable weather. The application of water-saving irrigation technology such as drip irrigation systems is a solution to overcome water scarcity, especially in areas prone to drought.

Social and educational approaches are also starting to be strengthened. Land rehabilitation programs through tree planting in critical areas are one of the steps to maintain agricultural ecosystems, while training on climate change adaptation strategies helps farmers adopt more environmentally friendly and sustainable practices. Collaborative efforts between the government, research institutions, and farmer communities are key to building a resilient agribusiness system (Ioris, 2018; Munonye & Esiobu, 2017). Fluctuating market challenges can be better addressed, opening up new opportunities for Indonesian agribusiness to grow sustainably amidst global challenges with strong synergy.

This study aims to identify innovative strategies that support the development of sustainable agribusiness, an approach is needed that is able to strengthen the resilience of the agribusiness sector while encouraging sustainable growth in facing challenges such as climate change, resource constraints, and market fluctuations. This study will analyze various strategies that will be explored to find solutions that not

only focus on increasing productivity, but also integrate sustainability principles, such as efficient use of resources, adoption of environmentally friendly technologies, and strengthening market access for agribusiness actors. This study is expected to contribute to designing more adaptive and sustainable agribusiness policies and practices in the future.

B. LITERATURE REVIEW

1. The Concept of Sustainability in Agribusiness

Sustainability in agribusiness rests on three main pillars: economic, social, and environmental. The main focus is on maintaining long-term profitability through the application of technology, supply chain efficiency, and fairer market access (Mariyono et al., 2022). The social aspect plays a role in strengthening the position of farmers by encouraging the empowerment of local communities and ensuring equitable distribution of benefits (Mariyono, 2014). The environmental pillar emphasizes environmentally friendly practices such as the use of organic fertilizers and conservation of natural resources to maintain the balance of the ecosystem. These three pillars complement each other in building a resilient and sustainable agribusiness.

The environmental pillar emphasizes efforts to maintain ecosystem quality through natural resource conservation, effective waste management, and adoption of environmentally friendly technologies (Bissonnette, 2016). This approach aims to reduce negative impacts on the environment while maintaining land productivity and energy efficiency. Previous studies have also highlighted the close relationship between the three pillars of sustainability. Research by (SOETRIONO et al., 2020) on paprika agribusiness in Gowa Regency shows that the success of agribusiness does not only depend on production aspects, but is also influenced by social, economic, ecological, technological, and institutional factors.

Although this integrated approach is supported by many studies, its implementation in the field faces various challenges. Limited access to technology, lack of capital, and increasingly unpredictable climate change are often the main obstacles, fluctuations in commodity prices and inequality in market access worsen the position of smallholder farmers in the value chain. (Mariyono et al., 2020) emphasize the importance of cross-sector collaboration to design policies that support the adoption of sustainable practices, sustainable agribusiness not only focuses on productivity and economic benefits, but also maintains social balance and environmental sustainability for future generations.

2. Innovation in Agribusiness

Innovation in agribusiness is the process of applying new ideas, technologies, or methods aimed at increasing efficiency, productivity, and sustainability in the agricultural sector, this innovation can cover various aspects, such as new product development, improved production processes, more effective marketing strategies, or business models that are more adaptive to market changes (Mariyono, 2014; Mariyono

et al., 2022). The main objectives of innovation in agribusiness are to meet the increasing need for food, improve farmer welfare, and maintain environmental sustainability. One of the studies that discusses the importance of technological innovation in agribusiness development was conducted by (Mariyono, 2020a), this study emphasized that agribusiness development based on technological innovation can accelerate the growth of the agricultural sector by increasing efficiency, productivity, and added value of agricultural products. This study also highlights the importance of integral community participation in agribusiness activities to achieve better market competitiveness.

A case study conducted by (Mariyono, 2020b) on the digital agricultural startup "Agree" shows the application of a modified lean startup method in developing a digital agricultural business, this study revealed that the use of this method helps in product and company development, although there are several driving and inhibiting factors faced during the implementation process. Research by (Djuwendah et al., 2018) examined the application of rice farming technology innovation through Prima Tani activities in Musi Rawas Regency, South Sumatra. The results of the study showed that although the technology application scores for participating and non-participating farmers were in the moderate category, there was a real increase in rice farming income for participating farmers compared to non-participating farmers.

Not all studies fully support the implementation of innovation in agribusiness. Several studies show that innovation adoption often faces challenges, such as resource constraints, lack of knowledge or skills, and resistance to change. A holistic and inclusive approach is needed in designing and implementing innovation, taking into account the local context and involving various stakeholders. Innovation in agribusiness has great potential to transform the agricultural sector towards a more efficient and sustainable direction, the success of its implementation depends greatly on the readiness and ability of agribusiness actors to adopt and adapt the innovation according to local conditions and needs (Bissonnette, 2016; Mariyono, 2020b).

3. Innovation-Based Business Development Strategy

Innovation-based business development strategies in agribusiness emphasize the importance of collaboration and the use of digital technology to support sustainable growth. Collaborative approaches, especially through partnerships with research institutions and local communities, play a vital role in accelerating the adoption of innovation among agribusiness actors. These partnerships enable the transfer of knowledge and technology that can increase farmers' capacity and strengthen their position in the value chain. (Mariyono, 2014) research highlights the importance of developing community-based agribusiness involving various stakeholders to achieve sustainable food security. (SOETRIONO et al., 2020) study on the digital agricultural startup "Agree" shows that strategic partnerships with research institutions and local communities help accelerate product development and expand market access, although challenges such as limited human resources and technological adaptation are still obstacles that need to be overcome.

Digitalization in agribusiness has opened up new opportunities to increase efficiency and productivity through the application of technologies such as the Internet of Things (IoT), Big Data, and digital platforms. IoT technology enables real-time monitoring of environmental and crop conditions, the data of which is then analyzed using Big Data techniques to produce appropriate action recommendations. For example, monitoring soil moisture or air temperature through IoT sensors can help farmers make faster and more accurate decisions regarding irrigation or fertilization. The use of digital platforms also facilitates better connectivity between farmers, distributors, and consumers, enabling faster and more transparent access to market information. The adoption of digital technology in agribusiness is not without challenges. Research by (Mariyono et al., 2022) shows that inadequate infrastructure, lack of digital knowledge among farmers, and resistance to change are significant obstacles to the implementation of this technology. Support is needed from various parties, including the government, private sector, and educational institutions, to provide more equitable access to technology and training programs that support increasing digital literacy among agribusiness actors.

C. METHOD

The methodology of this research uses a qualitative approach that aims to explore the strategy of developing innovation-based agribusiness in the context of sustainability. This approach was chosen because it is able to explore in-depth understanding of the experiences, views, and practices applied by agribusiness actors in facing challenges and utilizing innovation opportunities.

The data in this study were collected through three main methods designed to provide an in-depth understanding of innovation strategies in agribusiness. First, in-depth interviews were conducted with agribusiness owners and managers who have implemented innovation in their business operations. The main informants included small and medium business actors in the agriculture, livestock, and plantation sectors who adopted new technologies or sustainable methods in their production and distribution processes. Interviews also involved representatives from farmer cooperatives and agricultural extension workers who play a role in assisting farmers in implementing innovative practices. The focus of the interviews was to explore the strategies they implemented, the factors supporting their success, and the challenges they faced in the innovation process.

The second step is to conduct a survey to obtain a broader picture of the implementation of sustainability strategies among agribusiness actors. Survey respondents consisted of farmers, agribusiness entrepreneurs, cooperative members, and business actors in supporting sectors such as agricultural technology providers and financing institutions, this survey targeted areas with high agribusiness potential in Indonesia, such as West Java, Central Java, and Sumatra, which are known as centers of agricultural production. The purpose of the survey was to identify trends in technology adoption, perceptions of sustainability, and driving and inhibiting factors in the implementation of innovative practices in this sector.

The final step is to select case studies to provide a deeper understanding of best practices in implementing innovation. The subjects of the case studies involve agribusinesses that have successfully integrated innovative strategies, both in terms of technology, management, and marketing. Examples raised include businesses in West Java that utilize digital technology for direct product marketing to consumers, the use of smart irrigation systems to save water, and the development of products based on local agricultural products that have high added value (Mariyono, 2020a, 2020b).

The data obtained were analyzed using thematic analysis. This technique was used to identify patterns, main themes, and relationships between variables that emerged from interviews and case studies. Each interview transcript and case study documentation was reviewed in depth to find themes that were relevant to innovation and sustainability strategies. This process involved coding, categorizing, and interpreting data to build a comprehensive understanding of how agribusiness actors design and implement innovations to support the sustainability of their businesses.

D. RESULT AND DISCUSSION

1. Identify Key Innovations

The results of this study reveal several key innovations implemented by agribusiness actors to support the sustainability of their businesses. One of the most prominent innovations is the application of smart technology, such as the use of smart irrigation systems, precision farming, and drones, this technology not only increases efficiency but also helps minimize excessive use of resources. For example, smart irrigation systems allow for real-time monitoring of crop water needs, so that water can be used more efficiently and crops receive optimal supply. In addition, the use of drones to monitor land conditions and spray pesticides automatically has been shown to increase work accuracy and reduce the risk of crop damage due to excessive use of pesticides.

Innovation in business processes is also an important strategy to support the sustainability of agribusiness. Optimizing the supply chain is done by shortening the distribution channel, which allows products to reach consumers faster and in a fresher condition. Agricultural waste management receives special attention with the use of organic waste as natural fertilizer. This approach not only reduces the waste produced, but also helps improve soil quality sustainably. For example, crop residues are processed into compost that is reused to enrich the soil, so that production costs are reduced and soil fertility is maintained in the long term. These innovations show that with the right approach, agribusiness actors are able to create a more efficient, environmentally friendly and sustainable production system.

Innovation in marketing plays an important role in expanding the market reach for agribusiness players. One prominent strategy is building local product branding by highlighting the uniqueness of the region of origin and the story behind the production process, this approach not only strengthens the product identity, but also

creates an emotional closeness with consumers who are increasingly interested in products with authentic and sustainable values.

Social media is also used to build closer communication with consumers, introduce transparent production processes, and build communities that are loyal to local products. Ibu Siti, as an agribusiness entrepreneur who has successfully utilized digital platforms, said that online marketing allows her products to be known more widely. *"We utilize social media and e-commerce platforms to market our products, customers from outside the region and even abroad can directly order our products,"* she said, this marketing innovation not only helps increase sales, but also strengthens the position of local products in the global market, making it an important part of the agribusiness sustainability strategy.

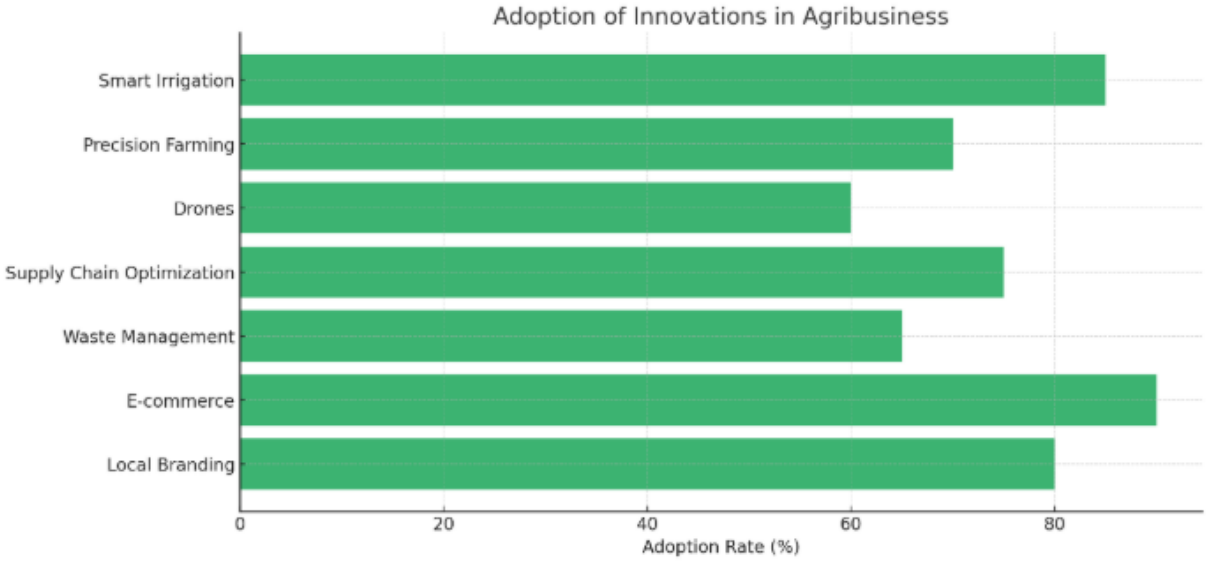

Figure 2. Adoption of Innovation in Agribusiness

Source: data proceed

This data visualization illustrates the adoption rate of various innovations in agribusiness, which are grouped into three main categories: technological, process, and marketing innovations. From the visualization results, it can be seen that the use of e-commerce is in the highest position with an adoption rate of 90%, this reflects the awareness of agribusiness actors of the importance of digitalization in expanding market reach and increasing accessibility of local products. Analysis of the collected data shows that the success of the adoption of this innovation cannot be separated from several supporting factors, such as partnerships with research institutions and support from the government through training programs and technology assistance. There are also challenges that remain, especially related to limited capital and access to advanced technology, closer collaboration is needed between the government, academics, and business actors to create a more inclusive and sustainable agribusiness ecosystem. The innovations implemented not only help increase productivity and efficiency, but also strengthen the competitiveness of business actors in the global market, this strategy proves that with the right approach, agribusiness can develop sustainably, provide significant economic benefits, and contribute to maintaining social and environmental balance.

2. Innovation Based Development Strategy

The innovation-based development strategy implemented by agribusiness actors in West Java is not only a response to existing challenges, but also opens up opportunities to create more adaptive and sustainable business models. Business diversification, for example, is not limited to planting various types of commodities, but also extends to processing harvested products and developing derivative products. In the Lembang area, one of the farmers interviewed said that he started producing vegetable chips from excess harvests, this step not only reduces the potential for losses due to unsold products, but also increases the added value of agricultural products.

"Previously, excess harvests were often thrown away because the market price dropped drastically. Now, I process them into ready-to-eat products such as vegetable chips. This helps me earn extra income and my products are also more widely known."

Strengthening partnership networks is a strategic step in building a mutually supportive agribusiness ecosystem. As many as 75% of survey respondents stated that partnering with cooperatives and agribusiness companies provides better access to markets and resources. Farmer groups in Gabut who are members of partnerships with local cooperatives receive facilities such as the provision of modern agricultural tools and access to microfinance programs, this partnership also facilitates farmers in marketing their products to large retail networks.

"Joining the cooperative makes it easier for us to get fertilizer at a cheaper price and access to a wider market. We also get guidance on how to manage the business more professionally."

Increasing human resource capacity through training and education is an important foundation in accelerating the adoption of innovation among farmers. Based on the interview results, the most popular training is related to the use of modern agricultural technology such as automatic irrigation systems and crop monitoring using drones. Around 65% of respondents admitted that after taking the training, they were more confident in using technology to increase productivity. In Subang, for example, one farmer group took part in training on the use of e-commerce to expand the market. The impact was quite significant, where they managed to increase sales by 30% in six months after starting to market their products online.

"Previously we only relied on middlemen to sell our crops. After learning about online marketing, we can sell directly to consumers at a better price."

It is seen that the success of innovation-based strategies is highly dependent on three main elements: access to information and technology, institutional support through partnerships, and strengthening farmer capacity through ongoing training, and these three elements form a complementary foundation in creating a resilient and sustainable agribusiness ecosystem in West Java. This strategy not only strengthens the competitiveness of local farmers but also forms a more independent and innovative agribusiness community, ready to face the dynamics of the global market.

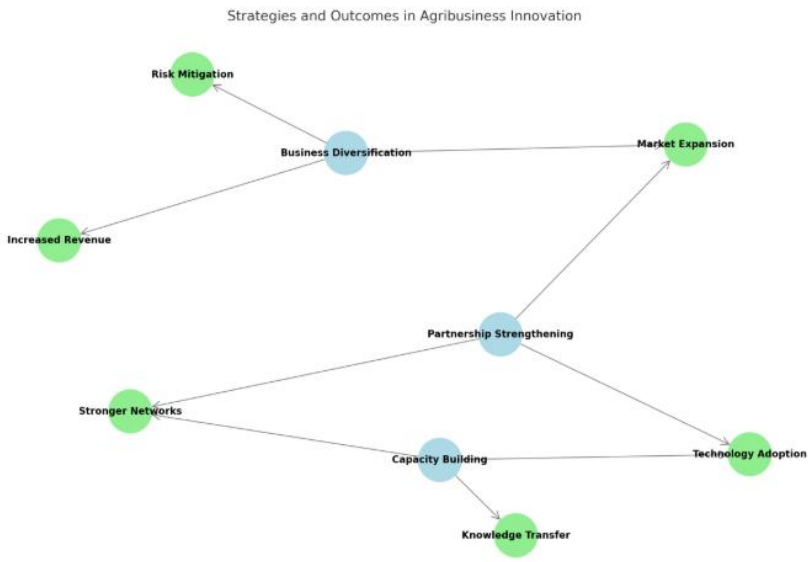

Figure 3. Strategies of Outcomes in Agribusiness Innovation

Source: data proceed

Business diversification is an important strategy for agribusiness actors to reduce risk and expand market opportunities. Farmers no longer rely on just one type of commodity, but have begun to develop derivative products such as processed agricultural products and agrotourism services. For example, coffee farmers in Garut produce ground coffee and ready-to-brew coffee, which has increased income by 20% in the last two years, this diversification opens access to new markets, supports business sustainability, and encourages collaboration with various parties in building a more inclusive and adaptive business ecosystem.

Strengthening partnership networks plays an important role in facilitating agribusiness actors' access to capital, technology, and market information. For example, a partnership between dairy farmers in Lembang and a local milk cooperative provides access to quality feed and automatic milking technology, which has an impact on increasing productivity and the bargaining position of farmers. Increasing human resource capacity through training and education, such as organic farming programs and the use of drones by the West Java Agriculture Service, encourages the adoption of more efficient and environmentally friendly practices. These three main strategies, namely business diversification, strengthening partnerships, and increasing human resource capacity, complement each other in building a resilient and sustainable agribusiness. Diversification opens up opportunities for market expansion and increased income, partnerships support access to technology and market networks, while increasing human resource capacity ensures the readiness of business actors to optimally utilize innovation. This combination of strategies allows agribusiness in West Java to adapt to global challenges and create a more inclusive and sustainable ecosystem.

3. Supporting and Inhibiting Factors

Access to technology and capital are key factors in supporting the adoption of innovation in West Java agribusiness. Business actors who have adequate access to technology tend to be more adaptive in implementing modern practices, such as smart irrigation systems and precision farming, which not only increase efficiency but also minimize the risk of crop failure due to climate change. Unequal access is a major challenge, especially for small farmers who face obstacles in obtaining advanced technological tools and devices. Capital plays an important role in supporting the implementation of innovation. Business actors who have access to financing, either from banks or microfinance institutions, are better able to invest in technology, product diversification, and market development (Mariyono et al., 2020; SOETRIONO et al., 2020). Conversely, limited capital is a major obstacle for farmers who do not have collateral or access to flexible financing schemes.

Government regulations and policy support play a critical role in driving innovation in the agribusiness sector. Tax incentives for investment in agricultural technology and subsidies for superior seeds, for example, can provide significant impetus for business actors to transform. Overlapping policies and convoluted bureaucracy often become obstacles in accessing assistance or taking advantage of the opportunities provided. Consistency in policy implementation and strict supervision of program implementation are crucial aspects so that regulations truly provide benefits for agribusiness actors in the field.

Adoption of innovation in agribusiness has a significant positive impact on economic, social, and environmental resilience. The economic aspect views that the application of modern technology and business diversification increases productivity and opens access to wider markets, so that farmers and agribusiness actors have the opportunity to increase income more stably. The social aspect actively supports innovation to encourage collaboration between farmers, communities, and other stakeholders, strengthen partnership networks, and support the growth of human resource capacity. The environmental aspect views that sustainable agricultural practices such as the use of organic fertilizers and water-saving irrigation technology help reduce negative impacts on the ecosystem, maintain environmental balance, and support long-term production continuity.

Innovation in agribusiness not only has an impact on the economic aspect, but also strengthens social structures and supports environmental sustainability. Socially, innovation encourages the formation of a more solid farmer community through training and mentoring, creating an inclusive and collaborative work environment. It also strengthens the partnership network between business actors, local communities, and external parties. The environmental perspective views that the implementation of precision agriculture and smart irrigation systems helps reduce excessive use of natural resources, maintains ecosystem balance, and supports long-term production sustainability. Better waste management and the adoption of environmentally friendly technologies are also concrete steps in minimizing the negative impacts of agribusiness on the environment. Agribusiness in West Java has the potential to

become a model of sustainability that balances economic, social, and environmental aspects. An inclusive and participatory approach is key so that the innovations implemented not only increase productivity, but also strengthen the resilience of agrarian communities amidst increasingly complex global dynamics.

E. CONCLUSION

This study highlights that innovation in agribusiness in West Java plays an important role in building sustainability through the integration of economic, social, and environmental aspects. Adoption of modern technology, business diversification, and strengthening partnership networks have proven to be able to increase productivity, expand market access, and strengthen the competitiveness of business actors. This success cannot be separated from challenges such as limited access to capital and technology, and regulations that are not yet fully supportive. Targeted policy support, cross-sector collaboration, and empowerment of local communities are key to ensuring the adoption of sustainable innovation. Agribusiness in West Java has the potential to become a development model that is not only economically profitable, but also contributes to social resilience and environmental preservation by optimizing supporting factors and mitigating existing obstacles.

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