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Institutional Dimensions and Their Impact on the Sustainability of Shallot Farming in Samosir Regency, Indonesia

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ABSTRACT

Shallots are a vegetable that plays an important role in various Asian countries, including Indonesia. This plant, which belongs to the Liliaceae family, is one of the main sources of income for farmers in tropical regions. Shallots were once a prime agricultural commodity in North Sumatra Province. The well-known shallot cultivation centers in North Sumatra are located in the areas surrounding Lake Toba, at an altitude of 900-2000 meters above sea level, specifically in Samosir Regency. This study aims to analyze the institutional dimensions of shallot farming and their impact on the sustainability of shallot farming. The institutional variable (X4) has a positive effect on Farm Sustainability (Y), with a coefficient value (Original Sample column) of 0.300, T-Statistics = 3.237 > 1.96, and P-Values = 0.001 < 0.05. The most dominant indicators of the institutional variable (X) in influencing farm sustainability (Y) are participation in agricultural extension programs and farmer groups, with the highest path coefficient values of 0.952 and 0.957, respectively.

Keyword: Shallot, Sustainability, Institutional

INTRODUCTION

Shallots are a vegetable that plays an important role in various Asian countries, including Indonesia. This plant, which belongs to the Liliaceae family, is one of the main sources of income for farmers in tropical regions. Generally, shallot cultivation is carried out using bulbs as planting material. The important role of shallots as a food complement has led some consumers to believe that shallots have become an indispensable part of staple food menus.

Shallots contain carbohydrates and various vitamins such as A, B, and C. Additionally, they are rich in phenolic compounds, including gallic acid, apigenin, eriodictyol, quercetin, isoquercetin, rutin, kaempferol, catechin, and tannic acid. The numerous health benefits of shallots include reducing the risk of cancer, improving heart health, supporting the detoxification process, regulating blood sugar levels in diabetes patients, and enhancing brain function. Moreover, shallots are beneficial for managing obesity and allergies, strengthening bone structure, maintaining eye health, boosting the immune system, improving skin conditions, supporting a healthy digestive system, and promoting hair health. Due to these extensive health benefits, shallots remain highly sought after by consumers (Wenli et al., 2019).

Shallots were once a leading agricultural commodity in North Sumatra Province. One of the most well- known shallot cultivation centers in the province is located around Lake Toba, specifically in Samosir

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Regency, at an altitude of 900â??2000 meters above sea level. In 2002, this region recorded a shallot production of 8,840 tons with a harvested area of 518 hectares (Samosir Regency in Figures, 2003). Agriculture in this area relies heavily on rainfall for its success. The local Samosir variety is a flagship commodity known for its distinctive characteristics, including a spicier taste, lower water content, and a brighter color. These factors make Samosir shallots highly preferred by consumers.

Samosir Regency consists of 10 districts, all of which have land for shallot cultivation. Each district has varying planting areas and shallot production levels. Data on shallot production in Samosir Regency, based on district data, is presented in Table 1.

Table 1. Harvested Area, Production, and Productivity of Shallots by District in Samosir Regency in 2023.

District	Harvested Area	Production	Produktivity
Sianjur Mulamula	71	1021	14,38
Harian	38	583,2	15,34
Sitiotio	35	771	22,02
Onan Rungu	18	199,2	11,06
Nainggolan	17	220,5	12,97
Palipi	29	598,5	20,63
Ronggur Nihuta	1	25	25
Pangururan	82	940,7	11,47
Simanindo	45	841,7	18,70
Jumlah	336	5200.8	151,60

Source: BPS Samosir Regency, 2023

The table above shows that Samosir Regency still considers shallots as one of the agricultural businesses for farmers. This can be observed as each district has an area for shallot cultivation with potential for development. However, the significant potential of shallots in Samosir Regency has yet to be supported by current conditions, particularly regarding productivity, which has not been maximized.

The demand for horticultural crops is very high among consumers, especially in North Sumatra. One of the horticultural commodities is shallots, which have not been able to meet consumer needs, particularly in North Sumatra. Samosir Regency is one of the suppliers of shallots in the North Sumatra region. The demand for shallots in North Sumatra was approximately 43,000 tons in 2020, while the production of shallots in North Sumatra was only 26,000 tons. Therefore, there is still a shortfall of 13,000 tons, and to meet the remaining demand for shallots, supplies are sourced from Brebes (Dahler, 2020).

The government's role is crucial in preventing land degradation and strengthening agricultural institutions to support the sustainability of the agricultural sector. The government can contribute through policies that protect agricultural land, land rehabilitation programs, capacity building for farmers' institutions, and providing access to technology, finance, and markets. Additionally, collaboration among institutions and the implementation of integrated programs are key to creating a productive, sustainable, and highly competitive agricultural environment. With this comprehensive approach, the government can ensure farmers' welfare while preserving natural resources for future generations (Putri, 2021).

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Farmers Group

To enhance community participation and involvement in sustainable agriculture, farmers need to be directly engaged in collaborative farming activities. This is important to support the success of development programs without neglecting their individual interests. Farmers' groups can function effectively when their members actively participate. This participation usually occurs through social interactions that develop among group members and the surrounding community (Ardianto, 2019).

Participation in Extension Services

Extension services play a crucial role in enhancing agricultural productivity. The responsibilities of extension services should not only focus on the application of productive, environmentally friendly, and sustainable cultivation technologies but also encompass aspects of economic productivity, strengthening local values, developing institutions, and identifying and utilizing local creative products. Additionally, extension services need to provide support for the socialization and marketing of farmers' creative products. Thus, the active role of extension services can significantly contribute to supporting farmers' success in their agricultural enterprises (Setiawan, 2012).

The Role of the Government

The government plays a significant role in supporting the agricultural activities carried out by farmers to this day. Government policies not only focus on price control but also aim to encourage farmers to be more active in running their businesses. Price policies are used as one of the tools to achieve sustainable development goals. Additionally, the government supports the implementation of sustainable agricultural practices and wise management of natural resources. These efforts include promoting more efficient and environmentally friendly agricultural management by adjusting price policies in line with sustainability principles (Dasipah, 2023).

The sustainability and functioning of all subsystems, actors, and related sectors are determined by the agricultural enterprise itself. If it operates smoothly, this agricultural activity is considered important and worthy of attention. Agricultural activities must be developed with new innovations from all actors involved in the agricultural system, particularly in agribusiness. The consistency and consequences of all participants must ensure the preservation and protection of the sustainability of the agricultural enterprise, along with everything that encompasses it, such as the ecosystem, sociosystem, and geosystem (Setiawan, 2018).

The aspect of sustainability is crucial in fulfilling the concept of well-being as a whole because this concept encompasses more than just welfare. Well-being includes improvements in quality, happiness, fulfillment of basic needs, equality, and justice in life. Essentially, sustainability is based on the continuity of implementing strategies for harmonious relationships between humans and nature. This connection is very close in sustainable agricultural activities, which rely on the role of nature for their success (Fauzi, 2019).

In general, sustainability business models use social, environmental, and financial dimensions as the foundation to drive performance. In this model, human resources play a role in taking actions and their consequences on the environment, social aspects, and finances. Similarly, in agricultural activities, these dimensions can be used to illustrate the inputs, processes, outputs, and expected outcomes (Soeharso, 2020).

METHOD

Place and Time of Research

The research location is where the study is conducted. The research site is Samosir Regency, North Sumatra Province. The selection of the research location was determined using a purposive method, which is a

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technique for deliberately selecting research sites based on predetermined considerations and criteria. The research schedule was conducted in March 2023.

Sampel merupakan bagian dari populasi dari objek yang akan diteliti yang menunjukkan bahwa setiap dari populasi akan berpeluang untuk dijadikan sampel. Sebaliknya bhawa sampe harus mampu menjadi cermin dari populasi. Sampel juga bisa dikatakan sebagai perwakilan dari populasi. Sehingga apa peniliti akan menentukan sampel dari populasi, maka dapat memilih keseluruhan populasi atau bagian dari populasi dengan rumus yang ditentukan untuk penarikan sampel (Roflin dkk., 2021).

A sample is a part or representative of the population being studied. If the subjects are fewer than 100 individuals, it is advisable to include them all. If the subjects are larger or more than 100 individuals, a sample of 10-15% or 20-25% of the total population can be taken, or the entire population can be included (Arikunto, 2016). Thus, the research sample consists of all farmers, totaling 239 farmers in the study area.

The sample determination was conducted using purposive sampling, and the identification of stakeholders related to this research was carried out using snowball sampling, where stakeholders recommend other stakeholders as respondents.

Data Collection Methods

Primary Data

The collection of primary data was conducted through direct observation at the research site (observation) and in-depth interviews based on a structured questionnaire with farmers and stakeholders.

Secondary Data

The collection of secondary data was obtained from the Samosir Regency Government through the Samosir Regency Agriculture Office, the Samosir Regency Central Statistics Agency (BPS), and the profile of Samosir Regency. The secondary data includes land area, production, productivity, the number of shallot farmers, adopted technology, and climate and weather, specifically rainfall.

Data Analysis Methods

To analyze the formulation of the problem, the four dimensions used in measuring sustainable development goals are latent variables that cannot be measured directly but can be observed through indicators that represent them. Structural Equation Modeling (SEM) is a statistical technique that is an extension of multivariate analysis and regression analysis, allowing for the examination of the relationship patterns between latent variables and their indicators (Otok, 2013).

Partial Least Squares (PLS) is a method that generalizes and combines features of principal component analysis and multiple regression. PLS is a powerful analysis technique because it can be used with any type of data. This method can also be applied when the theoretical foundation for the measurement model is still new, making it suitable for predictive purposes. SEM-PLS becomes a good choice when faced with situations such as: a small sample size, limited available theory, the importance of accuracy, and uncertainty regarding the actual model specifications (Wong, 2013).

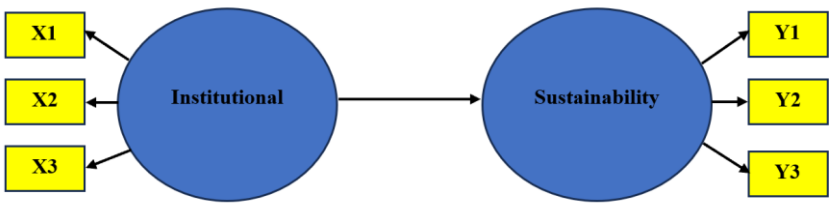

Figure 1. Hypothetical Structural Equation Model

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RESULT

Based on the results in Table 2, the most dominant indicators of institutions (X) in influencing the sustainability of agricultural enterprises (Y) are participation in extension services and farmers' groups, with the highest path coefficients of 0.952 and 0.957, respectively. The testing results are presented in Table 2.

Tabel 2. Pengujian Pengaruh Dimensi Kelembagaan (X4) Paling Dominan terhadap Keberlanjutan Usahatani (Y)

Institutional (X) Impact on Agricultural Sustainability (Y)	Original Sample (O)
The Role of the Government -> Agricultural Sustainability (Y)	0,904
Participation in Extension Services -> Agricultural Sustainability (Y)	0,952
Farmers' Groups -> Agricultural Sustainability (Y)	0,957

Source: Processed Data Results, 2023

Agricultural extension is a service system that provides support to farmers through informal education processes, helping them apply farming techniques and methods to enhance production and the success of their enterprises. The application of extension methods is an important aspect of agricultural extension activities. Farmers' participation in agricultural extension can provide knowledge and skills in shallot cultivation (Karliati, 2023).

Sustainable shallot cultivation provides economic benefits for farmers while also preserving the environment and ensuring food availability for the community. Therefore, cooperation between the government, farmers, research institutions, and the private sector is a key factor in promoting the adoption of sustainable practices in shallot cultivation (Dewi et al., 2024).

The role of farmers' groups significantly influences the agricultural activities being carried out. Farmers' groups serve as a platform for farmers to exchange information and obtain the latest updates. These groups are also a place for learning and access to assistance that supports agricultural activities (Berun et al., 2023). This is also in line with the condition of shallot farming in Samosir Regency. Farmers benefit from many conveniences by actively participating in farmers' groups.

To encourage farmers to continue their agricultural activities, it is necessary to strengthen the role of farmers' groups with government support through agricultural training programs, marketing development, and enhancing economic benefits in semi-organic shallot farming (Torani et al., 2022).

CONCLUSION

1. Institutions (X) have a positive influence on Agricultural Sustainability (Y), with a coefficient value (Original Sample column) of 0.300, T-Statistics of 3.237 > 1.96, and P-Values of 0.001 < 0.05.
2. The most dominant indicators of institutions (X) in influencing agricultural sustainability (Y) are participation in extension services and farmers' groups, with the highest path coefficients of 0.952 and 0.957, respectively.

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