

## Utilization of Coffee Commodity Agricultural Waste Through Partnership Towards Sustainable Production and Consumption

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**Abstract:** One of the SDGs for the process of coffee production and consumption through partnerships is SDGs 12 and 17. SDGs 12 relates to Responsible consumption and production and SDGs 17 relates to partnerships for the Goals. Efficient management of waste management is an important target for achieving SDGS 12 goals to move towards a more sustainable consumption pattern by 2030. Coffee production is increasing every year accompanied by an increase in coffee consumption and drinking trends around the world. This research was conducted at Satya Terra Bhinneka University by holding a Focus Group Discussion (FGD) by inviting stakeholders consisting from farmers, government, business world and academics. on July 20 2023. The data collection method was carried out using the PRA (Participatory Rural Appraisal) method and analyzed in a descriptive. The research results show that coffee farmers in North Sumatra Province are spread across several districts which produced Arabica and Robusta while the original coffee variety is "Sigarar Utang". Coffee farmer institutions in North Sumatra are in the form of farmer groups, farmer group associations and farmer cooperatives to managing plantations by implementing agricultural corporations. The use of coffee waste is making compost and liquid organic fertilizer. Coffee waste is also used as a Cascara drink and making coffee ashtrays.

**Keywords:** Coffee waste, sustainable development goals sustainability.

### Introduction

The Sustainable Development Goals are a sustainable development program that covers issues of social and economic development. This program is carried out by world leaders and officially endorses the SDGs programs as a global development agreement. SDGs contain 17 goals and 169 targets which are a global action plan valid from 2016 to 2030. Sustainable development consists of mutually integrated factors, namely economic factors (economic sustainability) to assess whether a business is profitable or not, social factors (environmental sustainability by not destroying the environment) and wanting social (socially useful) (Ferawati, 2018). One of the SDGs for the process of producing and consuming coffee through partnerships is

SDGs 12 and 17. SDGs 12 relates to sustainable consumption and production and SDGs 17 relates to partnerships to achieve goals (Partnerships for The Goals). Efficient management in waste management is an important target to achieve the SDGS 12 goal of moving towards more sustainable consumption patterns by 2030.

Coffee production is increasing every year along with increasing consumption and coffee drinking trends throughout the world. BPS (2021) states the 5 provinces with the largest coffee plantation area South Sumatra, Lampung, Aceh, North Sumatra, and East Java. North Sumatra Province is one of the provinces which is a center for coffee plantations. The amount of coffee production produced from the available coffee plantation area in 2019 with total area 752.51 Hectares, in 2020 762,38

Hectares and in 2021 786,19 hectares and the land area always increases every year and always increasing with the majority of coffee plantations controlled by smallholder coffee plantations. Apart from that, Indonesian coffee consumption has also increased. Coffee consumption in 2022 will reach 5 million bags of coffee measuring 60 kilograms. An interesting fact is that for every coffee produced, 40-45% of the proportion of coffee waste is produced in the form of coffee cherry skin (Kharishma & Septiana, 2022). In addition, coffee grounds waste from one cup of coffee contains 20 grams of coffee grounds (Rahmadi, 2018).

This is still a problem for coffee farmers, coffee processors and stakeholders. Large-scale waste can have an impact on the environment and ecosystems. Coffee waste consists of two types, namely coffee skin waste and coffee grounds. Coffee skin waste is a problem in the upstream sector of coffee production, where farmers have not been able to make maximum use of coffee skin waste and most of it is disposed of by farmers, damaging the soil and the environment. Meanwhile, the problem in the downstream sector is that coffee grounds are simply thrown away and have not been utilized properly by businesses such as coffee shops or restaurants. Coffee skin waste contains caffeine, polyphenols (tannins) and free phenols.

Toxic substances can cause changes in the metabolism of plant microorganisms which can cause a decrease in agricultural yields (Hj *et al.*, 2022). In addition, the most severe impact of coffee waste is if the waste is disposed of in waters which causes coffee effluent to be released creating anaerobic conditions (Juwita *et al.*, 2017). This is due to farmers' limitations in utilizing waste and the ability of farmers to innovate waste into something of value. To carry out environmental improvements or to mobilize the government and the private sector in adopting waste management policies is an important thing to consider because it can affect the quality of the environment (Hasibuan & Baga, 2023). Therefore it is necessary to carry out research to identify the handling of coffee agricultural waste through partnerships towards sustainable production and

consumption. Research purposes to: 1) identify the general situation of coffee farmers in North Sumatra Province; 2) To identify forms of coffee farmer partnerships in North Sumatra; 3) To identify forms of utilization of coffee waste in North Sumatra.

## **Materials and Methods**

### **Time and place of research**

This research was conducted at Satya Terra Bhinneka University by holding a Focus Group Discussion (FGD) on July 20 2023. FGD was carried out with a participatory approach to identify conditions, needs, problems and potential in village development (Putra, 2020). Informants in the FGD activities were the Head of the plantation sector at the Plantation and Livestock Service Office of North Sumatra Province, Functional Position of Extension Officer at the Plantation Service at the Plantation and Livestock Service Office of North Sumatra Province, functional position as analyst for quality control of agricultural products at the Plantation and Livestock Service Office of North Sumatra Province, Kudu Coffee Owner (coffeshop entrepreneur in Medan City), North Sumatra Coffee Farmers and Processors, and member of the post-harvest and processing sector of the North Sumatra coffee council, academics (Satya Terra Bhinneka University and University of North Sumatra)

### **Data collection and analysis methods**

The data collection method was carried out using the PRA (Participatory Rural Appraisal) method involving various stakeholders ranging from farmers, government, business world and academics. Data collection activities were carried out by holding an FGD (Focus Group Discussion) which aimed to find out information about the description of coffee farmers, the use of coffee waste by farmers and entrepreneurs. Data analysis techniques are collected, presented and concluded in a descriptive manner. The trigger questions in the FGD (Focus Group Discussion) activity are:

1. Have you ever heard of the concept of 17 SDGs(Sustainable Development Goals)?
2. Do you know the concept of SDGs 12: Responsible Consumption and Production?
3. What do you think regarding the trend in

- demand for coffee which is increasing every year followed by coffee production which is also increasing?
4. What impact does coffee waste have on the environment/soil?
  5. How are coffee farmers currently handling coffee skin agricultural waste? If not, what are the obstacles?
  6. How is coffee grounds waste currently handled by coffee entrepreneurs?
  7. What is the latest research regarding handling agricultural waste for coffee commodities?
  8. What policies and programs has the government implemented to overcome this?
  9. How do stakeholders encourage farmer institutions to obtain good quality coffee in accordance with Good Agricultural Practice?

Does it include waste handling?

## Results and Discussion

### Overview of Coffee Farmers in North Sumatra

Coffee farmers in North Sumatra Province are spread across several districts including Karo, Humbang Hasundutan, Simalungun, North Tapanuli, Dairi, Mandailing Natal, Pakpak Bharat, Toba and Samosir districts. This area is used as a geographical indication (GI) which is used to protect the geographical name of a region as the authenticity of the origin of coffee products in North Sumatra. Coffee production data as a coffee center area in North Sumatra is as in table 4 below.

**Table 4.** coffee production as coffee center areas in North Sumatra

Regency	2019 (tonnes)	2020 (tonnes)	2021 (tonnes)
North Tapanuli	15.213	15.220	16.036
Simalungun	10.324	10.523	11.235
Dairi	9.612	9.613	9.620
Humbang Hasundutan	9.677	9.683	9.690
Karo	7.402	7.403	7.411
Samosir	4.157	4.163	4.172
Toba Samosir	4.187	4.403	6.018
Mandailing Natal	2.332	2.533	3.049
Pakpak Barat	1.085	1.084	1.090

Source: BPS, 2023

Based on the data above, this district is the center of coffee plantations in North Sumatra with the highest production volume, namely in 2022, North Tapanuli Regency amounting to 16,036 tons. The coffee produced in North Sumatra is Arabica and Robusta, while the original coffee variety from North Sumatra is “*Sigarar Utang*” variety. Apart from that, there is also Simalungun coffee, Mandailing coffee, Lintong coffee, and Sidikalang coffee. Based on information obtained from informants representing farmers, not all farmers care about SDGs, but farmers only focus on productivity. Farmers are thinking more about making profitable coffee cultivation efforts. Community empowerment efforts to improve welfare society is always carried out by the government.

Empowerment efforts the community requires the active participation of all elements of society who are targeted by identifying specific

problems found in the community in the utilization of coffee waste to get added value (Rochmah *et al.*, 2021). There is a program from the North Sumatra Province Plantation Service to form assisted farmers in Simalungun Regency starting from the stages of planting, care, harvesting, post-harvest processing to producing coffee powder products and marketing them to Starbucks stores as offtaker assisted farmers. Apart from that, there is also a waste utilization program, namely the use of coffee skins to make coffee beer in Simalungun.

### Coffee farmer institutions

Coffee farmer institutions in North Sumatra Province are in the form of farmer groups, farmer group associations, and farmer cooperatives. In 2019, the North Sumatra Province Plantation Service has formed a farmer institution by forming millennial farmers from 10

coffee center districts in the North Sumatra Plantation Service. The formation of millennial farmers is to invite regional youth to play an active role in the agricultural sector, managing gardens by implementing agricultural practices in accordance with Good Agriculture Practices (GAP) for coffee cultivation (Sihombing *et al.*, 2023). Farmer assistance is a process to prepare professional farmer human resources by making efforts change in mindset so that farmers are able to be independent and superior in terms of cultivation, processing of crops, marketing as well as organizational management namely knowledge, expertise, and morals (Ameilia *et al.*, 2021).

Apart from that, suggestions from stakeholders who have been invited by institutional farmers can be carried out by becoming a group assisted by industry such as PLN and Pertamina which is part of the company's CSR (corporate social responsibility) with the aim of processing it until the product is finished. Based on information obtained from informants, an example of an institutional farmer who has become a farmer assisted by the Company as a form of Company CSR is the Family Forest Farmer Group (KTH) Coffee Farmer located in the Aek Nauli concession, Simalungun Regency who has been a farmer assisted by PT Toba Pulp Lestari (TPL) since 2017. The form of coaching is carried out by providing coffee seeds, mentoring and training for coffee schools. In line (Mukrimaa *et al.*, 2016) Corporate Social Responsibility is a program to provide a commitment to increasing farmers' knowledge to get the best results by implementing sustainable agricultural practices. Besides that, strengthening farmer institutions can be done by forming farmer corporations to implement corporate farming (Siahaan, 2023)

### **Utilization of coffee waste**

Currently, many farmers do not care about the utilization of coffee skin waste. Farmers only focus on coffee production. According to (Riga *et al.*, 2022) stated that farmers have not used coffee husks because farmers do not understand that coffee husks can be used as valuable compost for the needs of the coffee plants they cultivate. Besides that, it can also be a source of economy through the sale of fertilizers produced by farmers. However, there are also farmers who

understand that coffee husk waste is used as fertilizer from coffee skin cherries which is used to fertilizer farmers' coffee cultivation. The fertilizer produced by farmers is in the form of POC (liquid organic fertilizer) compost from coffee skin waste which is first fermented with a mixture of livestock waste, husks and dolomite, all of which can be accelerated by using EM4 solution and molasses.

The resulting compost can be harvested after 1-2 months of composting. Coffee waste used as solid and liquid fertilizer affects plant height, number of leaves, plant wet weight, plant dry weight, root wet weight, root dry weight and root length (Putri *et al.*, 2017). Apart from that, there are also those who use coffee grounds waste as organic fertilizer which is used because it contains potassium, phosphorus and nitrogen which is good for plant growth (Maulana *et al.*, 2023). The increasing popularity of processed coffee products nowadays makes producers always innovate to increase market interest. However, not only coffee beans can do it developed, coffee fruit or better known as cascara or coffee cherry can also be used as a food product. Apart from being able to create zero net coffee production waste, processing cascara into food products can also utilize food potential optimally functional (Subeki *et al.*, 2019).

Entrepreneurs use coffee skin waste by processing coffee skins into drinks. The drink produced from coffee skins is made into Cascara, which comes from Spanish, which means skin, which is processed from washing the coffee cherries, drying them to produce the cascara. A coffeeshop entrepreneur in North Sumatra who has succeeded in processing coffee skin waste to make cascara is selling for IDR 20,000/bottle with a size of 200 ml. Utilization of coffee skin waste is also done by making coffee skin powder by sorting the coffee skins/cherries and washing them until clean, then drying them and then grinding them to obtain a fine powder (Nur *et al.*, 2019). In addition, (Sumadewi *et al.*, 2020) stated that in addition to processing coffee waste as liquid fertilizer and coffee cherry tea, it is also processed into incense and candles.

According to (Sumadewi *et al.*, 2020) Coffee grounds has not been utilized because of limited knowledge. For this reason, another alternative is needed in the use of coffee grounds so that it becomes a useful item and has economic

value. Coffee lovers in coffee shops in the city of Medan have greatly increased, because informants representing coffee shop entrepreneurs see that the number of coffee consumers who stop by the coffee shop is always increasing. This trend is caused by young people needing a place as a working space. The greater the number of shop visitors means the greater the amount of coffee grounds produced from the coffee shop. Coffee drinking culture in big cities in this millennial era, it is back to stretching, even the trend of doing work activities in coffee shop or cafe is irresistible.

This culture has enhanced growth coffee shops and cafes in big cities including Medan. At the top coffee consumption growth can be up to 5 kg per day that can be brewed by a coffee shop, and after brewed coffee grounds become useless dregs and waste (Setya Diningrat *et al.*, 2021). Every cup of coffee produces around 15 grams of coffee grounds which are usually wasted. However, currently coffee shops have started to develop coffee grounds waste into coffee ashtrays to provide a coffee aroma in the room. Apart from that, there are also plans to develop a business to utilize coffee grounds waste, namely biobriquettes. In line with research by (Hadiasyah *et al.*, 2021) that coffee grounds waste has enough potential calorific value to be used as briquettes and coffee grounds raw materials are easy to find. Coffee grounds can be used to make biobriquettes which are used as an environmentally friendly alternative energy source. Steps to realize responsible coffee production and consumption through partnerships:

1. There must be collaboration between stakeholders to develop the use of coffee skin waste and coffee grounds. The role of stakeholders is good from the Government and private parties are very necessary to achieve quality and quantity of coffee and active role of agricultural extension workers provide training and non-education formal for managing farming businesses coffee (Triana *et al.*, 2013). When empowering farmers, stakeholders must ensure market availability in the future. In terms of utilizing coffee skin waste, farmers are of course willing to collect coffee skins/cherries produced by farmers, but there must be certainty of the availability of

markets/offtakers to accommodate coffee skins as raw material for making cascara drinks by entrepreneurs.

2. It is hoped that with points 12 and 17 of the SDGs, environmental, economic and social factors can be aligned. This can be realized when the farmer's economy improves and farmers' prosperity is created, having an impact on the surrounding community and ecosystem management without damaging the environment.

## Conclusions

Coffee farmers in North Sumatra Province are spread across several districts which produced Arabica and Robusta while the original coffee variety is "Sigarar Utang". Coffee farmer institutions in North Sumatra are in the form of farmer groups, farmer group associations and farmer cooperatives to managing plantations by implementing agricultural corporations. The use of coffee waste is making compost and liquid organic fertilizer. Coffee waste is also used as a Cascara drink and making coffee ashtrays.

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