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Towards feasibility and sustainability of chrysanthemum cut flowers farming: Evidence from Pasuruan Regency, Indonesia

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ABSTRACT

The chrysanthemum commodity has shown a marked increase in the demand for decorations, ornaments and ceremonies service business in urban areas. This has raised attention to the feasibility and implications of sustainable production at the farm level. This study aims to measure the economic feasibility and sustainability of the chrysanthemum farm business. The study was carried out by surveying 24 chrysanthemum farmers in the village of Tutur, Tutur District, Pasuruan Regency. The analysis method used farming feasibility and multidimensional scaling (MDS) approach of Rapfish. The results of the study found the criteria for chrysanthemum cultivation of R/C ratio and ROI of 2.58 and 1.58, with profit equivalent to 126.66 million rupiahs per month per hectare. The study also found that the sustainability index in the dimensions of the social, economic, institutional, and environment was 62.74, 57.76, 57.48 and 51.66; all of which are categorized as fairly sustainable. In those dimensions, it was found that the most important attributes influencing sustainability were land conversion, farmers' network in chrysanthemum cultivation, access to business capital and changes in market trends. Further research suggests strengthening farmer group institutions, implementing innovation and developing sustainable tourism areas.

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INTRODUCTION

Horticulture as an agricultural product is seen as a potential source of growth to be developed in the agribusiness system because it has high linkages both to the upstream and downstream sides. It covers all activities in the agricultural sector, from providing production inputs to product processing and marketing.

Floriculture plants are one of the horticultural commodities that have great potential to be developed as an effort to grow the regional and national economy. Flower plants have become a global agricultural business venture, relying on innovative trends and niches to help increase product sales (Darras, 2021) such as roses, carnations, gerberas, and chrysanthemums. Of the various types of floriculture plants that exist, chrysanthemum has good agribusiness prospects and provides high economic opportunities.

The progress of development in various fields encourages the decoration and ceremony service industry to develop rapidly in various regions in Indonesia. According to Darras (2021) the cut flower industry is able to meet the challenges of demand for innovation and new products through dynamic

marketing campaigns. The chrysanthemum business is highly dependent on market demand and prices (Putra et al., 2019). Wijayani et al. (2017) found that the largest consumer of cut flowers came from office workers and loyal customers. Events such as weddings, new year, Eid, or certain ceremonies request decoration services from flower material, cut leaves or a series of pot plants (Lintang et al., 2020). In addition, public awareness of the need for green open space, especially in urban areas, is a great opportunity for the development of nurseries in various areas to provide potted plants and landscapes.

The prospect of rising demand for ornamental plant commodities will have an impact on market opportunities for business people. The increase in the flower business will spur the economy of rural communities, improve the standard of living of farmers, increase the country's foreign exchange, and open up job opportunities. The number of cut flower producers is increasing every time, indicating that the market share is still relatively open. In addition, the increasing public knowledge about the benefits and uses of cut flowers in big cities triggers the development of the cut flower industry.

Considering that the demand for ornamental plants, including chrysanthemum, continues to grow both for domestic and export needs, ornamental plants can be positioned as important trading commodities in the country and in the global market (Darras, 2021). Meanwhile, during the last few years, floriculture business actors have grown from small to medium scale. Floriculture production centers need to be nurtured through an efficient, sustainable and competitive scale of garden management.

In 2020, chrysanthemum production reached 383,466 million stalks with a harvested area of 836.96 hectares. Provinces with the largest production of chrysanthemum were West Java, East Java, and Central Java, with the contribution of production of 140.06 million stalks (36.52%), 121.18 million stalks (31.60%) and 111.38 million stalks (29.05%). The chrysanthemum harvested areas of the three provinces were 166.37, 495.31 and 165.06 hectares, respectively. The export value of chrysanthemum reached US$733 thousand, with the main export destination of Japan with 43 tons worth US$732,064. Meanwhile, the import value of chrysanthemum reached US$19,000, especially from China which reached US$18,917 (3 tons) (BPS, 2020).

In East Java, chrysanthemum production in 2020 was contributed mainly by Pasuruan and Malang Regencies, with 93,783 and 4,683 million stalks, respectively (BPS Malang Regency, 2021; BPS Pasuruan Regency, 2021b). This makes Pasuruan Regency a center for chrysanthemum development in East Java, in which the potential to meet increasing market demand is very open for development.

Tutur Village in Pasuruan Regency is one of the main production centers of chrysanthemum plants. The village has optimal ecology for chrysanthemum farming, especially fertile soil, altitude, and cool air temperature. Chrysanthemum farming in Tutur village grows rapidly, gaining support from institutional, social, and economic factors. The chrysanthemum cultivation atmosphere in Tutur village is supported by cultivation experience, innovation, market access, and infrastructure support.

However, the chrysanthemum cultivation business in Tutur village also has numerous problems. Field conditions show that chrysanthemum cultivation faces several obstacles, including small business scale, limited capital, limited quality seeds, and weak production and marketing management. This indicates the uncertainty of business sustainability. Many studies on chrysanthemum have been carried out, including in terms of the supply chain (Putra et al., 2019), business feasibility and risk (Chrisdiyanti & Yuliawati, 2019; Fadlilah et al., 2020), description and business strategy (Fadlil et al., 2020; Helmiatin & Susanty, 2019), technology implementation (Hayusman et al., 2019; Lintang et al., 2020), market perception (Wijayani et al., 2017), and global trade (Darras, 2021). The studies provide important findings regarding the optimistic prospects of chrysanthemum, the importance of technology and access to capital. However, they do not focus on the sustainability of the chrysanthemum business.

A more comprehensive study on sustainability seen from the institutional, social, economic and environmental aspects will be able to describe in more detail the chrysanthemum business in Tutur village. A comprehensive approach needs to be taken to map the scope of agribusiness (Chengappa, 2018) to detect the extent to which farmers receive benefits or costs, the constraint factors, and what needs to empower them. An integrated approach involving the government, farmer associations and other concerned parties so that the floriculture business or business is

efficient, competitive, and provides farmer welfare (Putra et al., 2019).

This study aims to analyze the economic feasibility and evaluate the sustainability of chrysanthemum farming in Tutur village in Tutur district, Pasuruan regency.

RESEARCH METHOD

The research was conducted in Tutur Village, Tutur District, Pasuruan Regency. The location selection was done deliberately with the consideration that the area is a production center area, and that the cut chrysanthemum is one of the leading ornamental plants in Pasuruan Regency.

The research was carried out through interviews with chrysanthemum farmers using a closed-ended question questionnaire. A total of 24 respondents were selected randomly to obtain variables and attribute concerning institution, social, economic and ecological characteristics of the chrysanthemum farming (Table 1). Secondary data were obtained from documents from the Pasuruan Regency Agriculture Office and relevant agencies.

The research objective was operationalized through the feasibility method of farming and the multidimensional scaling (MDS) approach. The economic feasibility analysis method of farming used the criteria of cost and revenue analysis, Revenue Cost Ratio (R/C Ratio), and Return on Investment (ROI). The variable costs and revenues were obtained from farmer respondents.

Table 1. Research Variable and Attribute

	Variable and attribute	Criteria	
		Good	Bad
	Institutional		
O6	Government policies to support flowers farming	4	1
O9	Tourism policy boosts domestic demand for cut flowers	4	1
T2	High competition with imported products in the free market era	1	4
T3	Changes in economic and political conditions affect price stability	1	4
T4	Market trends are changing rapidly affecting production	1	4
T1	The free market will suppress the domestic market	1	4
T8	Government support for floriculture business is relatively low	1	4
	Social		
O2	Not many farmers have developed chrysanthemums	4	1
S8	Lot of resources to support the chrysanthemum cultivation	4	1
T5	Many farmers cultivate ornamental plants	1	4
TK3	Labor costs of chrysanthemum cultivation	1	4
S4	A lot of farmers are engaged in chrysanthemum cultivation	4	1
W8	Marketing of chrysanthemum is done individually by farmer	1	4
P3	Area size of chrysanthemum cultivation	4	1
	Economy		
S1	Farmers' skill in chrysanthemum cultivation technology	4	1
P7	Production quantity of chrysanthemum	4	1
P6	Seeds cost of chrysanthemum cultivation	1	4
O3	Improved technology in cultivation and postharvest	4	1
T7	Obstacles for a business capital access	1	4
P4	Greenhouse cost	1	4
W9	The price of chrysanthemums tends to be low during the main harvest	1	4
O1	The demand for chrysanthemums is increasing in outside city	4	1
O8	The demand for chrysanthemums is increasing in big cities	4	1
W6	Cultivation technology depends on import product	1	4
	Environment		
S2	The period for cultivation is relatively short and throughout the year	4	1
O7	Local varieties are available in abundance and quality	4	1
P5	Pesticides cost of chrysanthemum cultivation	1	4
P1	The water irrigation cost of chrysanthemum cultivation	1	4
P2	Electricity costs of chrysanthemum cultivation	1	4
T6	Land conversion from agricultural to non-agriculture land	1	4
S3	Cultivation technology produces very bright chrysanthemum colors	4	1
O5	Expansion of chrysanthemum cut flower business in other locations	4	1
W5	Seed degeneration of chrysanthemum cultivation	1	4
S5	Chrysanthemum cultivation technology is relatively simple to do	4	1

The MDS analysis method used the Rapfish software application to calculate the sustainability index of each variable (Table 1) to find sustainable farming adjusted for the sustainability category (Table 2). Furthermore, the MDS method also measured the leverage index to identify which indicators (Table 1) were levers or critical, to determine sustainability farming. Indicators were obtained from farmer respondents, who gave close-ended answers on an ordinal scale of 1 to 4 (Likert scale).

Table 2. Sustainability Level Category

Index Value	Category	Sustainability Level
00.00 - 24.99	Bad	Not Sustainable
25.00 - 49.99	Less	Less Sustainable
50.00 - 74.99	Enough	Fairly Sustainable
75.00 - 100.00	Good	Sustainable

Source: (Pitcher & Preikshot, 2001)

RESULT AND DISCUSSION

Overview of Research Area

Tutur is one of the 24 districts in Pasuruan Regency, sitting at the geographical position of 7.30° - 8.30° South and 112°30° - 113°30° East latitude. Tutur District occupies an altitude of 300-1,600 m above sea level couple with wavy and hilly physiography, with 3,448 mm of rainfall and 129 rainy days in a year. With climatic and ecological conditions suitable for floriculture planting, Tutur District is the center for cut chrysanthemums production in East Java (BPS Pasuruan Regency, 2020).

Chrysanthemum production in 2019 reached 93,753 million stalks, up from 86,247 million stalks in 2016 (BPS Pasuruan Regency, 2021a). Chrysanthemum production in Pasuruan regency is only found in Tutur district. More than 7 groups of farmers work on 30 hectares of land area, where each group consists of 10-25 farmers spread over the villages of Blarang, Tlogosari, Gendro, Andonosari, Kayukebek, Ngadirejo and Tutur villages.

Chrysanthemum cultivation has developed in 20 years. This builds farmers' experience in mastering cultivation technology and number of skilled workers. The experience shapes people's competence and innovation to make Tutur District a center for chrysanthemum production, producing standard and spray types of chrysanthemums. Chrysanthemum plant growth until harvest is 8-12 weeks depending on the variety and season. In the dry season, chrysanthemum flowers are harvested at 8-11 weeks, while in the rainy season the harvest is 12 weeks.

Tutur Village is one of 12 villages in Tutur sub-district. It has an area of 3.42 sq. km, inhabited by 5,477 residents (BPS Pasuruan Regency, 2020). As the capital of the sub-district, the availability of infrastructure, market access, and production factors are very adequate so that the chrysanthemum farming business in Tutur Village is more advanced than in other villages. The increase in chrysanthemum production is due to the application of drip irrigation cultivation technology, the use of superior seeds and balanced fertilization, the development of chrysanthemum gardens, and the support of the government budget. The marketing of chrysanthemum reaches various areas such as Surabaya, Malang, Bali, Jakarta, and Makassar.

Characteristics of Respondents

The age of most farmer respondents ranges in the 41-50 years' group, i.e. as many as 54.2% of the total 24 respondents. Meanwhile, the most experience in farming chrysanthemum was found in the group of 5-10 years or 66.60% of all respondents. Respondents with work experience of 10-15 years and 15-20 years were 4 people or 16.70%. The distribution of farmers' education level was found to be highest at the high school level (66.70%), followed by university (25%) and junior high school (8.30%) (Table 3).

Characteristics of age, work experience and education can reflect the attitudes and behavior of farmers in running a farming business. Age level can affect farmers' physical and thinking abilities at work. According to Soekartawi (1990), young age reflects the spirit to recognize new things and adopt innovations and develop farming business.

The farming experience reflects expertise, skill, and innovation. Farmers with experience are also able to analyze problems and find solutions for their business ventures. Time will shape the maturity to face problems and find the skills to innovate in a fast-changing business venture.

The influence of education is it strengthens management and enables farmers to recognize the scope of business ventures. The chrysanthemum business must deal with dynamic market conditions. It is not surprising that university graduates are involved in the chrysanthemum business, because they can identify input innovations to marketing that require complex analysis. The chrysanthemum business deals

with modern services, which generate high added value because it requires service management that emphasizes speed and customer satisfaction.

Table 3. Characteristics of Respondents

Variable	People	Proportion %
Age		
31-40 years	4	16.70
41-50 years	13	54.20
>50 years	7	29.10
Education level		
Junior High School	2	8.30
Senior High School	16	66.70
University	6	25.00
Working experience		
5-10 years	16	66.60
10-15 years	4	16.70
15-20 years	4	16.70
Land size		
<500 m^2	9	37.50
500-2,000 m^2	11	45.83
2,000-4,000 m^2	2	8.33
>4,000	2	8.33
Production		
<25,000 stalks	9	37.50
25,000-100,000 stalks	11	45.83
100,000-500,000 stalks	3	12.50
>500,000 stalks	1	4.17

Furthermore, the average land area for chrysanthemum cultivation is 1,579 m2 per respondent. The highest land distribution was found in the area of 500-2,000 m2, as many as 45.8% of respondents. As many as 83.3% of respondents have a land area of fewer than 2,000 m2, which indicates a relatively small land area. This also has an impact on the low average production of 85.873 stalks per respondent, with productivity rate of 54.38 stalks per m2.

The cultivation of chrysanthemums in the village of Tutur characterizes modern agriculture. The scope or supply chain of production to the market affects the lives of farmers (Putra et al., 2019). Characteristics of respondents indicate a change in life towards modern society, especially with regard to technology and social organization (Rifkian et al., 2017). Changes in 20 years have shaped the attitudes and behavior of farmers to quickly adapt to market demands and needs and accumulate chrysanthemum farming competencies.

Feasibility of Farming Business

The cost and income analysis calculations are presented in Table 4. Production costs in chrysanthemum cultivation include variable costs (seeds, fertilizers, pesticides, equipment depreciation, and labor costs) and fixed costs (depreciation, electricity and water). The average cost per season incurred by each respondent was 31,635,789 rupiah. Meanwhile, the average production per respondent was 2,060,950 flower stalks, and with a unit price of 950 rupiah per stalk, the revenue was 81,579,271 rupiah and profit was 49,943,482 rupiah. This study found the R/C ratio and ROI of 2.58 and 1.58, respectively.

Table 4. Chrysanthemum Farming Costs and Revenue

Variable[1]	Value
Average fixed cost (rupiah)	
Depreciation of materials	4,156,875
Electrical installation	372,708
Water installation	677,708
Average variable cost (rupiah)	
Seed	20,920,313
Fertilizer	2,566,935
Pesticide	1,995,833
Labor	945,417
Average total cost (C)	31,635,789
Number of respondents	24
Total production (stalk)	2,060,950
Average production (stalk)	85,872
Price (rupiah/stalk)	950
Total revenue (rupiah)	1,957,902,500
Average revenue (rupiah) (R)	81,579,271
Average profit (rupiah) (π)	49,943,482
R/C Ratio (R/C)	2,58
ROI (π/C)	1.58

[1]Calculation on the average of each respondent

These results indicate that chrysanthemum farming is very profitable. This research shows that with an average land area of 1579 m2, it can generate a profit of almost 50 million rupiah (rounded off) within 10 weeks (average harvest age), or equivalent to 20 million rupiah per month. If it is converted in a matter of one hectare, then farmers will get a profit equivalent to 126.66 million rupiah per month.

This study is alike as the findings (Chrisdiyanti & Yuliawati, 2019) in Badungan, Ungaran, Central Java, which found a profit of 133.40 million rupiah and an R/C ratio of 1.71. Meanwhile Fadlilah et al. (2020) discovered an R/C ratio of 1.90 in Batu City, where production is significantly affected by seeds, chemical fertilizers and labor. Cost is a focus in the chrysanthemum business supply chain. Chrysanthemum farmers in Bandungan, Semarang, generally accept the burden of transportation costs to retail traders in direct marketing (Putra et al., 2019). The conspicuous problem faced by farmers is the high cost although this study found a relatively high ROI

(1.58). They had to expense costs through various efforts to manage their business. Therefore, the experience of farmers is vital to anticipate access to costs, cultivation management, market access and to reduce the high business risk due to these high costs.

Sustainability of Farming Business

The sustainability index of the variables of Institution (I), Social (S), Economic (Ec), and Environment (Ev) was categorized into a fairly sustainable level (Table 5), or as displayed in the form of radar (Figure 1). Meanwhile, the Monte Carlo test results show no significant difference compared to the sustainability index. This result shows that the sustainability index meets reliability and is stable.

Table 5. Sustainability Index of Variable

Variable	Value[1]	Sustainability Level[2]
Institution	51,66	Fairly Sustainable
Social	57,76	Fairly Sustainable
Economic	57,48	Fairly Sustainable
Environment	62,74	Fairly Sustainable

[1]Reliability test using the Monte Carlo method on each variable shows a difference of no more than 1 unit
[2]0 - 24.99: Not Sustainable; 25 - 49.99: Less Sustainable; 50 - 74.99: Fairly Sustainable and 75 - 100.00: Sustainable (Pitcher & Preikshot, 2001)

This research shows that the environmental dimension indicated the highest sustainability (62.74), while the institutional aspect indicated the lowest sustainability (51.66). This signifies that the management of chrysanthemum farming in the environmental dimension ran most optimally. The involved attributes worked well in support of sustainability. On the other hand, the management of chrysanthemum farming in the institutional dimension worked less than optimally. Institutional attribute performance did not function to produce sustainability. Meanwhile, the social and economic dimensions show performance in the range between the institutional and environmental dimensions. A study by Parmawati et al. (2021) showed fairly sustainable farming shallot on the institutional and social dimensions of 52.9 and 60.47. Meanwhile, another study (Suryana et al., 2012) found 34.53 to 44.40 for the similar dimension in the red snapper fishery.

The sustainability index reflects the ability of resource attributes to support the extent to which resource functions work. Jowsey & Kellett (1995) stated that resource sustainability is contributed by ecological attributes that characterize recyclability/ depletability, longevity and environmental impact. It can also be adapted to the sustainability of the social, institutional and economic dimensions, and of course the interactions between them. The ability to recycle can be seen as the degree of adaptation to the extent to support the function of a resource.

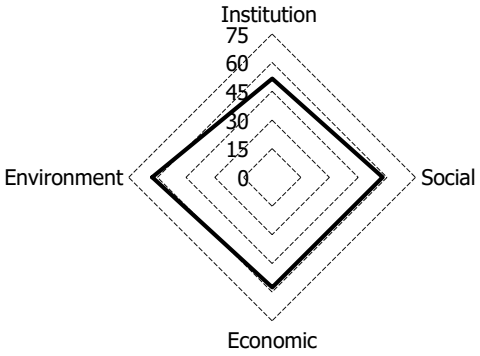

Figure 1. Sustainability index in the radar pattern

To complete the sustainability index, leverage measurement can further explain which attributes as leverage for the benefit of chrysanthemum business management sustainability. Attributes in a dimension are calculated from the leverage number, which is the percent change in Root Mean Square. Leverage shows the changes that occur when the attribute is released. The focus is to scrutinize at attributes that have the high leverage values. The higher the leverage indicates the more important or needed attribute to maintain sustainability.

The institutional dimension attribute leverage is presented in Figure 2. Three attributes with the highest leverage were found, i.e. the ever-rapidly changing market trends (4.52%), government support for floriculture businesses (3.93%), and tourism policies that encourage demand for chrysanthemums (3.87%). These attributes were an important requirement to support the chrysanthemum business. Cultivation of chrysanthemum is a new thing for the villagers. It has not been 20 years and there has been no local culture developed yet. Although it has provided benefits and welfare, in this study chrysanthemum cultivation is highly dependent on external institutions, especially demand and market prices (Putra et al., 2019). A study (Muryanti, 2020) indicated the need to establish local institutions to strengthen and buffer the implications of external influences. Helmiatin & Susanty (2019) argued that

the external factors of the chrysanthemum business are very dynamic, therefore farmers need organizational strengthening to manage the internal and external dynamics of their business.

Three attributes with the highest leverage on the social dimension (Figure 3) were the substantial number of farmers engaged in chrysanthemum cultivation (8.80%), the many farmers cultivating ornamental plants (8.69%), and the individual marketing (8.55%). The findings of this social dimension show an emphasis on competition and synergy. Chrysanthemum farmers have so far shown competition for the market, and therefore it is a positive thing to communicate with each other, filter information and improve the quality of cultivation and products. However, those have not been realized; instead, they worked individually and have not tried to build joint marketing, thus reflecting a weak bargaining position. Chrysanthemum agribusiness does not seem to reflect incentives for increasing cultivation quality and reasonable prices, as studies have shown (Irawan, 2016; Kahmir et al., 2008).

Owner farmers always cooperated with farm laborers because they both need each other. Farm workers needed agricultural land from the owner farmers, while the owner farmers need farm laborers to work on land that they cannot work on themselves. The more owner farmers give trust to farm workers to work on their land, the greater the expectations of farm workers to work and earn income (Rifkian et al., 2017).

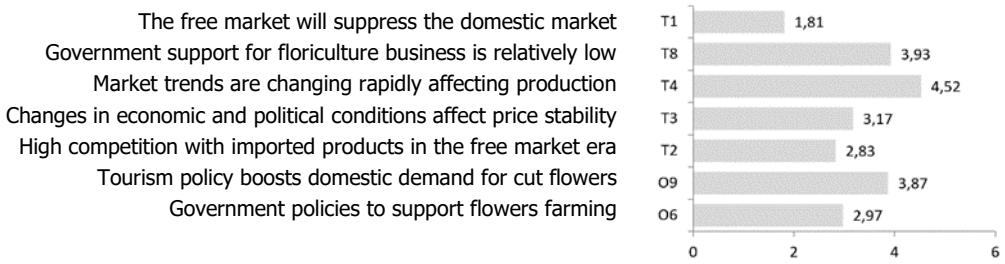

Figure 2. Leverage attribute for the institution dimension

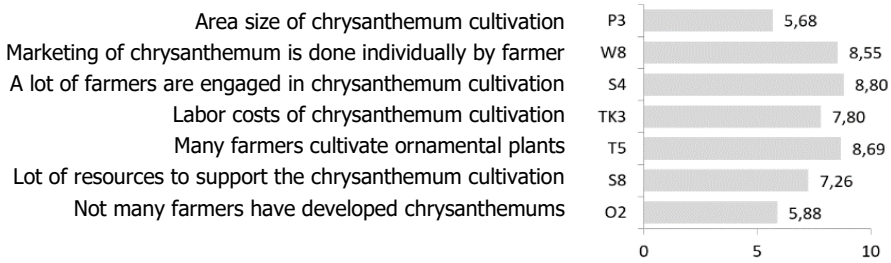

Figure 3. Leverage attribute for the social dimension

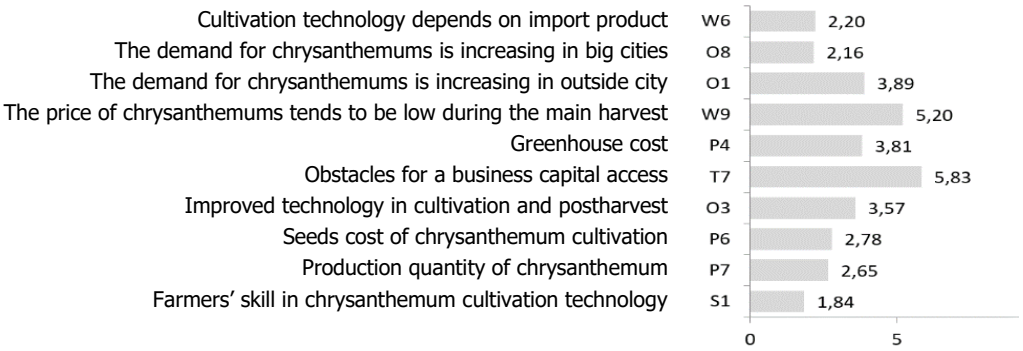

Figure 4. Leverage attribute for the economic dimension

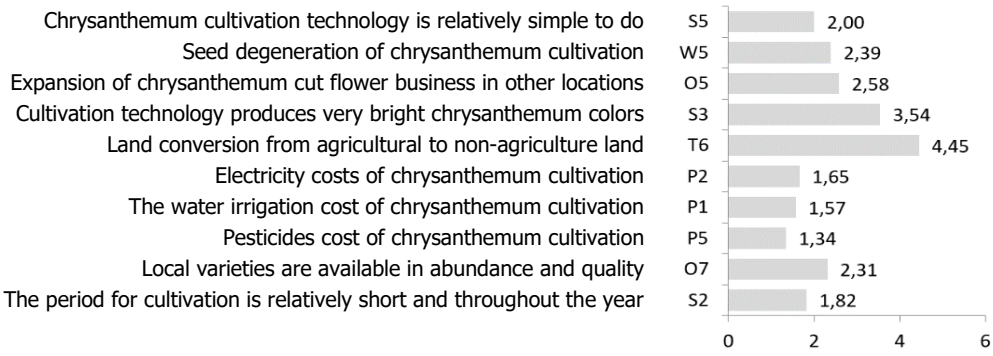

Figure 5. Leverage attribute for the environment dimension

The attribute leverage in economic dimension is presented in Figure 4. Two attributes with highest leverage were the application for business loans in agriculture (5.83%) and the price of chrysanthemum interest falls during the main harvest (5.20%). These two attributes were commonly found in horticultural agribusiness in Indonesia. Chrysanthemum cultivation requires high capital so that careful production management is vital to reduce the risk of loss, including the risk of harvest prices. Farmers should make the right decisions to prevent the risk of these losses (Irawan, 2016; Kahmir et al., 2008), especially since the influence of market demand and price is very robust on the chrysanthemum business, and farmers often receive relatively low prices in the supply chain (Putra et al., 2019).

Meanwhile, the attributes with the highest leverage on the environmental dimension (Figure 5) were the shift in the function of agricultural land to residential areas (4.45%) and the bright flower colors due to the altitude of the place (3.54%). These two attributes are the comparative advantages of the Tutur region as a center for chrysanthemum production in East Java. Meanwhile, the color of chrysanthemums and the appearance of freshness determine their economic value (Lintang et al., 2020), thus becoming the main factors in choosing the type of flower to be cultivated and post- harvest treatment. Thus, this comparative advantage becomes the focus to maintain its sustainability. According to Wijayani et al. (2017), yellow and white chrysanthemums are the flowers most chosen by consumers because they are believed to cause a sense of energy and social hope, as well as being able to stimulate mental and general activity.

The tourism service economy becomes a disincentive through changes in land use from agriculture to non-agriculture, and negatively influences ecosystem services (Stankov et al., 2016; Widaningrum et al., 2020). Saha & Paul (2021) stated that changes in land use in tourist areas induced in the entire landscape have been fragmented, vegetation cover degenerated, and the ecology of the plains has been destructed. The environmental dimension of sustainability requires attention due to tourism activities because it has the potential (Gössling, 2002) to change the land cover and land use, the use of energy and its associated impacts, as well as changes in the understanding of the environment.

Research Implication

The performance of farmers in chrysanthemum cultivation provides important findings, related to the feasibility of economic business and the challenges of business sustainability. However, it is crucially revealed that the chrysanthemum business involves a long chain, in which the farmers accept significant burdens and risks. This study reveals several needs that need to be done to help farmers and efforts to strengthen institutional performance in anticipating especially external factors that are the dominant factors in the chrysanthemum business.

Strengthen local institutions. A chrysanthemum farmer group has been formed in Tutur Village. So far, farmer groups have the function of coordinating activities to improve cultivation technology, market information, and other assistance, especially from the government. However, the function of the group is not yet fully binding and coercive as an organization, and on the contrary, farmers display more individual behavior when it

comes to efforts to improve efficiency, economies of scale, and market access. This puts farmers in a weak position and accepts high risks in running their businesses.

Strengthening farmer group organizations requires the commitment of farmers to work together and protect each other so that they have a strong position when facing the chrysanthemum supply chain (Putra et al., 2019). A strong internal management group will be able to face external challenges, especially market conditions (Helmiatin & Susanty, 2019). Internal strengthening of farmer organizations can strengthen social capital and capacity (Nugroho, Hanafie, Negara, et al., 2021), especially in addressing market influence, as is generally found for commodities that support tourism demand (Nugroho et al., 2020). It is time for farmer groups to formulate strategic needs for business development, for example, cooperation in the management of production factors to contract farming (Chengappa, 2018), as an effort to increase the value of the supply chain (Putra et al., 2019).

Innovation. Chrysanthemum farming requires a display of creativity and innovation to increase its economic value (Darras, 2021; Lintang et al., 2020). Production technology innovations are carried out by farmers corresponding to their abilities, skills and commitments to maintain flower quality in accordance with consumer needs. Special needs to produce chrysanthemum colors can use additional night lighting technology through electrical energy installations and greenhouses (Fadlil et al., 2020; Hayusman et al., 2019). Meanwhile, Lintang et al. (2020) suggested the post-harvest technology of pulsing and holding liquid during display for extending the chrysanthemum vase life.

Tutur Village should make innovations or breakthroughs to take advantage of the potential for tourist visits. This work requires government cooperation in local tourism planning (Nugroho et al., 2018), by allowing the establishment of storefronts or centralized tourist areas that promote chrysanthemum flowers along with other local agricultural products (Mardiana et al., 2019). Featured farmers or farmer groups can run this business using modern management, by providing introduction and education of chrysanthemums to attract more tourists. This can accelerate creating added value due to increased tourist visits in the surrounding area (Nugroho, Hanafie, Rahayu, et al., 2021).

Further, the innovation of the chrysanthemum business development can be directed towards medicinal or organic farming. Chrysanthemum plants are thought to contain natural bioactive compounds, which include flavonoids, phenolics, tannins, coumarins, luteolin, and apigenin. These compounds are useful for the treatment of anti-gout (Abu Bakar et al., 2018). Another benefit of chrysanthemum plants is as a compound in a natural insecticide. This type of insecticide may lead to organic farming, be more beneficial to biodiversity and the environment, and further reduce dietary exposure to pesticides. (Shahrajabian et al., 2020).

Access to capital. This study shows that access to capital is a significant constraint even though the study shows a relatively high ROI (1.58). There is a kind of tangled thread behind this problem so that the chrysanthemum business presents a disincentive for the entry of capital. This situation is probably due to the weak internal conditions of farmers, low economies of scale, and less functioning farmer groups. This situation creates a high level of business risk for formal financial institutions, which instead operate high-interest money lending at the expense of farmers. This should motivate farmers to work and collaborate by strengthening farmer groups in accessing capital or dealing with the external environment.

Land use policy. Pasuruan Regency greatly benefits from the natural resources and environment in Tutur Village, which provide the carrying capacity of agriculture, tourism, and especially horticultural commodities. This also creates a comparative advantage for the growth of chrysanthemums. This circumstance has a positive impact on the economic aspect, and indicating an impact on land use change. This change is a necessity, so the Pasuruan Government needs a land policy that is oriented towards sustainable tourism development for controlling the negative environmental consequences (Gössling, 2002; Saha & Paul, 2021).

Enforcement for tourism development enables an appropriate capacity of ecosystems in order to sustain food production, maintain freshwater and forest resources, regulate climate and air quality, and provide biodiversity (Foley et al., 2005). This policy also provides an ecosystem that supports human life to maintain the strengthening of institutional, social and economic aspects of chrysanthemum, through the

ability to adapt and maintain sustainability (Jowsey & Kellett, 1995; Nugroho et al., 2020).

CONCLUSION AND SUGGESTION

This study shows that the measurement of economic feasibility and sustainability work well and complement each other to find the important aspects of chrysanthemum business prospects that are proven to provide welfare for farmers in a sustainable manner. Economic feasibility indicates a performance portrait in a given condition, while the measurement of the sustainability index captures a wider perspective on strategic and synergistic steps to find the sustainability of the chrysanthemum business.

The chrysanthemum business has succeeded in providing farmers with a profit equivalent to 20 million rupiah per month on an average land area of 1579 m2, equivalent to 126.66 million rupiah per month per hectare. This study found the R/C ratio and ROI of 2.58 and 1.58, respectively.

The sustainability of the chrysanthemum flower business in the environmental dimension found the highest index (62.74), followed by social (57.76), economic (57.48), and institutional dimension (51.66). This index shows that all dimensions are categorized as fairly sustainable, where the environmental aspect shows the highest sustainability, while the institutional aspect requires attention to maintain sustainability by considering which attribute management is better.

The attributes of the institutional dimension with the highest leverage reflect the important needs to support the sustainability of chrysanthemum cultivation, i.e. market trends that always change rapidly (4.52%), government support for floriculture businesses (3.93%), and tourism policies (3.87%). The attributes that mostly influence the sustainability of the economic dimension are access to business capital (5.83%) and the price of chrysanthemum flowers falls during the main harvest (5.20%). Meanwhile, the attribute with the highest leverage on the social dimension is the togetherness of farmers engaged in chrysanthemum cultivation (8.80%) and marketing (8.55%). Sustainability in the social dimension reveals the need for strategic synergy among farmers to improve bargaining positions. On the attribute of the ecological dimension, the highest leverage is found in efforts to defend against land use conversion efforts (4.45%) and the comparative advantage of the high altitude location resulting in the quality of bright chrysanthemum colors (3.54%).

The research suggests several important things as implications of the research findings. First, strengthening farmer group institutions to face the chrysanthemum supply chain and formulating strategic needs for business development. Second, the application of innovation to improve yield and post-harvest quality, as well as the integration of regional development, tourism promotion, and medicine use. Third, strengthening access to capital and reducing business risk for chrysanthemum cultivation through farmer group management and external collaboration. Fourth, planning for sustainable tourism development and controlling the negative environmental consequences.

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