ANALYSIS OF KEY VARIABLES FOR THE SUSTAINABILITY OF THE SIMANTRI PROGRAM IN TABANAN DISTRICT

Desak Putu Diah Merta Lestari[1]
Universitas Udayana, Denpasar, Indonesia
diahmerta16@gmail.com

Ida Ayu Nyoman Saskara[2]
Universitas Udayana, Denpasar, Indonesia
saskara@unud.ac.id

Ni Putu Wiwin Setyari[3]
Universitas Udayana, Denpasar, Indonesia
wiwin.setyari@unud.ac.id

Abstract

Empowering farmers through the implementation of the Simantri Program is one of the regional agricultural development policies in Bali Province. The program aims to achieve long-term self-sufficiency in food, feed, organic fertilizer, energy (biogas), and farmer welfare. This study focuses on identifying the important variables that contribute to the sustainability of the Simantri program, with the research conducted in Tabanan Regency. The identification of key variables was done through a Focus Group Discussion (FGD) involving 19 stakeholders, and a questionnaire was also used to gather data from Gapoktan as a control measure for the FGD results. The collected data was analyzed using the MICMAC (Matrix of Cross Impact Multiplications Applied to a Classification) method to determine the variables that influence and/or depend on the sustainability of the Simantri Program. The analysis results revealed several crucial variables out of the 13 identified, namely seed assistance, fertilizer prices, natural capital, customary regulations, and local wisdom, all of which significantly impact the sustainability of the Simantri program.

Keywords: Agriculture, Simantri, Sustainability Program, Micmac

INTRODUCTION

Indonesia is a country abundant in natural resources, including water resources, land resources, forest resources, marine resources, and the rich biodiversity found throughout the islands of Indonesia. These natural resources serve as valuable assets for driving economic development in the country. The agricultural sector remains a significant source of employment, surpassing other sectors in the Indonesian economy. This highlights the immense potential of the agricultural sector to influence the Indonesian economy. As an agricultural country, a majority of Indonesia's population resides in rural areas and depends on the agricultural sector for their livelihoods. The agricultural sector has evolved into a strategic sector that plays a vital role in the national economy and sustenance of the population, contributing to GDP, employment, and food supply throughout the nation. Recognizing this role, many individuals continue to engage in agricultural activities. Data from various sources indicate that in several developing countries, over 75% of the population works in agriculture, and more than 50% of national income is generated by the agricultural sector. Additionally, a significant portion of the country's export commodities are agricultural products (Hermanda et al., 2017). Consequently, the agricultural sector holds great importance in Indonesia's Gross Domestic Product (GDP) formation each year, contributing to over 50% of national income (BPS Indonesia, 2012). The significant role of agriculture in economic growth has motivated the government to continuously improve the agricultural sector, including the implementation of integrated farming systems such as Simantri.

Simantri has emerged as a model for regional agricultural development in the Province of Bali. The program receives full support from regional leaders, aligning with the vision of the regional strategic program and the "Bali Mandara" (Bali Safe, Peaceful, and Prosperous) policy. Simantri represents a comprehensive integration of agricultural activities at the local level, encompassing vertical and horizontal integration from planning and policy formulation to implementation. To support Simantri's objectives, agricultural diversification has been established. The Simantri program was initiated in 2008 and continued until 2013, with further implementation from 2013 to 2018 (Kadin Humas, Regional Secretariat of Bali Province, 2013).

The Simantri program in Bali Province has successfully implemented the concept of integrated farming, receiving substantial funding, facilitation, and political commitment from regional leaders. This is achieved through policy synergies with strategic programs, regional strategies, and sustainable budgeting. The main objective of the Simantri program is to improve the welfare of farmers, reduce poverty and unemployment, and promote sustainable rural economic development in the future. The mainstreaming process extends beyond the farmer level, involving the bureaucracy and government agencies (SKPD) to serve as a model for the Simantri program approach at the government level.

Technically, Simantri represents a comprehensive integration of agricultural activities, including food crops, auxiliary crops, horticulture, animal husbandry, fisheries, and forest plants, all within a single operating area or location. It serves as a pilot model for accelerated technology transfer to rural communities, building upon the previous Prima Tani model. The objectives of Simantri encompass expanding crop areas, improving animal husbandry and fishery practices, ensuring a year-round supply of quality animal feed, organic fertilizers, and pesticides, as well as promoting the utilization of biogas. Furthermore, the program aims to diversify businesses, develop economic trade institutions, and improve rural infrastructure (Ministry of Food and Agricultural Crops, 2013).

Integrated activities are geared towards achieving zero waste agriculture and 4 F production (food, animal feed, fertilizer, and fuel). The core focus of Simantri is to integrate tree planting with animal husbandry. Plant waste is converted into animal feed and stored as reserves during the dry season, while livestock waste (feces, urine) is transformed into biogas, bio-water, organic fertilizer, and biopesticides (Ministry of Agriculture and Food Crops, 2013; Wisnuardhana, 2009)

The Simantri program holds significant importance in ensuring the sustained growth of regional income within the agricultural sector. The Province of Bali has experienced a decrease in agricultural land due to numerous conversions to the tourism sector. According to a news article published on nusabali.com on October 13, 2021, approximately 1,568 hectares of agricultural land disappear each year in Bali. Additionally, the global impact of the Covid-19 pandemic has severely impacted the tourism industry, resulting in a greater reliance on the agricultural sector for GDP contribution. The continuous implementation of

the Simantri program is expected to facilitate the development and investment in livestock assets, as well as support the integration of agriculture, livestock, and cultural activities, similar to other locally-managed resource-based businesses by each Gapoktan. The program also focuses on providing organic fertilizers, biological products, and biogas, while fostering collaboration between various institutional organizations within the province of Bali.

Anugrah's study in 2014 found that incorporating local crops in the Simantri Ramal area had positive effects on community service activities, job opportunities, animal needs, feed, manure, and organic pesticides like biogas. It also promoted local trade and government protection. The Simantri engineering activities aimed to enhance sustainability and welfare of farmers, contributing to regional autonomy. Another study by Yasa in 2013 showed the highly effective results of the SIMANTRI Program, benefiting cultivators in Kelating Village, Tabanan Regency. Simantri, as per Bali Governor Regulation No. 29 of 2010, is a concept that fosters land technology adoption and promotes rural development through integrated agriculture systems.

The development of an integrated agricultural system that combines the agriculture and livestock sectors with a global and environmentally friendly approach can optimize the utilization of local resources and potentials. This will lead to the creation of an independent, comprehensive, and sustainable agricultural system based on local resources and institutionalized practices. It is expected to contribute to increased income and welfare of farmers. These efforts are part of poverty eradication, unemployment reduction, and support for environmentally friendly and clean development, aligning with Bali's vision of becoming Bali Mandara. The integration of crops and livestock is supported by various equipment, including composting tools, food processing facilities, biological storage, and biogas plants. The implementation will be carried out gradually and continuously, with the goal of doubling farmers' income within the next four to five years.

REVIEW OF LITERATURE

Sustainable Development

The discourse on environmental issues and nature conservation today is an important issue in the international arena. As part of the international community, Indonesia, which has abundant natural resources, has a moral obligation to manage its natural resources wisely. In addition, the growing awareness of the domestic population that environmental preservation is a necessity and a way of life. At the national level, the implementation of environmental preservation obligations and awareness is translated into sustainable development policies. Green economy and blue economy policies are examples of this. Sustainable development revolves around achieving a balance between economic sector development, social sector development, and environmental protection.

The concept of sustainable development, introduced by the World Commission on Environment and Development (WCED) as outlined in Our Common Future or the Brundtland Report, remains a subject of debate among environmental experts. This has resulted in many interpretations of the definition of sustainable development. Here are some definitions of sustainable development. Ordóñez and Duinker (2010) state that sustainable development is first the capacity to maintain ecological, social, and economic stability in the transformation of ecosystem services to humans, second meeting and optimizing the needs of both the present and future generations, third the persistence of necessary and desired systems (socio-political or natural) indefinitely, fourth the integration of ethical, economic, social, and environmental aspects coherently so that present and future generations of humans and other living beings can live without limits, fifth meeting needs and aspirations under environmental, social, and technological constraints, sixth living in harmony with nature and others, and seventh maintaining the quality of the relationship between humans and nature. The International Union for Conservation of Nature and Natural Resources (IUCN) (1980) in the World Conservation Strategy defines sustainable development as the implementation of development that takes into account environmental, social, and economic factors based on life resources and considers the long-term and short-term benefits or drawbacks of alternative actions.

Meanwhile, the Food and Agriculture Organization (1995) through the fisheries commission defines sustainable development, as stated in the Code of Conduct for Responsible Fisheries, as the preservation and management of natural resources aimed at ensuring the sustainability of the needs of the present and future generations. The development of conservation, such as land, water, plants, and genetic resources, should not cause environmental degradation and should use socially and economically appropriate technology (Kusumastuti, Bogor, Mulyati, Suprayitno, & Pertanian Bogor, 2021). Law Number 32 of 2009 concerning Environmental Protection and Management defines sustainable development as a conscious and planned effort that integrates environmental, social, and economic aspects into development strategies to ensure the integrity of the environment and the well-being, ability, welfare, and quality of life of the current and future generations. Based on the above definitions, the development paradigm, which was originally focused solely on economic considerations, has shifted to a paradigm that includes the environmental and social sectors as indispensable sectors.

Principles of Sustainable Development

Sustainable development focuses on three pillars: economic, social, and environmental development. To ensure harmony among these pillars, the implementation of development must adhere to the principles of sustainable development. There are at least four principles of sustainable development (Zulkifli, 2013). These principles include: a) **Equality and social justice**. This first principle means that the development process must ensure the equitable distribution of natural resources and land for the present and future generations. Development should also guarantee the well-being of all segments of society; b) **Respecting diversity.** Biodiversity and cultural diversity need to be preserved to ensure sustainability. Biodiversity is related to the sustainability of natural resources, while cultural diversity is about equal treatment for every individual; c) **Using an integrative approach.** Sustainable development prioritizes the interconnectedness between humans and nature, as humans and nature are interdependent; d) **Long-term perspective.** In this regard, sustainable development is oriented not only towards the present but also towards the future. It aims to ensure that future generations will have the same or even better environmental conditions.

Sustainable Agricultural Development

The paradigm of sustainable agricultural development can be an alternative solution to improving the welfare of the people without neglecting the conservation of natural resources and the environment. Sustainable development can be optimized through the synergy and commitment to build partnerships among agribusiness stakeholders. Sustainable development through business partnerships can ensure efficiency and growth, fairness and equity, as well as environmental awareness. To support these efforts, strong institutional consolidation is needed at the level of farmers, private sector, and government (Septana and Ashari, 2007).

According to Priyono (2010), the economic dimension is related to the concept of maximizing income flow while maintaining productive assets as the basis for generating that income. The main indicators of the economic dimension are efficiency, competitiveness, value-added (including profit) magnitude and growth, and economic stability. The economic dimension emphasizes the fulfillment of economic (material) needs of both the present and future generations. The social dimension is oriented towards the people, related to the need for social welfare reflected in harmonious social life (including the prevention of social conflicts), preservation of cultural diversity and socio-cultural capital, including the protection of minority ethnic groups. Therefore, poverty alleviation, equal opportunities for entrepreneurship and income, social and political participation, and socio-cultural stability are important indicators to be considered in development implementation.

The development of agribusiness in the perspective of sustainable agricultural development needs to consider the following important aspects (Asriani, 2003):

First, the resource aspect (resource endowment). It is important to consider resource endowment, including its conservation, which includes: a) Increasing agricultural productivity through technical or socio-economic engineering; b) Enhancing productivity stability; c) Maintaining sustainability in agricultural management; d) Upholding and improving equity.

Second, the technological aspect (technological endowment). Agricultural production cannot increase without the mastery of technology. Therefore, the adoption

process of new technologies is crucial, and in this regard, the role of agricultural extension workers is highly strategic.

Third, the institutional aspect (institutional endowment). In developing the concept of agribusiness, producers or farmers should be able to independently manage their production, process their products, and market them at favorable prices.

Fourth, the aspect related to culture (cultural endowment). This aspect is often overlooked, and therefore, many analysts assume that cultural issues remain constant. However, this aspect actually develops dynamically.

According to Notohaprawiro (2006), smallholder agriculture should be the core target because this sector can become an instrument for integrating globalization with economic democratization. Strong smallholder agriculture can also withstand economic crises. To develop reliable new strategies towards sustainable intensification, a comprehensive understanding of the factors that determine or influence the performance of smallholder agriculture is needed, using farming as the monitoring unit. These factors include biophysical, social, economic, cultural, and political components of the environment.

RESEARCH METHOD

In identifying the analysis of key variables for the sustainability of the Simantri Program in Tabanan Regency, a purposely determined Focus Group Discussion (FGD) was conducted. MICMAC (Matrix of Cross Impact Multiplications Applied to a Classification) was used to identify the variables that influence the Key Variables for the Sustainability of the Simantri Program in Tabanan Regency. Fauzi (2019) explains that the pattern of relationships between variables in MICMAC can occur directly between one variable and another, or it can occur because of connecting variables that influence both. MICMAC follows three basic steps that need to be performed (Denzin, 2009), namely: identifying elements (variables), explaining the relationships between variables, and identifying key variables. The first step of the MICMAC analysis in this study was conducted by identifying the Key Variables for the Sustainability of the Simantri Program in Tabanan Regency based on the results of the Focus Group Discussion (FGD). Subsequently, the

second and third steps were performed automatically after the data was entered into the MICMAC software.

RESULTS AND DISCUSSION

Based on the results of the Focus Group Discussion (FGD), nineteen elements (key variables) were agreed upon. Table 1 below shows the dimensions, long labels and short labels of each.

Table 1
Identification of Key Variables

No	Long labels	Short labels
1	Seedling/Seed/Parent Assistance	SSP
2	Fertilizer Prices	FP
3	Land Availability	LA
4	Commodity Type	CT
5	Adar Rules and Local Wisdom	ARL
6	Farmer Age	FA
7	Companion Role	CR
8	Social Capital	SC
9	Human Capital	HC
10	Natural Capital	NC
11	Financial Capital	FC
12	Cultural Capital	CC
13	Policy	PL

All of these elements are evaluated through the Matrix of Direct Influence (MDI). Where the results are presented in table 2 below.

Table 2
Contents of the Matrix of Direct Influence Table

	1. Seed Help	2. Price of Fertilizer	3. Availability of Land	4. Types of Commodities	5. Customary Rules and Local Wisdom	6. Farmer Age	7. Chaperone Role	8. Social Capital	9. Human Capital	10. Natural Capital	11. Financial Capital	12. Cultural Capital	13. Policy
1. Seed Help	0	2	2	3	3	3	2	2	0	2	2	3	0
2. Price of Fertilizer	1	0	3	3	2	3	3	2	0	3	3	3	2
3. Availability of Land	1	3	0	3	2	0	2	1	0	3	3	3	2
4. Types of Commodities	3	1	1	0	1	1	1	1	0	0	3	3	3
5. Customary Rules and Local Wisdom	3	2	3	3	0	3	2	3	0	3	3	3	3
6. Farmer Age	2	2	3	3	3	0	2	1	0	3	3	3	2
7. Chaperone Role	2	1	1	3	1	3	0	3	3	3	2	1	3
8. Social Capital	1	1	2	2	1	2	3	0	3	1	2	0	3
9. Human Capital	0	0	0	0	0	0	0	1	0	1	0	0	0
10. Natural Capital	1	1	3	3	1	3	3	2	3	0	1	2	0
11. Financial Capital	3	1	1	3	1	3	3	3	0	0	0	0	0
12. Cultural Capital	0	0	0	1	1	2	1	0	0	1	1	0	0
13. Policy	0	3	2	3	0	2	3	3	0	0	0	0	0

Based on the following matrix table, the results of the direct influence/dependent map of the results of MICMAC data processing are presented in Figure 1. As follows:

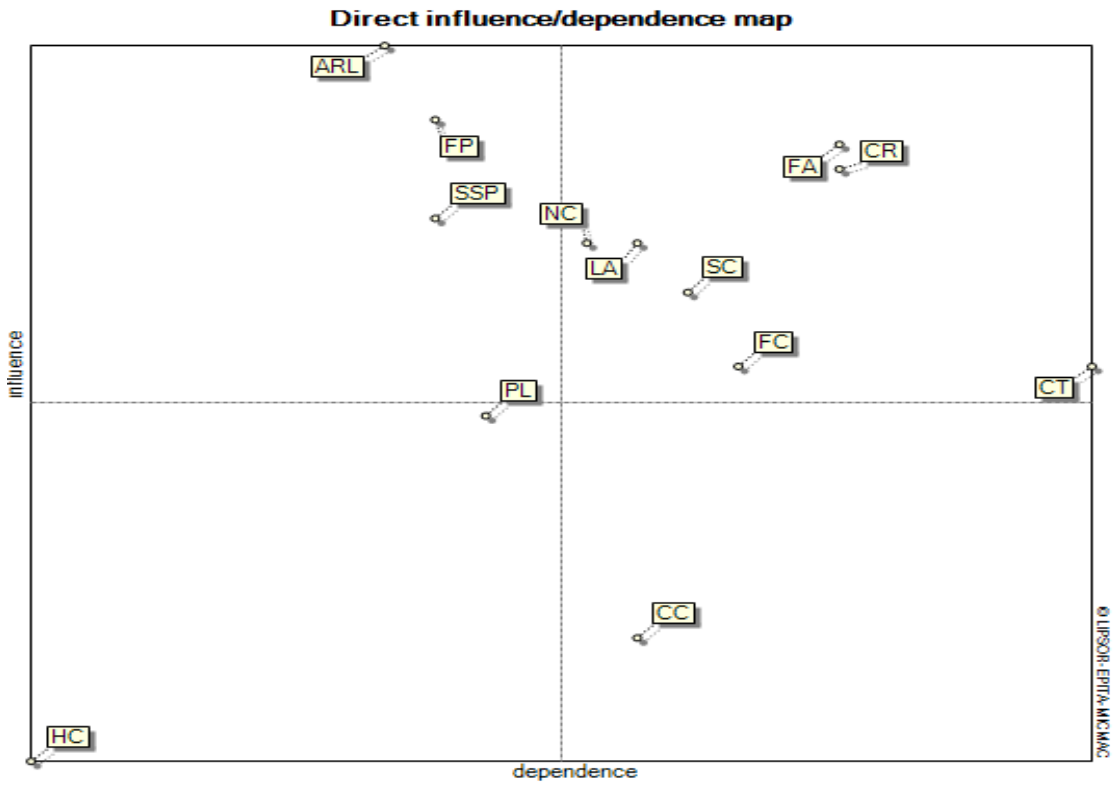

Figure 1
The Results of Direct Influence/ Dependent Map

The role of each emerging variable can be identified in the Direct Influence/Dependence Map as shown in Table 2. Variables present in Quadrant I are triggering or driver variables, namely customary regulations and local wisdom, fertilizer prices, seed assistance,

The role of regional leaders in making Simantri as the foundation for poverty alleviation, unemployment reduction, and improving the welfare of the Balinese community through the broad development of the agricultural sector has also been proven by providing significant attention through the integration of Simantri with other activities in the Bali Province. Simantri products such as organic fertilizers, rice, fruits, and organic vegetables are coordinated with the demand for fertilizer, rice consumption in the local market, and restaurant supplies. Some hotels and restaurants are required to purchase agricultural products (in a broad sense) produced by Simantri's Gapoktan. Financial institutions (both banks and non-bank institutions) are requested to participate in providing

funding for Simantri activities (livestock credit and infrastructure), in addition to cooperation in technological innovation with competent institutions for waste development.

Farmers, in economic terms, are resource managers who manipulate labor, land, capital, and other resources to achieve specific goals. These goals vary depending on the responsibilities of the farmers and sometimes align with their own ambitions for themselves and their families. Generally, farmers do not think about depleting their production from the land, but most of them are oriented towards reasonable "profits". Additionally, almost all "traditional" farmers accept new relevant technologies in any form because they believe that they can become "better" in one way or another and potentially gain more "profits" by adopting those technologies.

Quadrant II variables are highly sensitive variables (passing variables), meaning that if these variables are intervened, they will affect the entire system. These variables include farmer age, facilitator role, land availability, natural capital, social capital, financial capital, and commodity types. The process of human resource development can be questioned in relation to these variables.

Regarding the role of human resources that are developed or built, in order to achieve quality and substantial human resources that align with the objectives and essence of national development. Human resources, which originate from humans, are resources that need to be built and developed. Hasibuan (2003, p. 244) states that human resources are the integrated capabilities of every individual, encompassing physical and mental capacities. The environment and genetics shape their characteristics and behaviors, while the desire to fulfill their satisfaction is supported by work motivation. Every individual possesses human resources consisting of physical and mental capacities. In every activity carried out by humans, or human resources, they become the main element. Skills are acquired through training efforts or learning, while mental capacity is an inherent skill acquired since birth.

In quadrant III, there is the variable of cultural capital. Farmers are the nation's asset in meeting the food needs of the wider society, so in the management of agricultural produce (financial management), it should receive special attention from various

government institutions, ranging from village governments to the central government, in order to improve family economy.

Quadrant IV indicates that the variables with minimal influence on the sustainability of Simantri are policies and human capital. The business experiences of Simantri members are unique, making the Simantri program beneficial for farmers who want to acquire information on land management in accordance with local customs and culture.

Labor (workforce) is the second factor of production in agricultural production processes. In economics, labor is defined as human effort or endeavor undertaken to produce goods or engage in productive activities (Soeharjo and Patong, 1973). Labor in agriculture can be classified into two categories based on its source: 1) family labor and 2) hired labor. The types of agricultural labor can also be examined based on job specialization, physical abilities, and skills in the work.

The following presents the results of the indirect influence relationship between sustainable variables shown in Figure 2

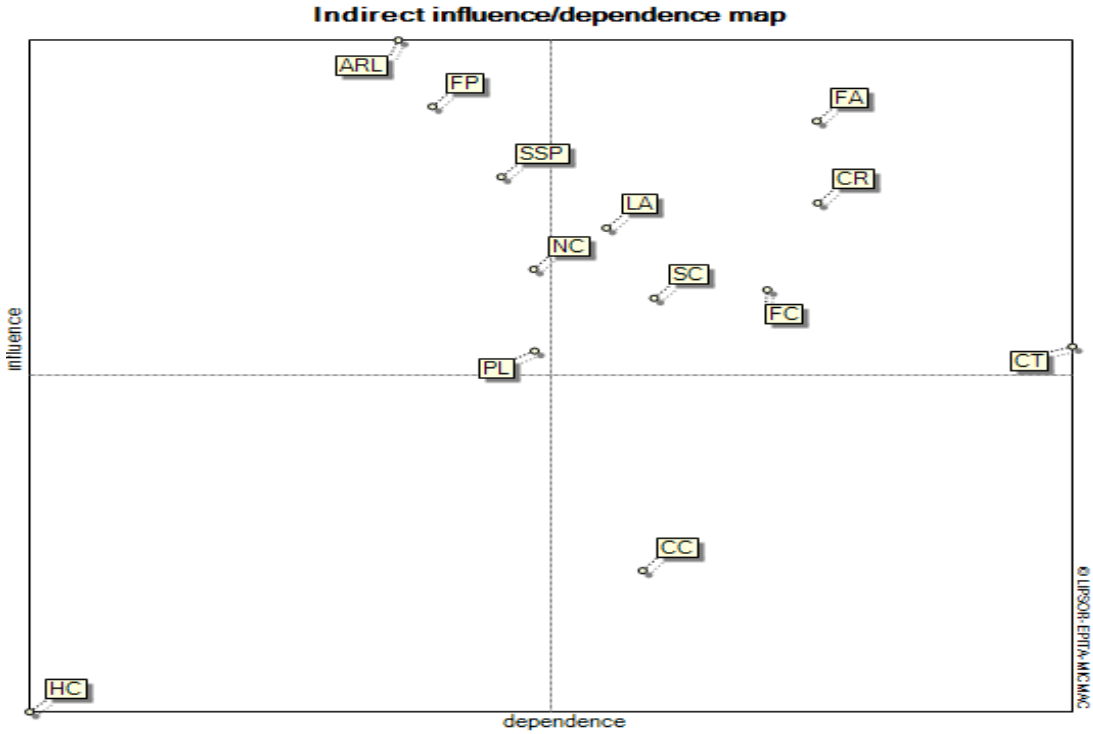

Figure 2
The Results of Indirect Influence/Dependent Map

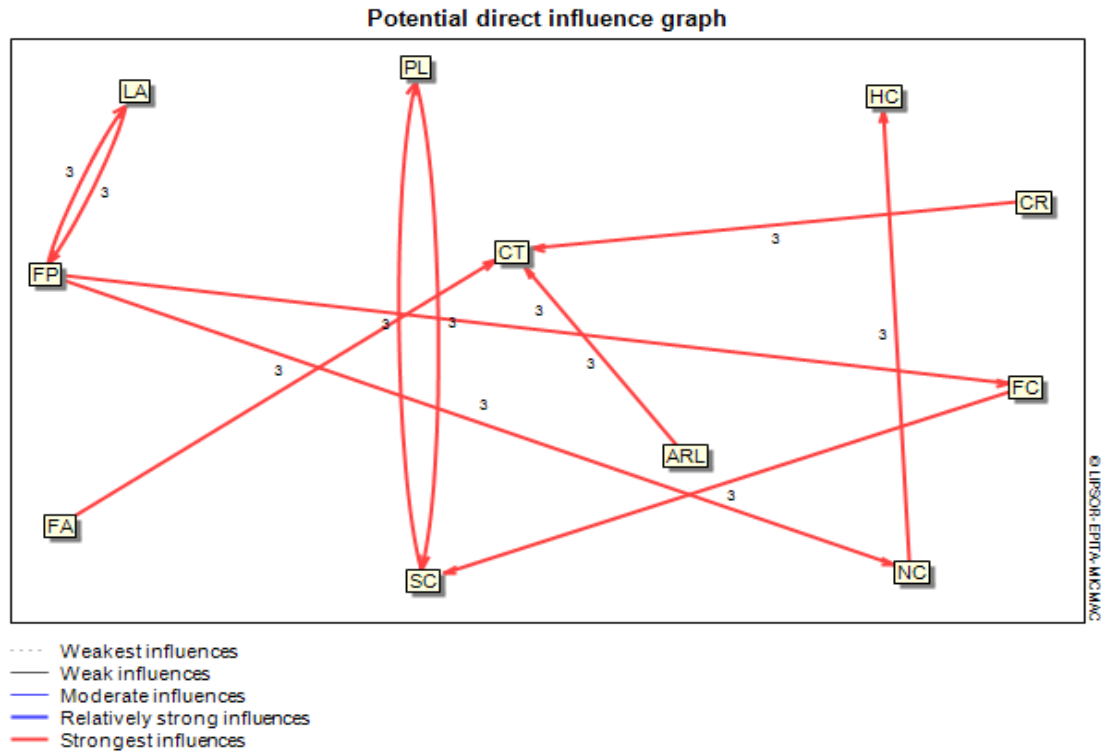

Figure 3
Direct Influence Relationships Between Variables Sustainability

Based on Figure 3, it shows that the specific relationship between variables is still not clearly visible. Therefore, the results of the indirect relationship between variables are presented in Figure 4.

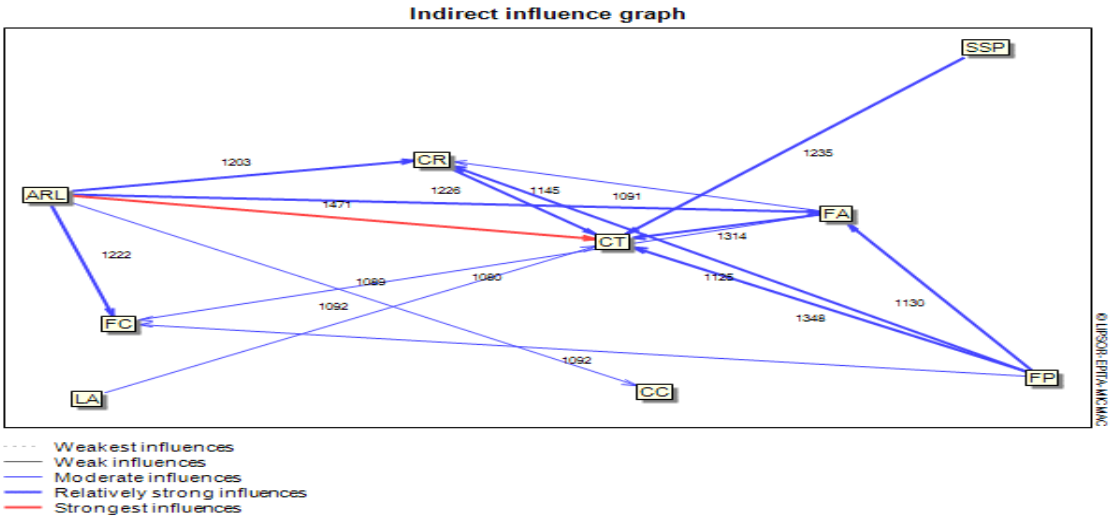

Figure 4
Indirect Influence Relationship among Sustainability Variables

Based on Figure 4, it shows that other variables have relatively strong relationships between variables indicated by blue arrows. Variables that have a very strong indirect influence are indicated by red arrows, namely authenticity towards society. The overall shift of variables from direct to indirect influence can be shown in the displacement map in Figure 4.

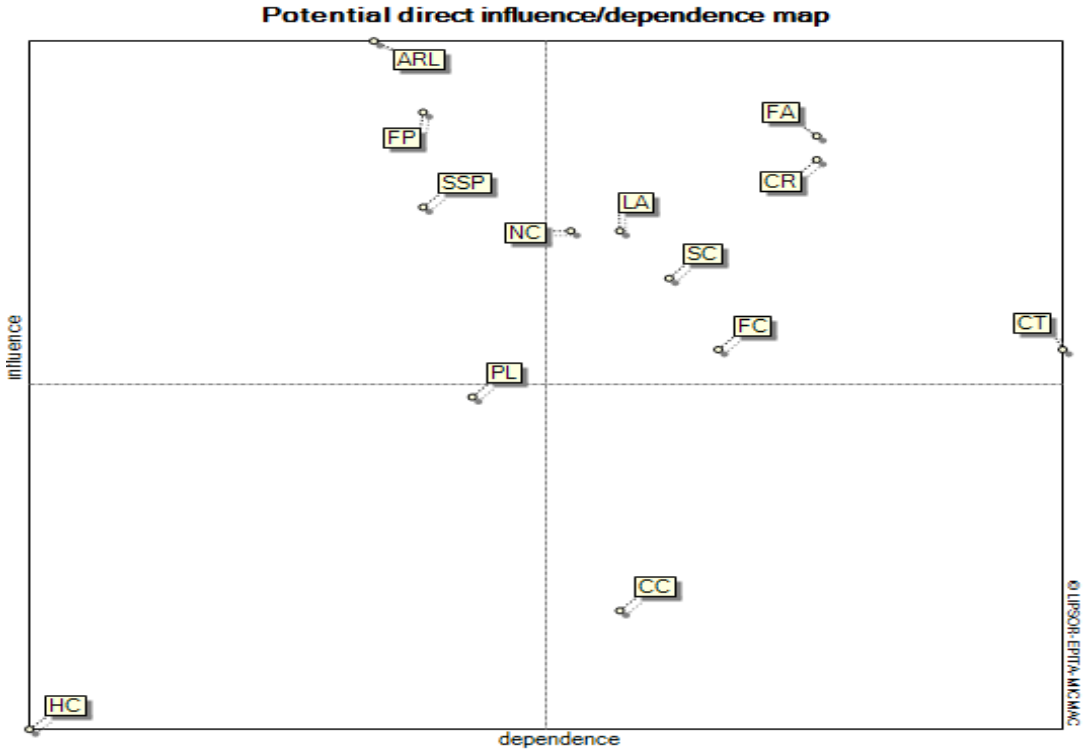

Figure 5
Potential Direct Influence/Dependence Map

Based on the results, the variables that have potential in the sustainability of the Simantri program in Tabanan Regency are customary rules, number of commodities, and farmers' age.

One of the successful aspects in implementing the Simantri schedule is the number of commodities. This refers to the variety of harvests obtained by farmers. Additionally, in terms of farmers' age, younger farmers contribute to better sustainability of the Simantri program, and government policies regarding farmers' welfare can enhance the program's continuity.

CONCLUSION

The conclusion drawn from the analysis results indicates that the key factors for the sustainability of the Simantri program in Tabanan Regency are seedling/seeds/parental assistance, fertilizer prices, natural resources, as well as customary rules and local wisdom.

One successful aspect of implementing the Simantri schedule is the provision of seedling assistance. This seedling assistance serves as an initial capital provided by the government to the Simantri participants. Additionally, in terms of fertilizer prices, it directly affects farmers' productivity in enhancing their livelihood sustainability and considering the available natural resources.

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