

MANGO AGRIBUSINESS DEVELOPMENT STRATEGY FOR SUSTAINABLE AGRICULTURE IN KARANGANYAR

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Abstract:

An agrarian country prioritizes the agricultural sector as its resource because it provides a high and influential contribution to the community, Indonesia is one of a country that has abundant natural resources and its economy depends on the agricultural sector. One of the industries that have the potential to be developed in the plantation sector and can be an aspect of sustainable agriculture is the mango fruit industry. It is necessary to analyze network factors affecting the production of mangoes in Indonesia and provide recommendations and priorities for strategies with the Analytic Network Process to develop sustainable agriculture. Informants are people who come from research locations and are considered the most competent. Priority Alternative strategies obtained by in-depth interviews with experts and processed through the super decision application are Developing Production through Postharvest Training and Improving Facilities (0.331522). These priorities are directly proportional to sustainable agricultural activities, pre-and post-harvest activities that are expected to support and contribute to increasing agricultural productivity profits in the long term, improving environmental quality (not damaging the environment), and as well as welfare of farmers with adequate facilities.

Keywords: Sustainable Agriculture, Analytic Network Process, Mango

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INTRODUCTION

Indonesia is a country that has abundant natural resources and its economy depends on the agricultural sector, so it is known as an agricultural country. An agrarian country prioritizes the agricultural sector as its resource because it provides a high and influential contribution to the community. The agricultural sector is considered very promising if it is supported by fertile land and soil. Most of the Indonesian population living in rural areas live to farm and play an important role in the national economy.

Sutawi (2002) states that agribusiness is a unit of business activities that includes one or all of the chains of production, processing of products, and marketing that have to do with agriculture in a broad sense. The mobilization of the agribusiness sector requires the cooperation of various related parties, namely the government, the private sector, farmers, and banks so that this sector is able to contribute to the country's foreign exchange. Policies in terms of increasing investment must be supported by a conducive investment climate, including bureaucracy, access to credit, as well as a review of tax regulations and tax rates for the agribusiness sector (Gumbira et al, 2005).

One of the industries that have the potential to be developed in the plantation sector is the mango fruit industry, which is a processed form of food or beverages derived from the basic ingredients of mango fruit. In general, mango fruit is in great demand in some circles for typical souvenirs and trading business production. Mango agribusiness has great prospects if it is well developed. Indonesia has a great opportunity to develop mango agribusiness considering the vast supply of land that has the potential to be planted with mangoes, favorable climatic conditions, and the availability of employment opportunities. According to data from the Central Statistics Agency of Central Java (BPS Jawa Tengah 2021), mango fruit is ranked second according to its production

level after bananas. The biggest increase occurred in 2021, where growth was 8.3% from the previous year. This makes mangoes have great potential to be developed.

According to Fiesca's research (2022), around 50-60 percent of Indonesia's population or people live in rural areas. Furthermore, about 70 - 80 percent of this community group includes the poor with traditional and subsystem agriculture, fisheries, and forestry businesses. The condition of farmers in the Karanganyar Regency generally has low incomes. In fact, the production of mango farmers in the Karanganyar Regency is not stable. In many cases, mango farmers in Karanganyar Regency are often affected by plant diseases in their fields, resulting in large losses. However, mango prices often fluctuate so that the selling price of farmers is unstable, causing losses. This situation can affect the income of mango farmers. As with other fruit commodities, the fluctuations in the selling price of mangoes are very high and it is difficult to predict accurately. The problem of price fluctuations makes farmers' selling prices unstable so it becomes a concern for mango farmers because fluctuating price changes can affect their income. Agustian et al, 2003, state uncertainty in the selling price of crops cause farmers to hesitate to implement intensive mango cultivation through increased input farm inputs as recommended.

The current condition of agriculture in Indonesia is a lot of modern agricultural practices, it can have an impact on environmental pollution that can damage soil fertility. The influence of excessive use of fertilizers and pesticides in addition to causing damage to the environment, the necessamaintenance costs are also quite large. This became the idea of developing sustainable agriculture. Sustainable agricultural development aims to increase the income and welfare of the farming community at large through increasing agricultural production which is carried out in a balanced manner by taking into account the carrying capacity of the ecosystem so that production sustainability can be maintained in the long term by minimizing the occurrence of environmental damage (Fadlina et al, 2013).

Table 1. Annual production of fruits and vegetables by plant type in Central Java Province, 2018 - 2021

Kind of Plant	Year (kw/qui)			
	2018	2019	2020	2021
Avocado	445,218	601,450	738,374	757,133
Grape	189	138	235	1,049
Apple	23	31	35	211
Star Fruit	145,194	156,065	180,431	188,723
Duku	225,026	145,650	155,198	151,250
Durian	1,432,270	1,729,390	1,611,878	1,694,937
Water Apple	248,948	269,079	417,318	461,668
Guava	637,159	624,174	1,056,518	1,123,428
Jengkol	109,134	111,270	226,490	133,746
Pomelo	167,400	179,514	138,004	394,188
Orange/Tangerine	460,824	346,991	266,465	228,843
Mango	4,434,872	4,850,413	4,805,727	5,203,714
Mangosteen	158,790	160,681	128,441	83,781
Passion fruit	1,334	1,232	906	-
Melinjo	512,135	508,653	592,930	663,960
Jackfruit	1,418,218	1,484,317	1,611,630	1,580,395
Pineapple	2,028,228	1,736,054	2,522,208	4,132,050
Papaya	1,028,616	1,174,086	1,211,249	1,425,041
Twisted Cluster Bean	924,968	929,985	913,951	1,086,844
Banana	6,138,696	6,215,355	7,946,267	8,056,947
Rambutan	1,137,398	1,080,037	988,350	1,208,995
Snakefruit	4,168,597	4,829,487	4,951,602	4,328,195
Sawo	138,203	129,264	192,275	214,372
Soursop	90,559	95,809	233,368	221,283

Breadfruit	300,038	281,589	442,583	367,880
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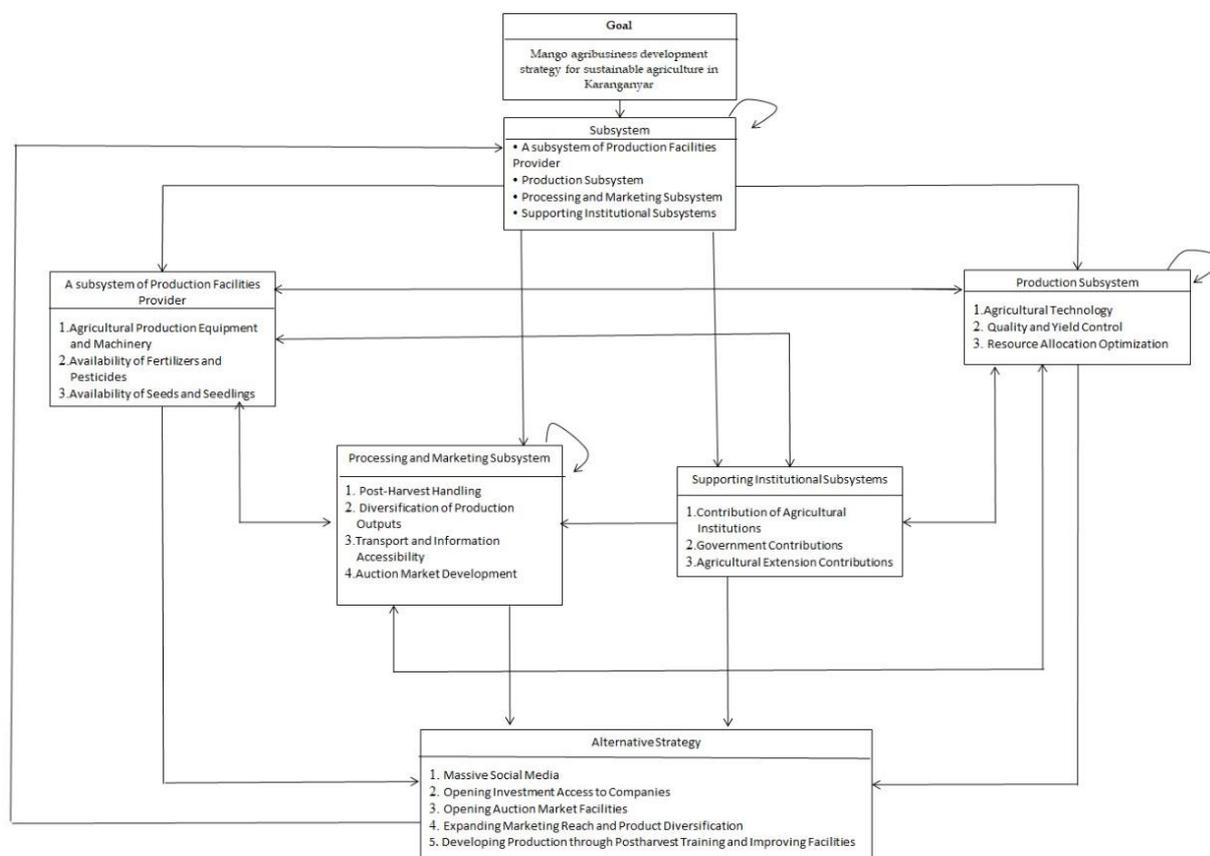
Source: BPS Jawa Tengah 2022

The purpose of this study is to analyze network factors affecting the production of mangoes in Indonesia and provide recommendations and priorities for strategies with the Analytic Network Process to develop sustainable agriculture.

METHODS

The method used is descriptive-analytic. Informants are people who come from research locations who are considered the most competent and willing to be used as a source of information, cooperate, discuss the results of research and provide clues, so that the information obtained is more in-depth (Kasiram, 2010). Informants are determined using judgment sampling techniques. An expert is a person who is considered to know the most about the object of study. The informants in this study were from the Department of Agriculture in Karanganyar Regency which consisted of the Head of Horticulture and Food Crops, the Head of Horticultural Production, and the Head of Processing and Marketing Section. To produce accurate data, the interview method is used directly through in-depth interviews with each informant. The interview results that have been obtained are then concluded by the triangulation method and used in determining the strengths, weaknesses, opportunities, and threats that exist in the Karanganyar Regency in the development of mango agribusiness. Data acquisition was carried out by analyzing by conducting interviews based on questionnaires that were distributed to respondents who had been selected as key informants and through direct observation in the field. The formulation of the strategy was processed using Analytic Network Process, by looking at the priorities. Analytic Network Process is a general theory of relative measurement used to derive composite priority ratios from individual ratio scales reflecting relative measurements of the influence of interacting elements with respect to control criteria (Saaty, 2005). Ascarya et al (2005) states in a network, elements in a component or cluster can be a person. Elements in a component or cluster can affect other elements in the same component or cluster (inner dependence), and can also affect elements in another cluster (outer dependence) by paying attention to each desired criterion in an Analytic Network Process to find out the overall influence of all elements. The result of the Analytic Network Process method is obtained from the calculation of the super decision application 3.2.0. Rater agreement analysis is a measure that shows the level of conformity (approval) of the respondents. ANP framework structure obtained from the agreement with the experts.

Figure 1. Analytics Network process flow and theoretical framework



Source: processed data 2022

RESULT AND DISCUSSION

The priority results of each aspect are presented in the table. In the subsystem aspect, the top priority for the development of mango agribusiness for sustainable agriculture is the Supporting Institutional Subsystem. Furthermore, on the node of the cluster; A subsystem of Production Facilities Provider, the priority is the Availability of Fertilizers and Pesticides. For Production Subsystems, the best priority node is agricultural technology. The priority for the Processing and Marketing Subsystem is the Diversification of Production Outputs. Supporting Institutional Subsystems that play the most role is Agricultural Extension Contributions. Priority Alternative strategies obtained by in-depth interviews with experts and processed through the superdecision application are Developing Production through Postharvest Training and Improving Facilities.

Table 2. Analytic Network Process results

No	Aspects	Normalized by Cluster	Limiting	Ranking	Rater Agreement (W)
Subsystem					
1	A subsystem of Production Facilities Provider	0.26026	0.067617	2	
2	Production Subsystem	0.201342	0.052309	4	
3	Processing and Marketing Subsystem	0.248163	0.064473	3	0.91
4	Supporting Institutional Subsystems	0.28989	0.075314	1	
A subsystem of Production Facilities Provider					
1	Agricultural Production Equipment and Machinery	0.264952	0.030511	3	0.33

2	Availability of Fertilizers and Pesticides	0.374133	0.043084	1	
3	Availability of Seeds and Seedlings	0.275238	0.031696	2	
Production Subsystem					
1	Agricultural Technology	0.375983	0.061687	1	
2	Quality and Yield Control	0.363289	0.059605	2	0.44
3	Resource Allocation Optimization	0.235554	0.038648	3	
Processing and Marketing Subsystem					
1	Post-Harvest Handling	0.251705	0.043604	2	
2	Diversification of Production Outputs	0.271907	0.047105	1	0.22
3	Transport and Information Accessibility	0.203361	0.035230	3	
4	Auction Market Development	0.200172	0.034678	4	
Supporting Institutional Subsystems					
1	Contribution of Agricultural Institutions	0.308433	0.048546	2	
2	Government Contributions	0.258283	0.040653	3	0.33
3	Agricultural Extension Contributions	0.422891	0.066560	1	
Alternative Strategy					
1	Massive Social Media	0.120027	0.015592	5	
2	Opening Investment Access to Companies	0.134843	0.017516	4	
3	Opening Auction Market Facilities	0.173441	0.022530	3	
4	Expanding Marketing Reach and Product Diversification	0.254916	0.033114	2	0.84
5	Developing Production through Postharvest Training and Improving Facilities	0.331522	0.043065	1	

Source: Data Processed

Subsystem

Supporting Institutional Subsystems ranked first in the subsystem criteria. Tedjaningsih et al (2018) state institutional is a supporting subsystem for the procurement of production facilities, farming, processing of products, and marketing. So that the existence of farmer groups as part of agricultural institutions will of course greatly help farmers in utilizing the assistance provided by the government, because if farmers continue to survive with the old pattern, namely by relying on individual systems, it will be difficult to be able to access all kinds of agricultural facilities provided by the government. Through the role of institutions, the process of disbursing aid funds from other financial institutions and institutions can be carried out more easily because of the scale of the group. And the bank also has confidence because the lending system is carried out through an institutional role.

Availability of Fertilizers and Pesticides

Fertilizer and pesticide subsidies are one of important factors determining agricultural production. Fertilizer and pesticide subsidies are intended to ease the burden on farmers, as well as a process of transferring technology to farmers to use superior seeds and balanced fertilization at affordable prices, so that production and productivity increase. Fertilization is important to do when the plant is not yet productive and after the age of the plant has entered the productive age, namely after harvesting and /or after heavy lifting.

Currently, farmers in Karanganyar Regency have never received fertilizer and pesticide subsidies, this is because mangoes are not a strategic staple. The horticultural subsector that received fertilizer subsidies in 2022 consisted of chili, shallots, and garlic. This is an obstacle for mango

farmers in Karanganyar Regency; because they work on their production facilities using personal funds so they cannot maximize their production. The availability of agricultural production facilities in the form of seeds, fertilizers, pesticides, and also capital is a factor that influences farmers' decisions in applying off-season technology.

Agricultural Technology

Mango farmers in Karanganyar Regency do not yet have the technology to develop production. Mango fruit has a high potential if it is to be developed. However, there is a need for time and energy efficiency to support productivity to be more efficient. This efficiency is in the sense of developing the company with technological investments, in the form of mechanical equipment. Using mechanical equipment, efficiency can be easily achieved. Horticultural production needs to be supported by the application of appropriate technology in accordance with the needs of farmers. The availability of appropriate technologies is an important part of encouraging the interest of farmers to apply them at the required level. The application of technology is also necessary to optimize the quality of products produced by farmers.

The use of information technology needs to be encouraged to align Indonesian horticulture with world horticulture which has built its competitiveness first. The potential for the application of smart farming in Indonesian horticulture is very open and needs to be developed massively to increase. According to Lestari (2020), smart agriculture is a cutting-edge agricultural system supported by today's technology to support the productivity of agricultural products to be maximized, this system aims to regulate and predict crop yields and problems faced by farmers.

Diversification of Production Outputs

Diversification is a business that is often taken by rural farmers. The situation that supports the implementation of this strategy is that if there are no more growth opportunities for mango products or market share begins to decline, consumers are unstable, and the impact on the rise or fall of sales or profits, and farmers optimize their land by means of such diversification. Processing new products by diversifying them are very important for the survival of farmers and companies, so companies or farmers need to diversify products to maintain income balance. Diversification of new products has a large role to play in economic growth and is often an overall contributor to the business being pursued. Cravens (1996) states the successful diversification of production output is closely related to the attractiveness of the industry (market), favorable market entry costs, and opportunities to increase competitive advantage.

Grant (1999) argues that, if a company that diversifies products, allocates resources, monitors and supervises operational managers more effectively compared to market systems in the long run, a diversified company or map will show greater profits and faster growth compared to specialized companies. Based on the description above, product diversification can be used as an alternative for companies and farmers to be able to increase their sales, and expand market reach and it is important for companies to hold planned and sustainable product diversification because of the positive influence between the introduction of new products and increased sales (Khamidi, 2013).

Agricultural Extension Contributions

Low human resources in the agricultural sector are a special concern for extension workers in building awareness of better farming agricultural extension is a process of education and learning with a non-formal education system to organize and change the behavior of farmers in order to have better knowledge, skills, and attitudes in accessing markets, technology and, capital so that decision-making from various alternative knowledge with increasing self-capacity to solve problems in an effort to improve their welfare. Agricultural extension is an important key in an effort to prosper the people who work in the agricultural sector in rural areas. Agricultural extension is an important key to change that directly relates to farmers.

Alternative Strategy

The priorities of alternative strategies are; 1. Massive Social Media, 2. Opening investment access to companies, 3. Opening Auction Market Facilities, 4. Expanding Marketing Reach and Product Diversification, and 5. Developing Production through post-harvest Training and

Improving Facilities. As a result, the most prioritized alternative strategy is to develop products through postharvest training and improve facilities. These priorities are directly proportional to sustainable agricultural activities, pre-and post-harvest activities that are expected to support and contribute to increasing agricultural productivity profits in the long term, improving environmental quality (not damaging the environment), and improving the welfare of rural communities with Integrated Pest Control. However, there is a need for time and energy efficiency to support productivity to be more efficient. This efficiency is in the sense of developing the company with technological investments, in the form of mechanical equipment. By using mechanical equipment, efficiency can be easily achieved and need guidance from agricultural extension workers so that the use of facilities does not damage the environment.

CONCLUSION

The purpose of this study is to find out the priorities in each aspect under study by conducting in-depth interviews with 3 experts who are truly experts in their fields. The results of the data obtained are accurate data because they use the rater of the agreement to ensure how homogeneous the data will be analyzed, the more homogeneous the agreement of the experts is fulfilled. From the results of the analysis for the Criteria of the subsystem, the most influential subsystem on mango development for sustainable agriculture is the Supporting Institutional Subsystem. Tedjaningsih et al (2018) state institutional is a supporting subsystem for the procurement of production facilities, farming, processing of products, and marketing.

The priorities of alternative strategies are: 1. Massive Social Media, 2. Opening investment access to companies, 3. opening auction market facilities, 4. expanding marketing reach and product diversification, and 5. developing production through post-harvest training and improving facilities. The most prioritized alternative strategy is to develop products through postharvest training and improve facilities.

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