

Analysis of Clove Agroindustry in Indonesia As an Alternative Green Industry

Antik Suprihanti

Agribusiness Department Agriculture Faculty of UPN "Veteran" Yogyakarta

e-mail: antik.s@upnyk.ac.id

Abstract.

Indonesia is one of main clove producers in the world. The majority of Indonesian clove is cultivated by small farmers. For many decades, majority of the clove production is used as main ingredient of the *kretek* cigarette industry. Therefore, the development of clove plant depends on cigarette production. To anticipate the decline in demand of clove in the future caused by the decreasing demand for cigarettes and to keep the Indonesian clove industry alive, there is a need to establish an alternative industry beside cigarette industry. This paper aims to analyze the policies related to clove, as well as the opportunities and challenges of alternative clove industries. This research is based on literature study and policies. The results of the study indicated that in the future, the development of other clove processing industries such as essential oil is very potential. All this time, the policies that related to cloves focus on the needs of clove as raw material of cigarette industries rather than on the need of alternative clove industries. Therefore, the development of other clove processing industries has to receive serious attention from the government both upstream and downstream sectors. The development of processed clove agro-industry is expected to encourage green industry and increase Indonesian clove exports and the clove farmers income.

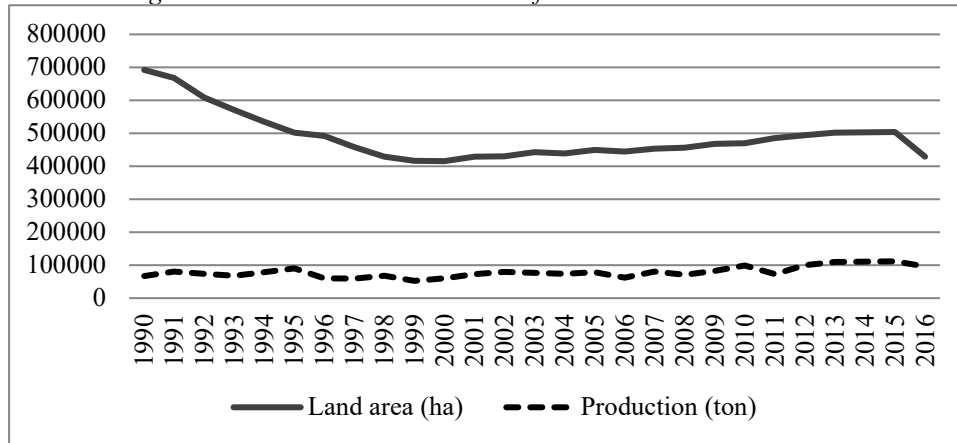
Keywords: clove, agro-industry.

1. Introduction

Indonesia is one of main clove (*Syzygium aromaticum*, syn *Eugenia aromaticum*) producers in the world. The main product of the clove plant is the flower that is harvested when it is still in buds. Indonesia usually exports the flowers in dried form. Clove is very important for Indonesian farmers because majority of clove (98%) is cultivated by small farmers [Ditjenbun, 2016]. The major areas of clove production in Indonesia are in Sulawesi, Maluku and a part of Java island.

Since 1996, clove production tend to decline because of the price uncertainty. This is brought about by the farmers' reluctance to maintain their plants, making them susceptible to pests and diseases (Agrofarm, 2013). According to Chief of Directorate General of Estates in Agrofarm (2013), among the problems of clove estate are old plants, spoiled plants, and clove diseases. In addition, the climate change, limited infrastructures, limitation of seed quality, poor quality of human resources, and farmer institutions likewise brought difficulties in increasing clove productivity. The effort to push production such as intensification, diversification and replanting policies in 2007 and also in 2018 not gave significant increase on clove production. Therefore, production of clove tend to be stable for more than two decades. Areas planted with clove also decreased since 1900 and reached at the lowest level in 2000 (Figure 1).

Figure 1. Land area and Production of Clove in Indonesia 1990-2016



Source: Directorate General of Estate (2016)

Clove production has a periodic production cycle of 4 years that is marked by a large harvest, a small harvest, and a big harvest. High production in a particular year will be followed by a decline in production in the next 1-2 years. Therefore, the production or supply of clove fluctuates. This made a big gap in price and profit of cloves in different years such as in North Sulawesi (Sondakh et.al.,2018).

Dried clove is a main ingredient for the Indonesian *kretek* cigarette or clove cigarette. The absorption of these industries reached 80-90%, meanwhile the rest only 10-20% consumed by other industries (*Infotek Perkebunan*, 2012 and *Pusat Data dan Sistem Informasi Pertanian*, 2014). Government revenues from the excise tax of cigarette industries also reached almost 147.72 billion in 2017 (Directorate General of Customs and Excise. 2017). Therefore, the government try to support clove cigarette industry through the policy related to clove. This policy support the availability of cigarette industries included clove as raw material.

One of industry made from raw materials clove product is clove oil. It can be made from the flower, stem, and leaf. Clove oil is one of essential oils that can be obtained from clove plant (*Eugenia caryophyllata* Thunb). This oil can be utilized by health, food, cosmetics, and waste treatment industries. However, all this time the essential clove oil for domestic consumption is still imported from other countries. Therefore, this agroindustry has a very high potential aside from the cigarette industry.

This research aims to analyze the policies related to clove, as well as the opportunities and challenges of alternative clove industries to be able to develop another Indonesian green-industry in the future such as clove oil industries. The results of this study are useful in describing the performance of Indonesian clove industry in the last decade, hoping to develop policies that will keep the industry alive.

Some researches related to clove oil business as agroindustry have been done by Khozali et.al (2012) in Central Java, and Arizona and Lamusa (2016) in Central Sulawesi. They found out that clove oil agroindustry provided additional income for the farmers. The said oil was sourced out from the leaves and flowers. These researches have also revealed that there was a difference in the production of clove oil between rainy season and dry season. Dry season is more favorable than rainy season in terms of clove oil production.

2. Methodology

This research utilized literatures and studies related to clove's agroindustry, as well as some policies from the last decades. The the results of several studies and the government policies related to clove are expected to illustrate the condition of the clove oil industry in terms of the business feasibility and constrains in Indonesia and find the policy solution.

3. Results and Discussion

3.1. Policies Related to Clove Agroindustry

There are many policies that have been made by the Indonesian government that has already implemented related to clove. But, there were no specific policies made for clove agroindustries.

Table 1. The Policies Related to Clove from 1996 to 2017

No	Rule/ Decision number	Contents
1	Minister of Finance Decree (KMK) 1996-1999	Establish excise tax rates and basic prices of tobacco products
2	Minister of Finance Decree (KMK) 2000-2017	Establish excise tariffs and limits on retail prices of tobacco products domestic
3	Government regulation (PP) No 109 2012	Safeguarding ingredients containing addictive substances such as tobacco products for health
4	Minister of Industry and Trade Decree No 528/ MPP/2002	Import of clove may only be done by licensed importers
5	Minister of Finance Regulation No. 84/PMK.07/2008	Utilization of Tobacco Excise Profit Sharing Funds (DBH-CHT)
6	Regulation of the Minister of Industry No. 117/M-IND/Per/10/2009	Road Map of Clusters Development of Tobacco Product Industry
7	Regulation of the Minister of Industry No. 63/M-IND/Per/8/2015	Revoke Regulation of the Minister of Industry No. 117 of 2009 and establish Road Map for Industrial Production of Tobacco in 2015-2020
8	Rules of trade ministry No. 75/M-DAG/Per/9/2015	Revoke Minister of Industry and Trade Decree No. 528 / MPP / 2002
9	Minister of Finance Regulation No. 6/PMK.010/2017	Establish tobacco import tariffs at five percent
10	Rules of Trade Ministry No. 84/Permendag/2017	Tobacco import provisions, restrictions on tobacco imports, especially Virginia, Burley and Oriental types

Source: Suprihanti et al, 2019

Majority of policies related to tobacco products such as cigarettes industry, which clove included as an ingredient on it (Table 1). Most of the policies related to cigarettes industry are in the form of excise tax, considering the important role of cigarettes in generating excise taxes for state revenues, farmers' welfare, and condition economics. The policies always changed and the amount of excise tax tends to increase every year. This aims to reduce the consumption of cigarette for health concerns. From 2009 to 2017, there were 23 policies related to excise tax for tobacco industry indirectly related to clove. Meanwhile, only 2 (two) policies were directly affecting clove products, and 2 (two) rules of tobacco import.

The policy regarding the importation of clove in 2002 ruled that it can only be carried out by licensed importers approved by the government. In its development this policy was later revoked because it had a serious impact on clove prices on farmers level (Suprihanti, 2019). Such policy made the clove price to go down sharply (Simatupang, 2003), and it also negatively affected the clove farmers' welfare (Suprihanti et.al, 2018a). The importation policy significantly influenced domestic supply of clove, and impact on clove price in the domestic market and the clove price in farmers' level.

3.2. The Opportunities and Challenges of Clove industry

One of the clove agroindustries that has a very high potential is clove oil. Clove oil can be obtained from its flowers and stems. One way to increase the added value of clove from leaf oil is by producing isolates from clove leaf oil, eugenol or its derivatives include iso-eugenol and vanillin (Yuliani, 2007). Eugenol is widely used in the food industry for fragrance and preservatives pharmaceutical industry for dental treatment. The need for eugenol for pharmaceuticals as preparations for dental treatment is still depending on imported products while those from within the country are increasingly rare was found. The quality of clove leaf oil is only slightly lower compared to flower oil or stem oil. Comparison of eugenol levels in clove oil extracted from the parts of clove were presented in Table 2.

Table 2. Comparison of eugenol levels in clove oil based on the parts of the clove plant

The sources of clove oil	Eugenol level
Flower	90 – 95 %
Stem	83 – 95 %
Leaf	82 – 87 %

Source: (Guenther, 1990)

In Indonesia, majority of the dried clove flowers were bought by the players of the cigarette industry and used as material in *kretek* cigarette. The rest of clove (stem and leaf) are sold as the main material for clove oil and can give added value for the farmers. Tropical plant research center stated that Java Island has extensive clove cultivation the area reaches ± 50,000 ha, it is estimated that it has the potential of deciduous clove leaves ± 305 tons per day or equivalent to 4.4 tons of clove leaf oil per day (Yuliani, 2007).

The production of clove oil from the leaves depends on the season. Dry season producing higher volumes of clove oil than the rainy season, thus affecting farmers profits. This is consistent with the result of some researches conducted by Khozali et.al (2012), Ronald et al (2015), and Arizona and Lamusa (2016), which showed that the clove oil agroindustries in dry season were more feasible than in rainy season. This is also in accordance with researchs that have been done in Indonesia that can be seen in Table 3 as follows.

Table 3. Some researches on Clove Oil Feasibility in Indonesia

Years	Location	Results
2016	North Sulawesi	Factory capacity Rp. 863.132.800,-. Investment capital returns in 0,63 year or 7,56 month with Break Even Point (BEP) reached 10.515,2 kg/year. The revenue at the end of the project amount Rp. 13.181.990.610,- Feasibility analysis indicated that NPV (Net Present Value) Rp. 5.353.342.926,- (more than zero), IRR (Interest Rate of Return) more than valid interest rate (18%) about 49.2 % and Benefit/Cost ratio (B/C ratio) was about 1.66 (more than 1). It means that the development of oil destilation project in Nort Sulawesi was feasible

2016	Donggala, central Sulawesi province	The monthly average income of clove leaf oil household industry during 5-month production process in Palau village was about Rp. 5.450.654. Average production of clove oil was about 287,8 kg monthly. In March (dry season), the income reached about Rp.27.253.270 and the lowest income in May (rainy season) Rp.1.675.854.
2012	Sub-District of Sukorejo, Kendal District, Central Java	Income of oil refinery in dry season as much as Rp 182.583,- each process. Meanwhile, in wet season the refiner losed about Rp 38.498,- /unit destilation. In dry season BEP of clove oil production about 16,21 Kg or BEP in rupiah about Rp 78.392,- /kg with gross B/C ratio as much as 1,13 for feasible project. Meanwhile in rainy season, BEP production of clove oil refinery about 7,75 kg or BEP rupiah as many as Rp 93.264,- /kg and gross B/C ratio about 0,94. Therefore, this project was not feasible in rainy season.
2013	South Sulawesi Province	The highly suitable area or S1 land has a potential net profit Rp 26.841.000/ha, IRR about 30,1%, and B/C about 2,16. The moderately suitable area or S2 created potential profit Rp 16.864.000/ha, IRR as much as 24,0%, and IRR about 1,73. The marginally suitable or S3 has potential profit Rp 2.723.000/ha with IRR as much as 5,9%, and B/C 1,12.
2014	Luwu District, South Sulawesi	Clove oil indutry in interest rate 18% gave B/C 1,26 and IRR 23%
2005	Karanganyar, Central Java	Level profit of clove oil industry as much as 27,67 %. Coefisien variation (CV) about 1,10 and in one processed possible loss as much as Rp 99.457,- per unit refinery . The calue of R/C from the refinery was 1,28 indicated that this refinery was efficient.
2005	Indonesia, <i>Balitbangtan</i>	Oil refining industry business at an interest rate of 18% provided B/C 1.26 and IRR of 23%

Some researchs shown in Table 3 indicated that clove oil agroindustry in North and South Sulawesi and Indonesia in general were feasible if viewed from the side feasibility indicators namely NPV, IRR and B/C. Besides, clove oil household industry gave significant additional income especially in dry season for the farmers in Sulawesi and central Java. This oil refining industries were increasingly feasible in areas that have high land suitability for clove and profitable in dry season. It caused by the production of leaves in dry season is higher than wet seasons. Therefore, the production of clove oil will increase significantly.

3.3 Indonesian Clove and the Problems of Clove Agroindustry

Indonesian clove facing problems both upstream and downstream sectors. In upsteam sector, clove productivity in Indonesia is still low because the use of superior plant material is still limited, cultivation technology applied has not followed the advice, the plant is old (over 15 years) and the attack of pests and diseases. If the plant left without maintenance and replanting, it can be feared that the existence of clove in Indonesia will gradually disappear. It will become worse cause Indonesia will lack of domestic supply of clove as raw material of cigarette industry and others. Eventually domestic needs of clove will be met from imports.

Some efforts has been done to repair and maintenance of clove plantations for garden conditions where most plant conditions are still good (minimum 75%). Plant rehabilitation is like an intensification program but only a small part of the plant's condition is still good (minimum 40%) and it is still possible to improve its condition. To support development, it is necessary to pay attention to the land and climate conditions needed by clove plants. Clove development should be directed towards areas that are suitable for growing requirements. Land suitability and climate maps can be used as a guide in direction plants should be developed.

In addition, the effect of season on clove made it worse. This is a major obstacle in the development of cloves in Indonesia. Thus, the government has given subsidies to increase clove production. Plant seeds are also provided to encourage replanting in main areas of clove production with clove seeds that have proven their resistance in the area. Potential locations for clove production in Indonesia must also be identified to increase production of clove and clove oil, and further increase the farmers' and refiners' profits.

In downstream sector, the development of clove-based industry in Indonesia is still constrained by many technical factors and problems, among them are:

1. The processing of clove (or distillation process) depends on the supply of both raw materials and clove itself. In rainy season, it is very hard to collect the raw materials in right amounts and the refinery can only process if the raw materials are sufficient for one process. If the raw materials are enough or more than sufficient, the processing can be done twice a day. The processing will take about 10 hours each. When the raw materials are difficult to find, the refiner has to collect leaves from different locations, making it inefficient.
2. There is a small scale and limited technology for clove oil distillation in the region. This leads to a quality for clove oil below the standard (Widayat, 2013) and affects the price of clove oil.
3. The prices of materials such as stem and leaves are also very low. This significantly affects the desire of the farmers to plant and produce clove and ultimately the sustainability of clove oil in Indonesia. In Java, some farmers have already turned into other plants.

From this condition, we can see clove agro-industry is difficult to develop, although the added value generated is quite high if it applied with good management. There is a lack of development of clove industry because there is no specific policy on clove from upstream to downstream.

The dependency of clove on cigarette industry impacted on the slow development of clove production. If the production of cigarettes will decline in the future, that will affect the demand for clove. Therefore, there is a need to develop other clove agroindustries to reduce dependency on the cigarette industry. In the case of Tanzania, the government has committed on developing the clove industry through policy and law reforms. The initiatives included supporting cloves purchase from the farmers, exports and production of essential oils, and increase in production and prices (Suprihanti et al, 2018a).

In the case of Indonesia, the same commitment can be applied in clove agroindustry development from upstream to downstream. The clove policy must take into account clove agroindustry development. The government has to support the development of Indonesian clove products such as essential oils and preservatives in order to increase the demand in the future. So, the dependency of farmers on the clove cigarette industry can be minimized and the farmers' socio economic status will be further improved.

4. Conclusion

The results of the study indicated that in the future, the development of other clove processing industries such as essential oil is very potential. All this time, the policies that related to cloves focus on the needs of clove as raw material of cigarette industries rather than on the need of alternative clove industries. Therefore, the development of other clove processing industries has to receive serious attention from the government both upstream and downstream sectors. The development of processed clove agro-

industry is expected to encourage green industry and increase Indonesian clove exports and the clove farmers income.

References

- Agrofarm. 2013. *RI Impor Cengkeh- 40 Ribu Ton*. 20 December 2013. Available from: <http://www.agrofarm.co.id/read/perkebunan/250/ri-impor-cengkeh-40-ribu-ton/>
- Arizona dan Lamusa. 2016. Analisis Pendapatan Industri Rumah Tangga Penyulingan Minyak Daun Cengkeh di Desa Palau Kecamatan Balaesang Tanjung Kabupaten Donggala. *e-J. Agrotekbis* 4 (4) : 461–467, Agustus 2016 ISSN: 2338-3011 pp. 461-467.
- Badan Penelitian dan Pengembangan Pertanian. 2005. Prospek dan Arah Pengembangan Agribisnis: Cengkeh. Departemen Pertanian. Jakarta. Available from: www.litbang.pertanian.go.id/special/komoditas/b4cengkeh.
- Directorate General of Customs and Excise. 2017. *Laporan Kinerja Direktorat Jenderal Bea dan Cukai Kementerian Keuangan*. Available from: <http://www.repository.beacukai.go.id/download/2018/03>.
- Directorate General of Estate. 2014. *Tree Crop Estate Statistics of Indonesia, Clove Commodity 2013-2015*. Jakarta: Secretariat of Directorate General of Estate, Ministry of Agriculture.
- Directorate General of Estate. 2016. *Tree Crop Estate Statistics of Indonesia, Clove Commodity 2015-2017*. Jakarta: Secretariat of Directorate General of Estate, Ministry of Agriculture.
- Guenther E. 1990. *The Essential Oils Vol III*. New York: Robert E Krieger Publ. Co. Inc Huntington.
- Infotek Perkebunan. Vol 4 (11), December 2012. Kebutuhan Cengkeh Untuk Industri Rokok. Kretek. Available from: <http://perkebunan.litbang.pertanian.go.id>. Download 15 March 2016.
- Isnaeni, Anisa and Sugiarto Yon. 2010. Crop Land Suitability for Clove (*Eugenia aromatica L.*) Based on Agroclimate Aspects and Economic Feasibility (Case Study: South Sulawesi Province). *Journal Agromet*. Vol 24 (2): 39-47. <http://journal.ipb.ac.id/index.php/agromet>.
- Khozali, Supardi, Hastuti. 2012. Analisa Usaha Penyulingan Minyak Daun Cengkeh (*Syzygium aromaticum, syn. Eugenia aromaticum*) (Studi Kasus di Kecamatan Sukorejo Kabupaten Kendal). *Jurnal Mediaagro*. Volume 8. no. 2, 2012. pp 32 – 42
- Ministry of Agriculture. 2014. Outlook Komoditi Cengkeh, Jakarta: Pusat Data dan Sistem Informasi Pertanian, Sekretariat of Directorate General- Ministry of Agriculture
- Pusat Data dan Sistem Informasi Pertanian. 2014. *Outlook Komoditi Cengkeh*. Kementerian Pertanian. Jakarta.
- Ronald, Abdul Majid, Maulina, Rukavina Baksh, Dance tangkesalu. 2015. Pengembangan Strategi Usaha Penyulingan Minyak Daun Cengkeh di Desa Sabang Kecamatan Dampelas Kabupaten Donggala. *E-J. Agrotekbis* Vol.3 (4): 521-528

- Simatupang P. 2003. Opsi Kebijakan Menulihkan Anjlok Harga Cengkeh. *Jurnal Analisis Kebijakan Pertanian*. 1 (4): 297-305.
- Sondakh J., Lintang M., Janne H.W. R., Layuk P., Kindangen J.G., 2018. Perkembangan komoditi cengkeh di Sulawesi Utara *dalam* Sinergi inovasi memperkuat pertanian rakyat berbasis tanaman perkebunan dan rempah-rempah. IAARD Press. Pasandaran E., Syakir M., Yufdy MP., (editors). <http://press.litbang.pertanian.go.id/images/pdfbuku/2018/Sinergi-Inovasi-Perkebunan-dan-rempah.pdf>. Accessed 2.12.2019.
- Sugiyanto, Joko. 2005. Analisis Usaha Penyulingan Minyak Cengkeh (*Eugenia caryophyllus*) di Kabupaten Karanganyar. *Skripsi*. Universitas Sebelas Maret (UNS). Sukakarta. Indonesia
- Sulaiman A A, Subagyo K, Pakpahan A, Soetopo D, Bermawie N, Hoerudin, Prastowo B, Syafaat N. 2018. *Membangkitkan Kejayaan Rempah Nusantara*. IAARD Press. Badan Penelitian dan Pengembangan Pertanian. Jakarta
- Supriatna A.S, Rambitan U.N, Sumangat, D dan Nurdjannah. 2004. Analisis Sistem Perencanaan Model Pengembangan Agroindustri Minyak Daun Cengkeh: Studi Kasus di Sulawesi Utara. Pp 1-18. <http://ejurnal.litbang.pertanian.go.id/index.php/bultro/article/view/1984/5416>. Accessed 13.11.2019.
- Suprihanti, A., Harianto. Sinaga, BM., Kustiari, R . 2019. Dampak Faktor Eksternal dan Internal terhadap Pasar Tembakau, Cengkeh, dan Rokok Kretek serta Surplus Ekonomi. *Disertation*. IPB University. Accessed <https://repository.ipb.ac.id/handle/123456789/98590>
- Suprihanti, A., Harianto. Sinaga, BM., Kustiari, R., 2018a. The Impact of Clove Import Policy on Clove Market and Cigarette Production in Indonesia. The 4th International Conference on Food and Agriculture Resources (FANRes 2018). *Advances in Engineering Research*, Vol 172. pp. 274-279. *Atlantis Press*.
- Suprihanti, A., Harianto. Sinaga, BM., Kustiari, R . 2018b. The Impact of Cigarette Excise Tax Policy on Tobacco Market and Clove Market in Indonesia. *International Journal of Economics and Financial Issues*. Vol 8 (6): 54-60. DOI: <https://doi.org/10.32479/ijefi.7228>
- Suprihanti, A. 2018. *The Dynamics Agribusiness of Indonesian Cigarettes and Its Implication on Tobacco and Clove Market*. International Conference “Strengthening Indonesia Agribusiness: Rural Development and Global Market Linkages. Bogor Indonesia, 25-26 April 2016.
- Isnaini dan Sugiarto. 2010. Kajian Kesesuaian Lahan Tanaman Cengkeh (*Eugenia aromatica* L.) berdasarkan Aspek Agroklimat dan Kelayakan Ekonomi (Studi kasus Provinsi Sulawesi Selatan). *Jurnal Agromet* 24 (2): 39-47
- Kemala, S. 2004. Status Tanaman, Produksi dan Penggunaan Cengkeh. *Jurnal Littri*. Vol 10 (2). Pp 59-65.
- Widayat, Bambang Cahyono, Hadiyanto, and Ngadiwiyono. 2013. Diversifikasi Minyak Cengkeh menjadi Fine Chemical. Prosiding Seminar Rekayasa Kimia dan Proses 28-29 Agustus 2013, ISSN : 1411-4216 Jurusan Teknik Kimia Undip Semarang, http://eprints.undip.ac.id/48688/1/Artikel_srkp_2013_Widayat.pdf

Yuliani, Sri. 2007. *Vanilin dari Limbah daun Cengkeh*. Media: Sinar Tani, 22 Agustus 2007 Available from: www.litbang.pertanian.go.id/artikel/173/