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SUSTAINABILITY ASSESSMENT WITH MULTIDIMENSIONAL SCALING IN THE SUSTAINABLE FOOD YARD PROGRAM (CASE STUDY: SEMARANG CITY)

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ABSTRACT

Population growth in Semarang City has an impact on the emergence of a food security issue and the high rate of unemployment. The Indonesian government issued a program named the Pekarangan Pangan Lestari or Sustainable Food Yard (SFY) that is expected to solve these problems through urban farming activities. However, the SFY is still experiencing many problems in the field that could threaten its sustainability. This study aims to analyze the sustainability status of the SFY program in Semarang City which consists of the Growth Stage and the Development Stage. The study is descriptive research with a survey method. The study was conducted on 130 sampling farmers in Semarang City that obtained the benefit of the program between 2020-2021. Sample determination used a proportional random sampling method. The data was collected by interview and analyzed using multidimensional scaling. Study results showed that the social, economic, and ecological dimensions of the Growth Stage are less sustainable than the Development Stage's dimensions. The most sensitive attributes for the social dimension are farmer's working hours and farmer's independence. The most sensitive attributes for the economic dimension are product affordability and market demand. The most sensitive attributes for the ecological dimension are water availability and LEISA application. Improvement of sensitive attributes in those dimensions needs to be done to increase the sustainability status of all dimensions in the Growth Stage and the Development Stage of the SFY program in Semarang City.

Keywords: *multidimensional scaling, sustainable food yard, urban farming*

BACKGROUND

Semarang City, one of the biggest urban areas in Indonesia, has a population of 1,659,975 people and an annual population growth rate of 0.21% (Statistics of Indonesia for Semarang City, 2023). Population growth causes food insecurity which raises the demand for food and puts pressure on agriculture's level of production (Kousar et al., 2021). Agriculture production aimed for the provision of food, which is a human right that must be fulfilled because it is crucial for the development of nations (Suryana, 2014). Food fulfillment takes into account both quantity and quality for individuals to live healthy and productive lives. Food circumstance can be measured using the Food Security Index (FSI) with indicators that reflect three aspects of food security named availability, affordability, and utilization of food. Semarang City's FSI score in 2018 was 85.93, but it dropped to 84.66 in 2020 (Ministry of Agriculture, 2021a). Although the score is considered good, overall it's declining and needs special attention to maintain the stability of food security, especially

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after Food and Agriculture Organization (2020) warned of the food crisis danger and efforts to mitigate risks in the present and the future by supporting small farmers to support food production.

Besides the food security issue, population growth has an impact on the unemployment rate because employers are unable to fully absorb the growing population (Faruq & Yuliana, 2023). According to Statistics of Indonesia for Semarang City (2023), Semarang City's unemployment rate in 2022 is 7.60% of the total workforce, the number is still higher than Indonesia's unemployment rate of 5.86%. Unemployment must be immediately solved by finding a long-term solution so that Semarang City residents can have proper income to cover their basic needs, especially food.

Food Security Agency below the Ministry of Agriculture proposed a solution to the issues of food security and unemployment by implementing an urban farming program named the Pekarangan Pangan Lestari or Sustainable Food Yard (SFY). The SFY program intends to increase the availability, accessibility, and utilization of food for households by making it more diverse, nutritious, safe, and market-oriented to raise household income (Ministry of Agriculture, 2021b). This is in line with Wijaya et al. (2022) who stated that urban farming may ensure family food security and bring economic advantages such as the creation of jobs and income generation. In 2020, the SFY program launches concurrently over all of Indonesia, including Semarang City. It is funded by either The Indonesian Budget (TIB) or Regional Government Budget (RGB). The SFY program is a development of the Sustainable Food House Area (SFHA) program with a little modification in the beneficiaries' range and the utilization of agricultural land.

Previous studies revealed that the sustainability of the SFHA program as the precursor to the SFY program was in fairly good condition (Khuswati et al., 2022; Putri et al., 2015), while other urban farming programs with a similar concept were also sustainable (Cahya, 2016; Irham et al., 2021). Yet, due to the SFY program's relative youth in comparison to other programs, studies on its sustainability are still very scarce. Furthermore, the SFY program in Semarang City received lesser attention from the government following its initiation and evaluation period, in the hope that farmer participants will be more independent. As a result, various obstacles from social, economic, and ecological aspects emerged and might potentially endanger the sustainability of the P2L program. If the SFY program stops running, then the farmers and the surrounding community will stop receiving benefits from this program. Based on the provided background, it is essential to carry out a study to assess the sustainability of the SFY program in Semarang City that is never been done before. In addition, the SFY program in Semarang City can be used as a reference for other SFY programs in other cities to achieve sustainability.

This study aims to investigate the social, economic, and ecological sustainability of the current SFY program (case study in Semarang City) which consists of two types, the Growth Stage and the Development Stage. Each dimension in the SFY program is assessed with the technique of Multidimensional Scaling (MDS) called Rapid Appraisal for Urban Farming SFY (RAP-UFS). Information regarding the status of sustainability in each dimension can be useful for reviewing the implementation of the SFY program in Semarang City and as a basis for formulating the program enhancement strategies that can hopefully be impacted farmers' food security and income increment.

RESEARCH METHODS

This study was conducted in Semarang City in June—August 2022. A survey method was applied for this study. The population was all farmers in Semarang City who obtained the benefit of

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the SFY program (funded by TIB) between 2020—2021 as many as 193 farmers from 6 different women farmer groups (WFG). Despite being unable to determine the sample's quality, the Slovin formula was used to determine the minimum sample size because the population was previously known in advance (Suprayitno et al., 2016). As a result, the number of samples was 130 respondents at an error tolerance of 5%. A probability sampling technique with proportional random sampling was used to determine the samples. Proportional random sampling takes a proportional sample from each WFG so that the number of samples obtained is representative. Primary data and secondary data were used for this study. Primary data were gathered through questionnaires and interviews, while secondary data were gathered from the outcome of earlier research and other sources.

Analysis of the sustainability status is done with the method of Multidimensional Scaling (MDS) (Irianto et al., 2020). MDS aims to map respondents' perceptions visually on a geometric map by calculating the distance between reference points in the ordination process using Euclidean distance squared. The ordination technique in MDS is called Rapid Assessment for Urban Farming SFY (RAP-UFS), which is a modified version of Rapid Assessment Techniques for Fisheries (RAPFISH) developed by the Fisheries Centre Research Reports. RAPFISH involves assessing status simultaneously in some evaluation domains that indicate a variety of ecological and human dimensions like social and economic (Pitcher et al., 2013). The method in this study follows Reza et al. (2021) consisting of three steps: formulation of attributes and indicators, data collection with a questionnaire, and data analysis by using Microsoft Office Excel Add-Ins Rapfish. There were sixteen attributes used in this study: five from the social dimension, six from the economic dimension, and five from the ecological dimension. These attributes were chosen because they were considered capable of being used to reflect the field circumstances and measure the SFY's sustainability. Using a four-point Likert scale, each attribute has been scored as follows: very good (3), good (2), bad (1), and very bad (0).

The output of MDS analysis is the sustainability index of each dimension. The range of sustainability index and sustainability status is grouped into four categories: 0.00—25.00% (unsustainable), 25.01—50.00% (less sustainable), 50.01—75.00% (fairly sustainable), and 75.01—100.00% (highly sustainable). The stress value of less than 0.25 and the squared correlation (RSQ) with a value close to 1 demonstrate the correctness of the measurement model (good fit) for each dimension and attribute in MDS. Additionally, the leverage analysis is used to identify the attribute sensitivity to sustainability through changes in Root Mean Square (RMS) in the ordination on the X axis. Abdullah et al. (2017) stated that the greater change in the RMS value of an attribute, the more sensitive these attributes are to the enhancement of the sustainability status. The error rate of sustainability analysis was predicted using the Monte Carlo analysis with a 95% confidence interval. Monte Carlo analysis also serves to test the stability and accuracy of attributes in this research.

RESULT AND DISCUSSION

The Implementation of the SFY Program in Semarang City

The SFY program took over its predecessor, the SFHA program, and has been running in Semarang City since 2020. The SFY program comes in two types: Growth Stage (first phase) and the Development Stage (second phase). The main difference between these two types is the amount of capital grants received. In 2020, two WFGs in Semarang City, namely Mekar Makmur and Hijau Asri, benefited from the Development Stage’s capital grants. These two WFGs previously obtained

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the SFHA program in 2019, are still active with minimum members of 30 people for each WFG, and are willing to sign the agreement letter; thus they met the requirements to receive the benefit of the Development Stage with capital worth Rp 15,000,000. This funding aimed to enhance the function of the SFY program. Meanwhile, four WFGs (Nandur Sedekah, Sekar Makmur, Mina Lestari, and Mekar Sari) obtained the benefit of the Growth Stage in 2021 with capital worth Rp 50,000,000. The amount of funding received was determined by the location of Semarang City which is categorized in Zone 1. The purpose of this funding itself was to carry out nursery facilities (greenhouse), development of demonstration plots, planting, and post-harvest handling which are important to run the SFY program.

The activity of the SFY program in greater detail is cultivating vegetables such as spinach, water spinach, bok choy, lettuce, long beans, etc. in the yard, either collective yard (demonstration plot with an area ranging between 100 m^2—350 m^2 and equipped with a greenhouse) or private yard of each farmer with an area less than 20m^2. Vegetable seeds are generally planted directly in the ground, but some farmers use pots, PVC pipes, and hydroponic or aquaponic systems. The field activity can also include farming livestock (chicken) and fish (catfish) that is integrated with the cultivation. However, most farmers in this study only do those activities in demonstration plots due to the lack of adequate private yards and a busy schedule outside the agriculture field. The majority of farmers also view farming as merely a hobby instead of an occupation that threatens the sustainability of the SFY program.

A portion of the crop yields (37.27%) produced by the SFY farming activity in Semarang City is consumed by the farmers themselves to reduce food expenses even though the amount is relatively small or less than Rp 50,000/month. This is in line with the previous research result on SFHA and SFY programs (Saputri et al., 2021; Sari et al., 2022). The remaining crop yields (62.73%) are either directly sold to locals nearby or promoted on social media such as WhatsApp and Instagram. The sales revenue went to the WFG treasury for further farming activities and emergency funds that function when there are unexpected expenses or crop failure, therefore the farmers do not receive any income from the SFY in the form of money, but through yields that can reduce food expenses.

The Goodness of Fit Model

If the stress value is less than 0.25 or 25% and the coefficient of determination (RSQ) is near 1.00 or 100%, the results of the MDS model are regarded as accurate and can be explained. The RAP-UFS results demonstrated that all the assessed attributes are fairly accurate and can be taken into account. As can be seen in Table 1, all of the MDS models used in this study are categorized as having a good fit and do not require any extra attributes because the stress values for all dimensions do not exceed 0.25 and the RSQ values are close to 1.

Table 1. The Stress Value and RSQ

Dimension	Stress Value	RSQ	Model Status
Social	0.16	0.94	Good fit
Economic	0.15	0.94	Good fit
Ecological	0.15	0.94	Good fit

Source: Primary Data (2022)

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The Sustainability of the Social Dimension

Five attributes are examined for the sustainability of the social dimension analysis. The first attribute is the farmer's network relating to social interaction between farmers in social networks and is very useful for farmers in developing their farming businesses (Rosadi et al., 2020). The second attribute is the farmer's participation, a process that involves the activeness of farmers in a series of activities, from planning to program implementation (Simanjuntak et al., 2016). The third attribute is the farmer's working hours or the amount of time allocated to work in one day in hours counted in one month (Sucipta et al., 2021). The fourth attribute is farmer's independence, described as how farmers can independently cultivate the land properly and correctly according to the rules, besides that farmers can optimally utilize the resources they have without any coercion from various parties (Ramdhan et al., 2020). The fifth attribute is the farmer's skill which can be seen in the ability of farmers to carry out physical farming activities (Fadhilah et al., 2018).

According to the result analysis of MDS RAP-UFS in Figure 1, the Growth Stage (GS) sustainability index value for the social dimension is 36.49% and for the Development Stage (DS) is 49.02%. Both stages are considered less sustainable because their values are between 25.01 to 50.00%. However, the Development Stage has a better position than the Growth Stage in terms of sustainability because its attributes outperformed those of the latter in the field. The overall social dimension of the SFY program in Semarang City has a sustainability index value of 40.67% and its status is less sustainable. It is brought on by the unfavorable attribute state.

The leverage analysis of the social dimension attribute in Figure 2 showed the attributes with the highest to lowest sensitivity based on the change in the root mean square (RMS) value when the ordinate on the X axis is observed. These attributes are the farmer's working hours, farmer's independence, farmer's participation, farmer's network, and farmer's skill. Farmer's working hours is the most sensitive attribute with the RMS value change of 7.24. The condition of the farmer's working hours attribute is the worst compared to other attributes. That happened because the average farmer rarely spends time on urban farming activities, around once or twice a month and less than an hour for each session, whether on demonstration plots or in their private yard. The SFY program, both the Growth Stage and the Development Stage, is hampered due to the lack of manpower with sufficient working hours. This is because most farmers are busy working outside the agricultural sector and/or taking care of the household. According to Daniel et al. (2014), rubber farmers' working hours have a significant effect on family income. Hence, farmers in Semarang City also need to increase their working hours in agriculture to improve their income which is one of the SFY program's main goals.

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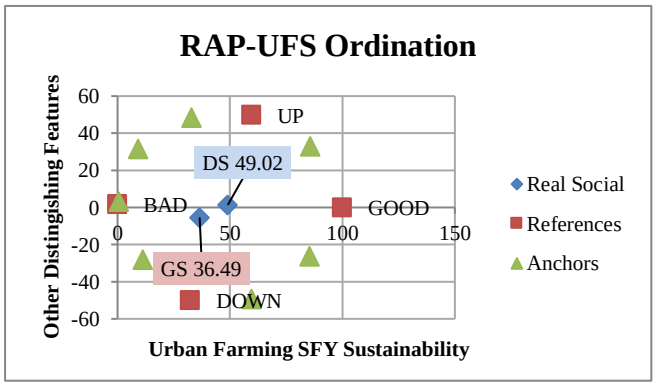

Figure 1. Sustainability Index of Social Dimension

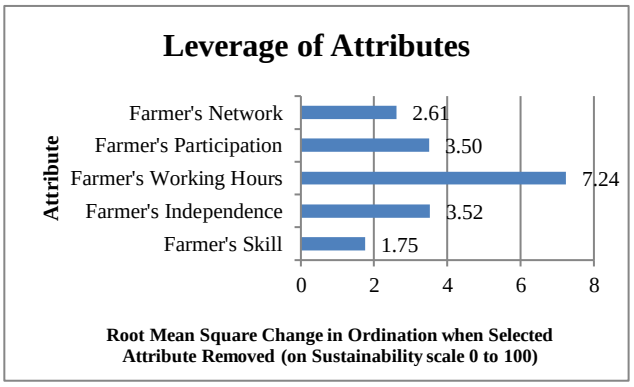

Figure 2. Leverage of Social Dimension Attributes

Source: Primary Data (2022)

The second most sensitive attribute is the farmer's independence with a change in the RMS value of 3.52. The current circumstance showed that farmer's independence is still low in terms of accessing agricultural resources such as natural resources, money capital, and technology. Farmers also tend to need assistance from external parties like extension workers to cultivate properly (following procedures) because their work backgrounds are not from the agriculture sector. However, farmers who benefited from the Development Stage are more independent than farmers who only benefited from the Growth Stage due to more experience and better bonding in the field. When a problem occurs during the cultivation or post-production, they are more proactive to find the solution through internet research and discussion. They do not rely much on extensive workers for problem-solving decisions. To boost the social dimension sustainability of the SFY program, farmer's independence needs to be improved in some aspects. According to Darmawan et al. (2023), the necessity for urban area farmer to be independent is sufficient education, training, workshops, and technology adoption.

The Sustainability of the Economic Dimension

Six attributes are used in the analysis of the economic dimension's sustainability. The first attribute is job creation which according to Ningsih & Abdullah (2021) is part of the state policy for expanding job opportunities in every region. The second attribute is expense savings, an act of managing finances when family expenses are quite large compared to family income so that household activities will not be disrupted (Juliani & Fatmasari, 2021). The third attribute is market demand where demand changes are determined by the size of the change in product prices (Kasdi, 2016). The fourth attribute is product affordability relating to the cost of the product and who can buy and access it (Milestad et al., 2020). The fifth attribute is product pricing, a strategy to determine the price of a new product that needs accuracy and consideration from the marketers (Trihatmoko & Purnamasari, 2019). The sixth attribute is product diversification, an effort to expand the range of goods to be sold, and is a strategy to increase market penetration (Bulan, 2017). Analysis of MDS RAP-UFS in Figure 3 showed that the sustainability index value of the economic dimension for the Growth Stage is 55.65%, while for the Development Stage is 61.04%. Both of them are considered fairly sustainable because the values are in the range of 50.01—75.00%. The Development Stage is slightly more sustainable than the Growth Stage because its attributes performed better than the

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Growth Stage's attributes during the research. Meanwhile, the overall economic dimension's sustainability index value is 57.46%, showing it is fairly sustainable.

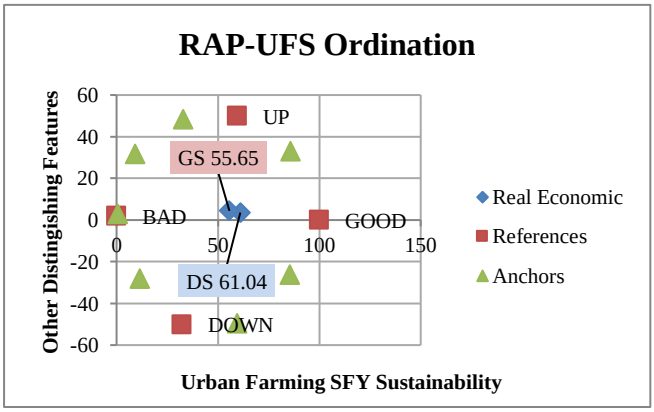

Figure 3. Sustainability Index of Economic Dimension

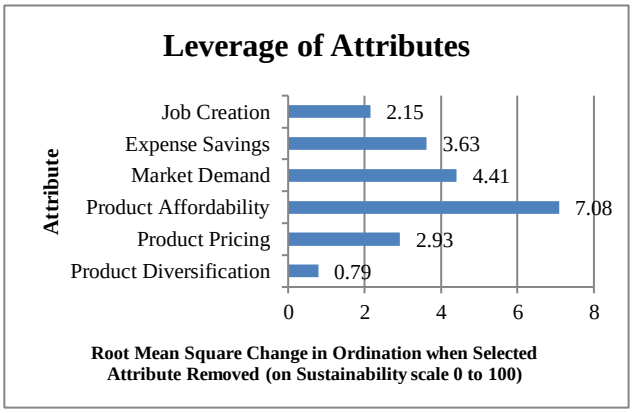

Figure 4. Leverage of Economic Dimension Attributes

Source: Primary Data (2022)

The leverage analysis of the economic dimension showed attributes with the highest to lowest sensitivity based on the RMS value change; these attributes are product affordability, market demand, expense savings, product pricing, job creation, and product diversification (Figure 4). Product affordability appears as the most sensitive attribute on the economic dimension with the greatest change in the RMS value, the number is 7.08. Product affordability's existing conditing is very good because organic horticulture and livestock products produced by the WFGs which received the benefit of the SFY program (both the Growth Stage and the Development Stage) are very affordable or slightly below market prices. This finding is similar to research by Putri et al. (2015) which showed that SFHA (the predecessor of the SFY) created healthier agricultural products at more affordable prices. If commodity prices are too high, the local community in Semarang City prefers to buy conventional agricultural products that are less expensive compared to organically cultivated vegetables by the SFY program, therefore farmers need to carefully watch the market price to keep the product price affordable. Besides the product price aspect, consumers also have no difficulty buying the products produced by the SFY farmers. They can buy directly on the farm (demonstration plot) or through delivery after contacting via WhatsApp. An effort that can be made to improve the ease of buying is farmers already prepare the crop yields and money exchange before buyers come to the demonstration plot.

Market demand is the second most sensitive attribute in the economic dimension with the RMS value change of 4.41. The situation on the ground shows the high market demand for various products produced by WFG that benefit from the SFY program. Consumers started to choose organic products as an alternative to consuming vegetables because they were considered safer for the body than conventional agricultural products which still rely on various chemicals during the cultivation process, especially since the start of the Covid-19 pandemic. Organic agricultural products generally have higher prices than conventional agricultural products. Even so, organic products from the SFY program were sold at quite affordable prices so demand from consumers was high. Market demand is closely related to product affordability because of the law of demand which states that the higher the product price, the lower the demand for product quantity; conversely, the lower the product price,

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the higher the demand for product quantity (Mazurek et al., 2019). Thus, both market demand and product affordability need to be maintained or even increased for better economic dimension sustainability of the SFY program in Semarang City.

The Sustainability of the Ecological Dimension

The sustainability of the ecological dimension analysis is carried out on five attributes. The first attribute is the integrated farming system, a sustainable farming approach by combining agriculture, livestock, or fishery activities in one land to produce food, feed, fertilizer, and fuel (Sumekar et al., 2021). The second attribute is Low External Input Sustainable Agriculture (LEISA) application, an effort to minimize the use of resources from outside the region by maximizing the use of internal resources (Firman et al., 2019). The third attribute is weather and climate; Miftahuddin (2016) described the weather as the condition of the air at certain times and in certain areas which is relatively narrow and for a short period, while climate is the average weather condition for a relatively long time and covers a wide area. The fourth attribute is water availability which is the combined volume of water from rainwater, surface water, and groundwater contained in the hydrological cycle in an area (Nurkholis et al., 2018); the water is used for various activities such as irrigation and animal husbandry. The fifth attribute is soil fertility or the ability of soil to provide the nutrients needed by plants to survive and produce well (Saosang et al., 2022).

The analysis of MDS RAP-UFS in Figure 5 showed that the sustainability index value of the Growth Stage and Development Stage is 42.55% and 55.58% respectively. The Development Stage is more sustainable than the Growth Stage because in general, it got better scores for its attributes than the Growth Stage's attributes. The overall sustainability index for the ecological dimension of the SFY program in Semarang City is 46.89% and is considered less sustainable.

Figure 6 showed the leverage analysis of ecological dimension attributes from highest to lowest sensitivity based on the change of RMS value. Those attributes are water availability, LEISA application, integrated farming system, soil fertility, and weather and climate. The first attribute that is most sensitive is water availability with the RMS value change of 8.96. Most WFGs that participate in the SFY program, either the Growth Stage or the Development Stage, use groundwater for cultivation. Changes in the amount of water can greatly affect urban farming SFY activities in the demonstration plots. However, according to data from the Meteorological, Climatological, and Geophysical Agency (2022), groundwater availability in Semarang City that can be used for plant cultivation is more than 60% or in the sufficient category. Even so, groundwater conservation needs to be controlled to support sustainable agriculture in Semarang City. Pryambodo & Supriyadi (2015) stated that uncontrolled extraction of groundwater causes the groundwater crisis which is marked by a decrease in the groundwater level and the occurrence of land subsidence. This problem occurs in big cities located in coastal areas, including Semarang City. Therefore, farmers should be wiser in using the water for plantation in the demonstration plot. Resource allocation can be applied so water is not wasted.

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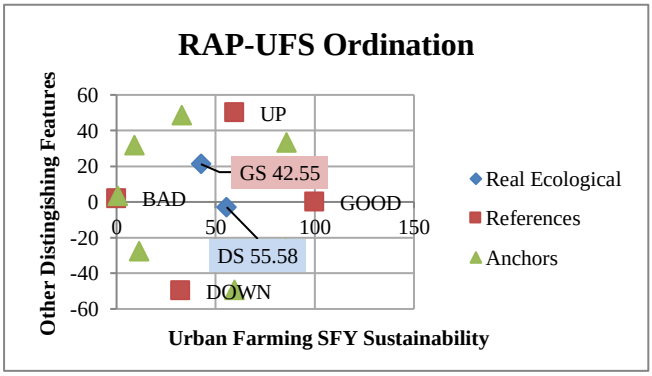

Figure 5. Sustainability Index of Ecological Dimension

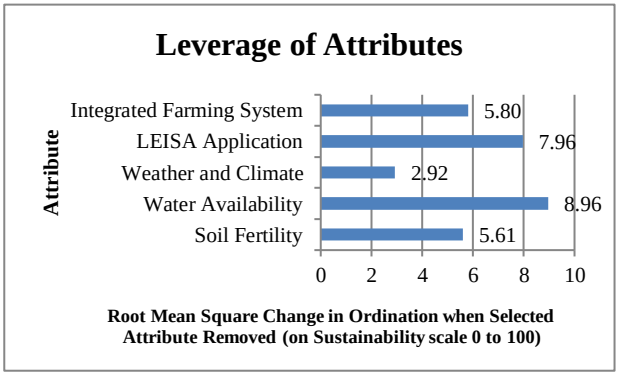

Figure 6. Leverage of Ecological Dimension Attributes

Source: Primary Data (2022)

The second most sensitive attribute is the LEISA application with a change in RMS value of 7.96. In general, the condition of this attribute in the field is very bad among other attributes on the ecological dimension. The majority of farmers do not implement LEISA because they use materials from outside the demonstration plots area. They usually purchased materials from various agriculture shops which were not too far from the demonstration plots. Those materials such as seeds, fertilizers, pesticides, and several agricultural tools to carry out cultivation. The farmers' reason for using external materials was that they can save time, costs, and energy rather than process the inputs themselves to be used for cultivation. Another factor that hinders the full implementation of LEISA is the limitations of farmers in terms of skills, this is in line with the research of Djuwendah et al. (2018). Hence, farmers who received the benefit of the SFY program, either for the Growth Stage or the Development Stage, should learn more about LEISA and its application to make the ecological dimension of the SFY program in Semarang City more sustainable. Farmers can learn on their own and ask the extension workers if needed.

The Sustainability of the SFY Program in Semarang City

The social, economic, and ecological dimensions that have been analyzed with MDS are then visualized with a kite diagram (Figure 7). This diagram's function is to see the form of integration between each dimension of the SFY program sustainability. Based on Figure 7, the formed kite diagram is quite balanced because the three dimensions do not show a big difference from each other based on the result of the MDS analysis. The average of all dimensions (multidimensional) sustainability index showed that the Growth Stage of the SFY program in Semarang City is categorized as less sustainable at a value of 44.90%, while the Development Stage has a value of 55.21% and is categorized as fairly sustainable. The Development Stage is more sustainable than the Growth Stage because the conditions of the social, economic, and ecological dimensions for the Development Stage are better than the dimensions belonging to the Growth Stage. This is due to the farmers who received the Development Stage's benefit have been running the SFY program in Semarang City longer than the farmers who received the Growth Stage's benefit, so they were more compact and skillful which lead to better performance on the social dimension. These farmers were also more knowledgeable in maximizing the potential of economic and ecological aspects while overcoming various difficulties that happen in the field.

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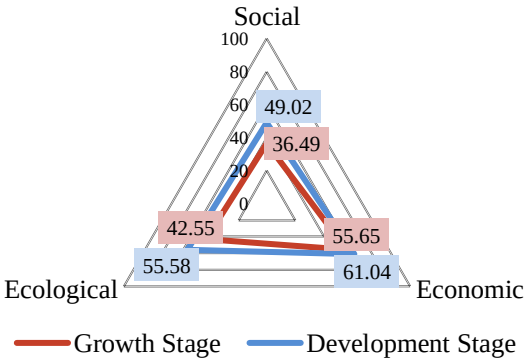

Figure 7. Sustainability Kite Diagram of the SFY Program in Semarang City
Source: Primary Data (2022)

The multidimensional sustainability index of the SFY program in Semarang City, which combined the Growth Stage and the Development Stage, is valued at 48.34% or less sustainable. The factor that affects the sustainability index of the SFY program in Semarang City is the social and ecological dimensions which are relatively low. Although the economic dimension is fairly sustainable, the score is close to a less sustainable status. Therefore, all dimensions must be carefully taken care of to improve the SFY program's sustainability.

The Monte Carlo Index

After simulating the Monte Carlo analysis, it can be seen that the number differences between the MDS index and the Monte Carlo index from the Growth Stage's multidimensional is 0.34 or less than 1 (Table 2). The result indicates a small error in the scoring procedure for each attribute and a variation in the scores presented for each attribute at a 95% confidence interval. Even though there is a 1.14 discrepancy between the MDS index and Monte Carlo index for the Development Stage's multidimensional, the result is still close enough to the limit value of 1 to qualify as a good test model, especially when looking at the stress and RSQ values (Rizqia Ramadhanty et al., 2022). Moreover, the results of the Monte Carlo analysis showed that the Growth Stage and the Development Stage of the SFY program in Semarang City converge at one point. This means that with 25 iterations of some uncertainty factors, the RAP-UFS results obtained are still within the multidimensional distance so that they can be used in determining the sustainability status of each dimension under the MDS rules.

Table 2. The Difference between MDS and Monte Carlo

Dimension	The Growth Stage			The Development Stage		
	MDS	Monte Carlo	Difference	MDS	Monte Carlo	Difference
Social	36.49	36.58	0.09	49.02	48.16	0.86
Economic	55.68	54.70	0.98	61.04	59.60	1.44
Ecological	42.55	42.41	0.14	55.58	54.45	0.87
Multidimensional	44.90	44.56	0.34	55.21	54.07	1.14

Source: Primary Data (2022)

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CONCLUSION AND SUGGESTION

The status of the SFY program in Semarang City's social dimension for the Growth Stage and the Development Stage is classified as less sustainable with a value of 36.49% and 49.02%. The most sensitive attributes on the social dimension are farmer's working hours and farmer's independence. The status of the SFY program in Semarang City's economic dimension for the Growth Stage and the Development Stage is fairly sustainable with a value of 55.65% and 61.04%. The most sensitive attributes of the economic dimension are product affordability and market demand. The status of the SFY program in Semarang City's ecological dimension for the Growth Stage is classified as less sustainable with a value of 42.55%, while the Development Stage has a value of 55.58% and is considered fairly sustainable. The most sensitive attributes of the ecological dimension are water availability and LEISA application. Overall, the multidimensional sustainability of the Growth Stage is less sustainable than the Development Stage.

Improvement of the sustainability status must be done by increasing the performance of each sensitive attribute, especially for the social dimension and ecological dimensions. Farmers and the government must work together in improving the performance of the SFY program to increase its sustainability. The strategy can be done by increasing the performance of several aspects (farmer's working hours, farmer's independence, and LEISA application) while maintaining the performance of other significant aspects (product affordability, market demand, and water availability) so that farmers can achieve food security and gain significant income in the future.

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