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A COLLABORATIVE MODEL FOR SUSTAINABLE COCOA PRODUCTION

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ABSTRACT

Cocoa in Indonesia nowadays faces some problems including in West Sulawesi which decreased the quality and quantity of cocoa bean. To enhance sustainability through high-quality cocoa production due to the supply of global market demand, it is important to elaborate a collaborative model between two-partner or more. As a purpose, this study focuses to measure the collaborative model between local cocoa farmers and Swisscontact through the Sustainable Cocoa Production Program (SCPP) in economic, environmental, and social dimensions. Primary data were collected by random sampling of 269 local cocoa farmers at the center of the Sustainable Cocoa Production Program (SCPP). Data were formulated using a scatterplot diagram, pearson correlation, multiple regression, and confirmatory factor analysis through the indicator in economic, environmental, and social dimensions. This paper provides a model of collaboration in which it bargains for stakeholders such as government both local and national, other policymakers, and private sectors to apply for sustainability programs in cocoa production. This model specifically showed a fit and good relationship between two partners as well as a good level of acceptance for the sustainable cocoa production program. Therefore, the origin found that collaboration would be a sophisticated model to be applied to the local cocoa farmers due to increasing their income, reducing the negative impact of environment and improving the quality standard of life.

Keywords: *cocoa, economics, environment, social, sustainable, swisscontact*

BACKGROUND

With the enermous problems faced by cocoa farmers such as capital, management and marketing, collaboration or partnership is a problem solver to increase opportunities for small farmers in the national economy, while improving people's welfare. Partnership is a form of alliance between two or more parties who form a cooperative bond based on agreement and mutual need (Widaningrum & Haryono, 2017). The objectives of the partnership include increasing business income, guaranteeing supply, quantity and quality of production. Partnership actors include farmers, farmer groups, associations of farmer groups, and companies operating in the agricultural sector. Through partnerships, it is hoped that it can increase farmers' productivity and income while also providing benefits to partner companies.

Through the partnership model, it is hoped that it can provide quality cocoa bean as raw

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Vol 8 (3): 740-755, November 2024

materials of chocolate. The existence of raw materials is one of the vital things in an industry in its production process. The process of providing good raw materials, which are in accordance with the company's wishes, will greatly support production activities. Therefore, companies must be able to project optimal raw material (Simbar et al., n.d., 2014). Nowadays, the sustainability of agricultural raw materials is influenced by dimensions of economic, ecological, and social (Lestari et al., 2015). Cocoa as a tropical tree producing is the global agricultural commodities which has an important value as a source of livelihoods for any developing country (Houston and Wyer, 2012; (Armengot, et al., 2020) . The commodity also contributes to increases in GDP per capita in Indonesia by 13.7% (Skelly, 2017; Voora, et al., 2019). Cocoa is one of Indonesia's global plantation commodities, having an important role to support Indonesia's economic growth as a source of income (Effendy, et al., 2019; Neilson, et al., 2020). Most of Indonesia's cocoa was exported in raw materials, that was dried cocoa beans. The export destination countries for cacao beans are Japan, Taiwan, China, Thailand, Singapore, the Philippines, Malaysia, Myanmar, Sri Lanka, Kuwait, the United Arab Emirates, Australia, America, the Netherlands, France, Germany, Belgium, Switzerland, Italy and Estonia with the total export volume of 39,622,124 kg or valued at 114,977,744 US $ (Agriculture, 2017).

Indonesia is one of the largest cocoa producers in the world spreading over several regions with a total production area of 1,667,337 hectares with production achievements of 699,345 tons in 2017. Indonesia's largest cocoa production center is mostly from Sulawesi Island, i.e. Central Sulawesi, Southeast Sulawesi, South Sulawesi, and West Sulawesi. Cocoa in West Sulawesi is a plantation commodity that contributes greatly to Gross Regional Domestic Product (GRDP) and also as a potential employment provider. The total area of cocoa plantations in West Sulawesi in 2017 reached 149,642 hectares with a total production of 57,141 tons so the average production per hectare was 2.5 tons. Since cocoa farmers have partnered with Swisscontact through the Sustainable Cocoa Production Program (SCPP), a program aimed in increasing the income of farmers' household about 75% and reducing emission gas of greenhouse about 30% from cocoa sector. This program was launched in 2012 which implemented the program such as transfer technology and knowledge for good agricultural practice, gender equality and nutrition, traceability and cocoa certification, financing facilities for integrated agribusiness, networking platform and stakeholder management. Cocoa production has doubled so that farmers' incomes tend to increase. SCPP focuses on people, profit, and the planet, or in other words touching the economic, environmental, and social dimensions. The target program is to increase cocoa farmers' income (economy), reduce greenhouse gas emissions (environment), and support local communities in improving their standard of living (social) (Swisscontact, 2016; Barrientos, 2014; Glin, et al., 2015; Krauss & Barrientos, 2021).

Generally, farmers in West Sulawesi have only an average of 1-2 hectares of cocoa land. In addition, various problems are still often an obstacle for cocoa farmers in West Sulawesi, especially in the on-farm subsystem such as seeds that are still imported from outside, the scarcity and high price of fertilizers, and pest and disease conditions on the land. The main problems of lack productivity are caused by pesticides and diseases, the aging of plants, and the reduction of nutrients in the soil and weather ((Blaser, et al., 2018; Effendy, et al., 2019; Herman, et al., 2020; Magrach & Sanz, 2020). In the off-farm subsystem, the most frequently complained about problems are capital and policy support. Moreover, farmers' educational level, technological innovation and inefficient use of resources are also problems for cocoa farmers ((Effendy, et al.,

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (3): 740-755, November 2024

2013; Effendy, et al., 2013). The presence of partners is expected to be a solution to overcome these problems to increase the quantity and quality of cocoa beans in West Sulawesi cocoa beans (Wessel & Quist, 2015). Therefore, the purpose of this research is measuring the collaborative model between local cocoa farmers and Swisscontact through the Sustainable Cocoa Production Program (SCPP) in economic, environmental, and social dimensions.

RESEARCH METHODS

This type of research is explanatory research aimed at analyzing the relationship among variables. The analysis is based on available data and describes systematically, factually, and accurately the facts, properties, and relationships among the phenomenon under study. This research was carried out in West Sulawesi in 2023. The location was chosen deliberately with consideration, the area is one of the main producers of cocoa bean in Indonesia which has collaboration of Swisscontact through the Sustainable Cocoa Production Program (SCPP). The total population is 815 local cocoa farmers, where the determination of the sample is calculated using the Slovin formula to obtain 268 samples which are selected by simple random sampling methods. The sample is considered to represent the number and characteristics of the population (Kusuma,2011). Primary data collection is done through interviews with a questionnaire that is equipped with secondary data from various related sources.

The data presented are correlation coefficient interval data (r) to measure the strength of the relationship between Swisscontact as the dependent variable (Y) and local cocoa farmers as the independent variable (X) through measurement of covariance and standardization. Next, calculate the coefficient of determination (r^2) to measure precisely the ratio of statistical data as a value that states the proportion of diversity that can be explained by the linear relationship among X and Y variables.

Scatter Plot

A Scatter plot diagram is a graphical representation consisting of a set of points from the value of a pair of variables about how strong the relationship between a pair of variables is.

Pearson Correlation

$$Covarian = S_{xy} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{n-1}$$

$$\text{Sxy} = Sxy = \frac{\Sigma\,(\text{Xi}-}{2a}\,\Sigma\,(\text{Xi} - \text{x ẏ } \text{Ƞ}$$

Standard deviation variables X and Y:

$$S_x = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n-1}}\ dan\ S_y = \sqrt{\frac{\sum(y_i - \bar{y})^2}{n-1}}$$

Correlation Coefficient:

$$r_{xy} = \frac{n\sum x_i y_i - \sum x_i \sum y_i}{\sqrt{n\Sigma x_i^2 - (\Sigma x_i)^2} \cdot \sqrt{n\Sigma y_i^2 - (\Sigma y_i)^2}}$$

$$\text{r} = \frac{\text{n}\Sigma\text{xy} - (\Sigma\text{x}(\Sigma\text{y})}{\sqrt{\{\text{n}\Sigma\text{x}^2 - (\Sigma\text{x})^2\}\ \{\text{n}\Sigma\text{y}^2 - (\Sigma\text{y})^2\}}}$$

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Vol 8 (3): 740-755, November 2024

Significance of correlation results:
1. H_0= If probability > 0.05 then the relationship among variables is not significant.
2. H_1= If probability > 0.05 then the relationship among variables is significant.

Determination Correlation:

$$Determination = r^2x100\%$$

Multiple Regression Analysis

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \ldots\ldots\ldots\ldots b_nX_n$$

Information

Y	: Swisscontact
X_1, X_2, X_3	: Economic (X_1), Environment (X_2) and Social (X_3)
a	: Constanta (Y value if X_1, X_2, $X_3 = 0$)
b	: Regression coefficient

Confirmatory Factor Analysis (CFA) Model

Confirmatory Factor Analysis (CFA) is used to examine the measured variables in describing several construct variables on the economic, environmental, and social dimensions that are systematically displayed in a model.

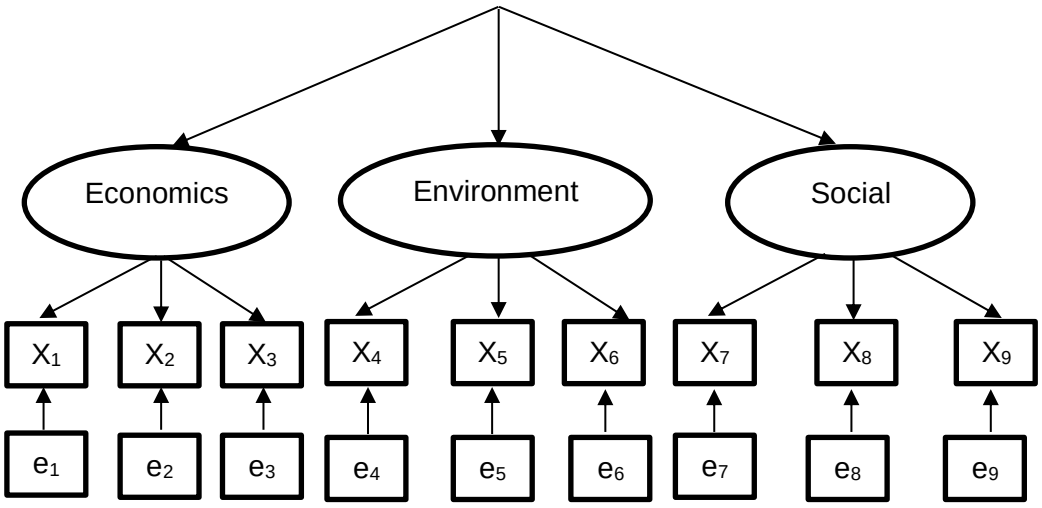

Figure 1. Confirmatory factor analysis diagram

Each dimension is measured using the following variables:
1. The economic dimensions are measured through the variables of skills training (X_1), access to services and capital (X_2), and business development (X_3).
2. The environmental dimensions are measured through the variables of waste (X_4), organic fertilizer (X_5), and environmentally friendly production equipment (X_6).
3. The social dimension is measured through the variable of eradicating the problem of malnutrition (X_7), education and training involving marginal groups such as women and youth (X_8), and the ability of farmers to plan and encourage the development of social life (X_9). The structural model is as follows:

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (3): 740-755, November 2024

$$X_1 = L_{x1} \text{ economics} + e_1$$
$$X_2 = L_{x2} \text{ economics} + e_2$$
$$X_3 = L_{x3} \text{ economics} + e_3$$
$$X_4 = L_{x4} \text{ environment} + e_4$$
$$X_5 = L_{x5} \text{ environment} + e_5$$
$$X_6 = L_{x6} \text{ environment} + e_6$$
$$X_7 = L_{x7} \text{ social} + e_7$$
$$X_8 = L_{x8} \text{ social} + e_8$$
$$X_9 = L_{x9} \text{ social} + e_9$$

This equation gives an understanding that the indicators X_1, X_2, and X_3 can describe the economic constructs of Lx_1, Lx_2, and Lx_3 respectively; then the indicators X_5, X_6, and X_7 can describe the environmental constructs of Lx_4, Lx_5, Lx_6, respectively; indicators X_7, X_8, X_9 can describe social constructs of Lx_7, Lx_8, Lx_9, respectively. Parameter values Lx_1, Lx_2,…… Lx_9 are parameters that measure the relationship between the construct and its indicators. The coefficient of the relationship between the construct and its variables is called loading or under standardized loading. Generally, Confirmatory Factor Analysis (CFA) is formulated as follows: $X = \Lambda \xi + \Psi \varepsilon$

RESULTS AND DISCUSSION

Swisscontact, an NGO from Zurich is one of the stakeholders which engages an important role in the sustainability of cocoa production in West Sulawesi, Indonesia. This NGO collaborates with local cocoa farmers through the Sustainable Cocoa Production Program (SCPP) on economic, environmental, and social dimensions. Current research released that these dimensions impacted the sustainability of the agricultural sector (Niggli, Fliebbach, Hepperly, & Scialabba, 2009; Jawtusch, Oehen, & Niggli, Environmental, Social, and Economic Impacts of Sustainability Certification in the Agricultural Sec, 2011). A new concept in the economic paradigm shifts to the green growth approach and emphasizing environmentally sustainable development so in this case SCPP implemented the sustainability concept for cocoa products in West Sulawesi as one of the project locations. This collaboration was under the Ministry of Home Affairs through a Memorandum of Understanding (MoU) including collaborating with the local governments and relatives.

The SCPP program through field schools carries out various activities in an effort to improve the quality and quantity of cocoa based on the concept of sustainability. The enhancement of cocoa production in West Sulawesi can be achieved through the implementation of various strategies, such as the advancement of tissue culture in cocoa seedlings, capacity building for farmers, improved agricultural practices, and the enhancement of cocoa bean quality. These measures are anticipated to contribute to the future competitiveness of the cocoa industry in the region. Sustainable agriculture encompasses a multifaceted and dynamic concept, integrating environmental, resource-based, economic, and social considerations. This study focuses on a three-dimensional evaluation encompassing economic, environmental, and social aspects to measure the performance of the partnership program between Swisscontact and local cocoa farmers, which has already embraced the principles of sustainability. Indeed, sustainability serves as the optimal framework to the local cocoa farmers.

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Vol 8 (3): 740-755, November 2024

The Scatterplot Diagram by the Relationship Between Local Cocoa Farmers and the Economic Dimension

A scatterplot is a data display data showing the relationship between two numerical variables x and y (Borges, et al., 2015). Based on the figure 2, the relationship between X_1 and Y showed a positive correlation, where the large values of the X_1 variable are related to the large values of the Y variable, while the small values of the X_1 variable are related to the small values of the Y variable.

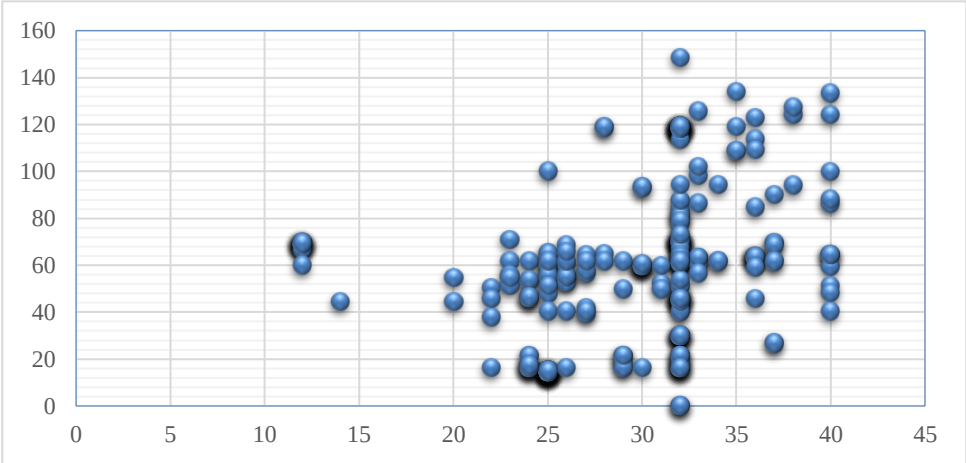

Figure 2. Scatterplot between Local Cocoa Farmers (Y) and Economic Dimension (X_1)

In the economic dimension, the programs are delivered by the Swisscontact to the local cocoa farmers such as training to the local cocoa farmers to increase cocoa production, training to access the capital resource, coaching to develop cocoa farming, and access price information of cocoa through field of school. Field schools provide training related to the development of superior clones that can produce healthy, high-quality cocoa pods that are resistant to pests and disease. High quality cocoa beans are taken and bred through a nursery method established in each village where the SCPP program is located which is then disseminated to farmers in West Sulawesi. Another SCPP field school activity is studying and developing the best cocoa cultivation techniques such as top grafting and side grafting techniques. Both of these techniques use superior scion found in farmers' farming area. In its implementation, field school participants are assisted by using appropriate and environmentally friendly equipment to achieve the expected results.

These attributes are hoped to boost of cocoa production. The program in economic dimensions is not only succesfully done but also increased the income of cocoa farmers in West Sulawesi. Eventually, armers perceive the performance of this program as very good. Beside that, available extension and training are needed for cocoa farmers to increase farmers income and reduce poverty in the rural area. At the same time, local cocoa farmers need more access to bank credit and the market (Effendy *et al,* 2019).

The sustainability of cocoa production in West Sulawesi can be effectively realized through the synergistic application of appropriate technologies, policy incentives, and institutional reforms. These initiatives are envisioned to establish a long-term sustainability framework for local cocoa farmers, addressing the need to reconcile land use solutions with the livelihoods of inhabitants and the growth imperatives stipulated by regional and national policymakers or stakeholders. Within this context, Swisscontact, as a key cocoa stakeholder via the Sustainable

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http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (3): 740-755, November 2024

Cocoa Production Program (SCPP), posits that economic sustainability can be attained through the training and mentorship of local cocoa farmers. This underscores the pivotal role of human capital in fortifying the economic dimension. Notably, many local cocoa farmers, constituting this human capital, possess limited education and face challenges in accessing crucial information pertaining to cocoa prices and financial capital. Consequently, there exists a dearth of potential financial support for their cocoa farming endeavors, compounded by a lack of familiarity with the requisites for engaging with financial providers.

Furthermore, trained farmers were encouraged to demonstrate management improvement neighboring cocoa farmers (Daniel, et al., 2011). In addition, training for farmers would increase demand for raw cocoa, as well as improve production and productivity methods (Tennhardt, Lazzarini, Weisshaidinger, & Schader, 2022) , promoting diversification guarantee methods to increase not only quantity but also quality for market needs (Matissek, Reinecke, Hagen, & Manning, 2012). Sustainability in economics aim to improve income of farmers, decent work opportunity and economic development (Ingram, Rijn, Waarts, & Gilhuis, 2018).

The Scatterplot Diagram by the Relationship Between Local Cocoa Farmers and the Environmental Dimension

Based on Figure 3, the relationship between X_2 and Y showed a positive correlation, where the large values of the X_2 variable are related to the large values of the Y variable, while the small values of the X_2 variable are related to the small values of the Y variable. The green growth model recognizes environmental resources which can be a driver for national and global economic progress.

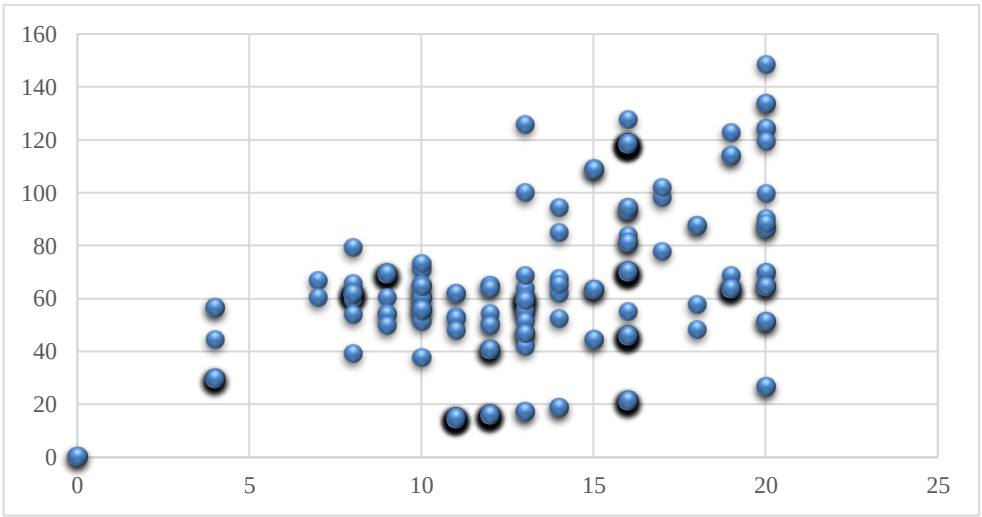

Figure 3. Scatterplot between Local Cocoa Farmers (Y) and Environment Dimension (X_2)

The decline in production and the many obstacles faced by cocoa farmers, especially pests and diseases, has led to the need to switch to an environmentally friendly concept. Apart from this, market demand wants organic cocoa so that the concept of environmentally friendly cocoa is in line with market needs. Through the SCPP, Swisscontact programs in environmental dimensions are understanding and applying utilization of cocoa waste, applying organic fertilizer in cocoa plants, and using and maintaining cocoa by using eco-friendly equipment. Moreover, a

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (3): 740-755, November 2024

combination of yield boost, cocoa certification, and Reducing Emissions from Deforestation and Forest Degradation (REDD) had potential to incentivize eco-friendly agroforestry and lift smallholder farmers out of poverty (Waldron, Justicia, & Smith, 2015).

The Scatterplot Diagram the Relationship between Local Cocoa Farmers and Social Dimensions

Based on the picture above, the relationship between X_3 and Y shows a positive correlation, where the large values of the X_3 variable are related to the large values of the Y variable, while the small values of the X_3 variable are related to the small values of the Y variable.

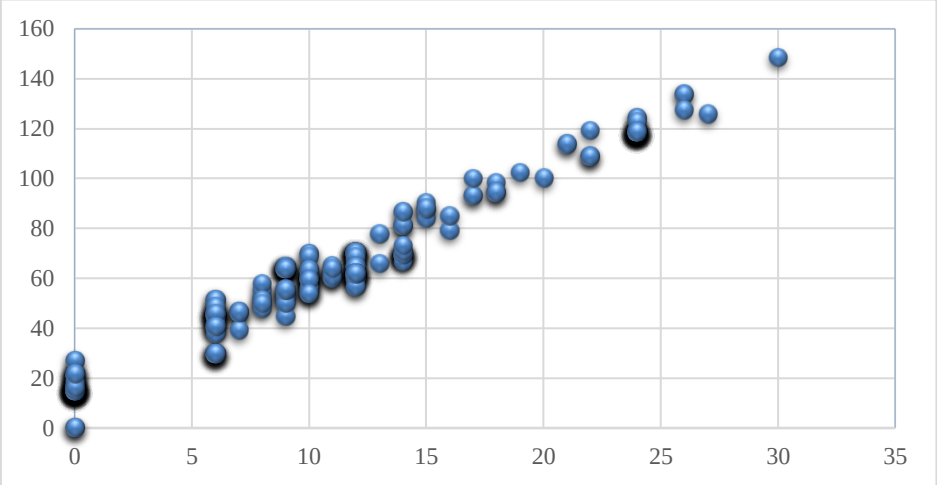

Figure 4. Scatterplot Between Local Cocoa Farmers (Y) and Social Dimension (X_3)

One of the SCPP programs in the social dimension is improving the nutrition of farming families, where this program mainstreams the participation of cocoa farmers' wives or women to obtain information about how to increase the nutritional value of families through the use of home gardens for planting vegetables that have nutritional and economic value at the same time. Women's involvement as an effort to reduce the unemployment rate in farming families and help the family economy as well as activate village women who do not have access to education and work. Furthermore, women in SCPP location in West Sulawesi can be directly involved in agricultural activities that previously had no impact on the economy.

It's about 75% of the world's poor live in rural areas and are dependent on the agricultural sector for their livelihoods. Agricultural growth effect on poor-country, develop the region and poor households to increase employment and income in the rural area. It is how to connect rural populations like farmers to broad economic development by providing programs to increase the quality standard of life. The reason why Swisscontact presents in West Sulawesi is to hire local cocoa farmers not only for economic and environmental purposes but also for social dimensions.

Sustainability for social aspects in agricultural farming includes farmers' equality, social management system, public relation, safety and health occupation (Oktami, et al., 2014) as well accessing women the farming activity (Ingram, et al., 2018). In West Sulawesi, some programs of Swisscontact in social dimensions are helping overcome the malnutrition problem in local cocoa farmer households by training and nutritious feeding, information related to gender equality, access to education and training involving women, marginalized people, and young generations

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http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (3): 740-755, November 2024

who has no access to education and increased local cocoa farmers ability to plan and encourage the development of quality standard of life. Moreover, social aspects described from the farmers' capability to develop a partnership, develop a relationship with other communities, increase prosperity and certification standard of cocoa in-house schemes (Iskandar, et al., 2021; Barrientos, 2011; Grabs & Sophia, 2021; Thorlakson, et al., 2018). In addition, social benefit would be given ease of access for women to land or credit (Ingram, et al., 2018). It provided highly convenience for them in social and cultural context for the cocoa supply chain (Thorlakson, et al., 2018; Tennhardt, et al., 2022).

Moreover, social aspects described from the farmers' capability to develop a partnership, develop a relationship with other communities, increase prosperity and certification standard of cocoa in-house schemes (Iskandar, et al., 2021; Barrientos, Beyond Fair Trade; Why are Mainstream Chocolate Companies Pursuing Social and Economic Sustainability in Cocoa Sourcing?, 2011; Grabs & Sophia, 2021; Thorlakson, De Zegher, & Lambin, 2018). In addition, social benefit would be given ease of access for women to land or credit (Ingram, Rijn, Waarts, & Gilhuis, 2018). It provided highly convenience for them in social and cultural context for the cocoa supply chain (Thorlakson, De Zegher, & Lambin, 2018; Tennhardt, Lazzarini, Weisshaidinger, & Schader, 2022).

Swisscontact's Performance on Local Cocoa Farmers in Economic, Environmental, and Social Dimensions Model

In this study, three variables were observed and each variable consisted of several measurable indicators to explain the economic, environmental, and social dimensions. This variable is the core work program of Swisscontact on the sustainability of cocoa farming to produce raw materials, namely cocoa beans with high quantity and quality. Measurements in each dimension represent the program that had been implemented by Swisscontact through the Sustainable Cocoa Production Program (SCPP) in West Sulawesi and brought good impact not only for local cocoa farmers but also for Swisscontact. Local cocoa farmers practiced good agricultural systems, selling at a high price of cocoa, at the same time, local cocoa farmers supported the Sustainable Development Goals (SDGs) program. On the other side, Swisscontact could buy farmers' cocoa beans with better quality. Sustainable development Goals are a concept to sustain the balancing among three dimensions in this case economic, environmental and social dimensions (Ishatono & Raharjo, 2016; Kashwani, 2019). In agricultural practices, the economic aspects are related to farmers' income, productivity, production cost efficiency, and high price level of cocoa beans. Meanwhile, the high-quality standard of life such as health, income and safety occupation, good partnership with the community, and gender equality are such social aspects (Oktami, et al., 2014; Ingram, et al., 2018).

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Vol 8 (3): 740-755, November 2024

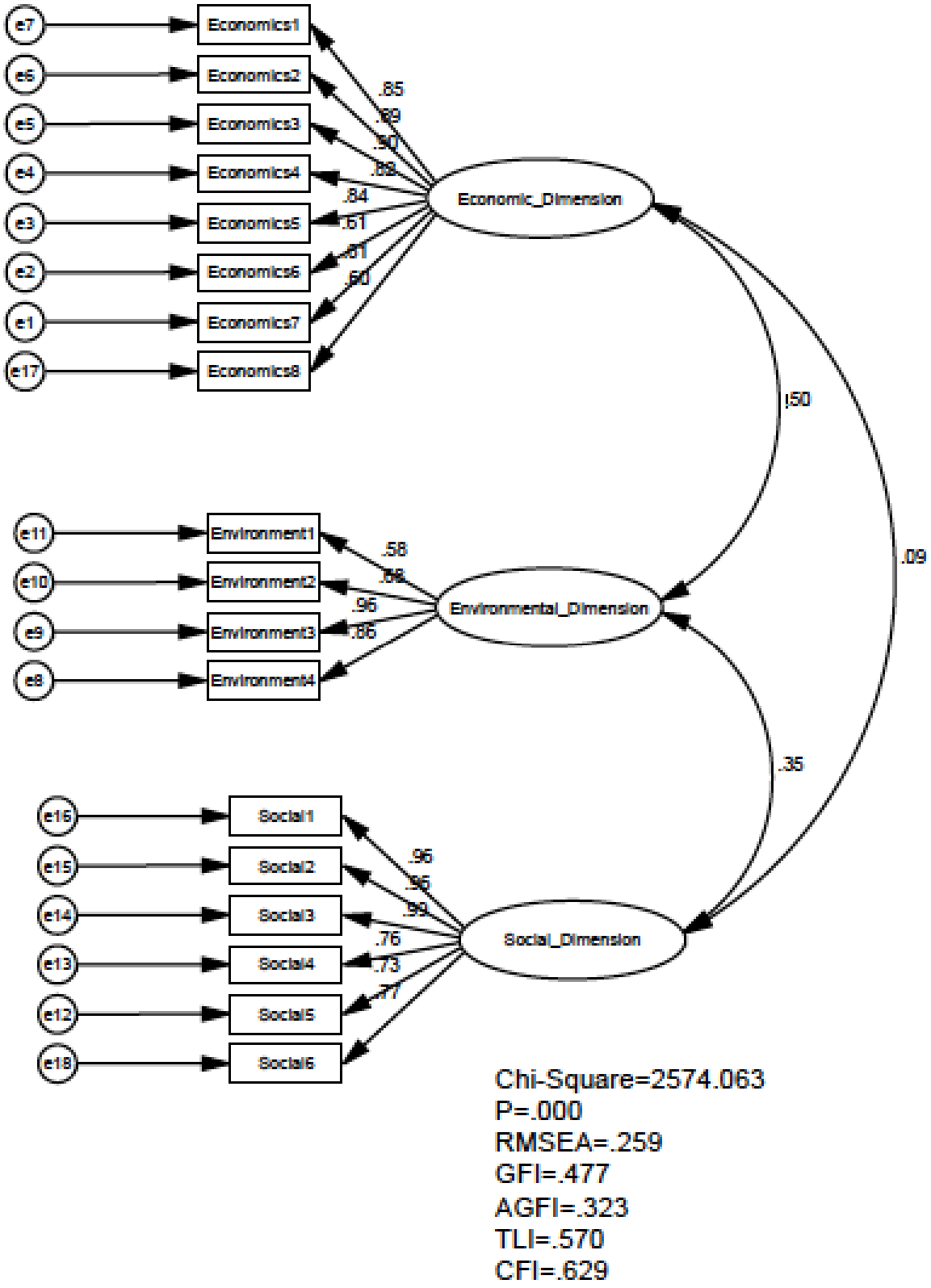

Figure 5. CFA Model for Sustainable Cocoa Production

The economic dimensions are measured in three variables such as skills training (X_1) where skills training indicators include training and skills related to the use of agricultural inputs (seeds, pesticides, equipment, etc.) with a factor load value of 0.85, training, and skills related to proper cultivation practices. with a factor loading value of 0.89, training on pest and plant disease

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Vol 8 (3): 740-755, November 2024

eradication with a factor loading value of 0.90, training on the use of good fertilizers with a factor loading value of 0.82, and training on proper cocoa plant maintenance with a factor loading value of 0.84.

Access to services and capital (X_2) includes increasing access to services and capital with a factor loading value of 0.61. The business development variable (X_3) is through business development coaching activities with a factor loading value of 0.61 and the provision of information and learning by stakeholders with a factor loading value of 0.60. Statistically, three variables measured X_1, X_2, and X_3 in all indicators are significant for measuring the economic dimension.

Swisscontact's programs on the economic dimension in X_1, X_2, and X_3 lead to system input and good agricultural training, providing access to capital and business improvement. Based on the standard value obtained for each loading factor in economic variables showed good results, which meant the program on those programs had been running well. Programs on the economic dimension were related to increasing the capacity of local cocoa farmers as main producers. In this case, these programs are needed as an effort to improve the quality of cocoa beans so that farmers can get high profitability for increasing their income (Tennhardt, et al., 2022).

Development strategy in the agricultural economic sector is continuously encouraged as an effort to increase farmer household income. Cocoa is a national strategic plantation crop that can bring more profits to farmers if managed properly. Therefore, Swisscontact trains cocoa farmers in Polewali Mandar to implement good agricultural practices as well as service for the capital and coaching for business development.

The environmental dimension consists of 3 measurable variables, namely waste (X_4) through understanding and application related to the use of cocoa waste with a loading factor value of 0.58. Organic fertilizer (X_5) is knowledge and application related to organic fertilizer on cocoa plants with a loading factor value of 0.68, and environmentally friendly equipment variable (X_6) through knowledge and application related to the use of environmentally friendly cocoa farming equipment with a loading factor value of 0.96 and knowledge and applications related to environmentally friendly cocoa treatment with a loading factor value of 0.86. Statistically, the three measured variables (X_1, X_2, and X_3) are significant for measuring the environmental dimension. Environmental practice in cocoa sector intented to reduce water and soil pollution, soil degradation, and deforestation (Matissek, et al., 2012; Nkamleu, et al., 2010; Ruf & Siswoputranto, 1995).

The eco-agriculture concept by Swisscontact is aimed at creating green agriculture based on efficient local resources. In addition, Swisscontact's in environmental friendly programs are aimed at supporting climate change and mitigation strategies. Through the sustainable cocoa program, cocoa farmers can work on agribusiness potential in long term. In Polewali Mandar, a field school was formed for nature and environmental management which is expected by cocoa farmers to pay attention in sustainability, ecosystems, and environmental change.

The sustainable cocoa program implemented through SCPP on the social dimensions focus on welfare and improving the quality of life of farmers. Several social issues that are often found in farming families are malnutrition, the presence of marginalized groups, and the low level of education in farming households. Therefore, Swisscontact provides reinforcement through the concept of training, education and time management coaching. This study measured three variables, namely poor nutrition of farmers (X_7) by helping to overcome the problem of

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (3): 740-755, November 2024

malnutrition in farmer households with a factor loading value of 0.96 and training related to malnutrition with a factor loading value of 0.96, as well as training on the ease of access of farmers to nutritious food with a value of 0.96. loading factor 0.99. Variable gender and marginal people (X_8) through understanding and knowledge related to gender equality with a factor load value of 0.76, ease of access to education and training and training involving women, marginalized and young people with a factor load value of 0.73. The variable of social life development (X_9) is through increasing the community's ability to plan and encourage the development of social life in the region which can increase their standard of living with a factor loading value of 0.77. The major issues in social dimensions led secure the long-term livelihoods of local cocoa farmers (Matissek, et al., 2012) to support farmers' capacity development, assist vulnerable local farmers, and gender equality (Tennhardt, et al., 2022). The vulnerability of local cocoa farming families to social problems that are inadequate, has made Swisscontact implemented programs related to those issues.

The results of the constructed test of the Swisscontact performance variable are evaluated based on the goodness of fit indices in the following table with the model criteria and critical performance presented. The evaluation of the proposed model shows that the evaluation of the construct as a whole produces a value above critical which indicates that the model is following the data so that further model suitability tests can be carried out. These three measurement dimensions are important to apply to local cocoa farmers to support farmers in increasing their income and standard quality of life as well as for reducing negative impact of pesticide used. In addition, these three dimensions are needed by farmers to produce high-quality cocoa beans by paying more attention to social and environmental aspects (Karim, et al., 2020).

Table 1. The Goodness of Fit of Confirmatory Factor Analysis (CFA) Model

The Goodness of Fit Index	Cut-off Value	Model Result*	Description
χ^2 – Chi-square	Expected smaller	14.293	Bad
Sig. probability	$\geq$ 0.05	0.27	Sig. alpha =0.01
CMIN/DF	$\leq$ 2.00	2.382	Bad
RMSEA	$\leq$ 0.08	0.71	Good
GFI	$\geq$ 0.90	0.983	Good
AGFI	$\geq$ 0.90	0.942	Good
TLI	$\geq$ 0.95	0.986	Good
CFI	$\geq$ 0.95	0.994	Good

The Table 1 shows that the three-dimensional measurement model has shown the existence of a model fit or suitability between the data and the model based on a test of seven criteria to assess whether or not a model is feasible. It is proven that all have met the criteria except the CMIN/DF criteria. However, these criteria do not deviate too far. Therefore, the above model showed a good level of acceptance, it can be concluded that the model can be accepted at an alpha level of 0.01.

Furthermore, there is a match between the model and the data based on the variables used to see the partnership between local cocoa farmers and the Swisscontact program through measuring economic, environmental, and social dimensions. A sustainable development program in economic, environmental, and social dimensions was an effective way to increase cocoa production for smallholder farmers. In this case, government policy is needed so that the intended programs can be

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http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (3): 740-755, November 2024

implemented properly (Franzen & Mulder, 2007). Moreover, partnerships between two stakeholders or more will bring multiple effects. It created governance arrangements to focus on the sustainable value chain, increasing the productivity and income of cocoa farmers, limiting bad impacts on the environment, requiring sectoral transformation, and further partnership. Then, further policy instruments are arranged to address the persistence of the program (Ingram, et al., 2018). The importance of partnership and involvement of multi-sectors in supporting cocoa sustainability included market and pricing mechanisms, buyer and export licenses, control of cocoa genetic material, and capacity building of local farmers.

CONCLUSION

There are some conclusions in this study. Firstly, the scatter plot diagram shows that there is a positive correlation between the economic (X_1), environmental ($X,_2$), and social dimensions (X_3) with local cocoa farmers (Y). Secondly, the magnitude of the correlation value between X_1 and Y in the amount of 0.270, X_2 and Y in the amount of 0.440, and X_3 and Y in the amount of 0.986. Thirdly, both simultaneously and partially, X_1, X_2 and X_3 to Y show a direct relationship uninfluenced with a significance value for each dimension < 0.05. The last, the model confirmatory factor showed a good level of acceptance for the sustainable cocoa program in economic, environmental, and social dimensions. The implication is expected to involve many sectors, both government and private, to implement training and counseling programs, so that they use the same approach in order to strengthen strategic relations between the government and the private sector. Collaboration between stakeholders is very important to achieve the desired level of quality and quantity to improve the economy and welfare of farmers through the application of environmentally friendly cocoa.

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