# Impact of Domestic Policies on Indonesia's Sugar Competitiveness

Baida Soraya[1], Sri Hartoyo[2], Hermanto Siregar[3], Harianto[4]

[1] Study Program of Agricultural Economics, Graduate School of Bogor Agricultural University, Jl. Kamper Wing 5 Level 4, Darmaga, Bogor, Indonesia

[2, 3, 4] Study Program of Agricultural Economics, Faculty of Economics and Management, Bogor Agricultural University, Jl. Kamper Wing 5 Level 4, Darmaga, Bogor, Indonesia

**Abstract - Indonesia as one of the most populous countries has high sugar consumption rate. Indonesia sugar consumption rate is continue to surging. In contrast, domestic production could not satisfy the demand and Indonesia need to import sugar. In 2020, Indonesia is predicted to proceed import 4400 thousand MT raw sugar. Indonesia will continue to import sugar because sugarcane output is predicted to fall in 2019/20 due to dwindling land availability. In addition, the majority of Indonesia's sugarmills is over than a hundred year and lead to low sugar's extraction rate to only 6.9%. This research examines Indonesia's sugar competitiveness using Policy Analysis Matrix. Indonesia's Domestic Cost Ratio is 2.04. The number means that Indonesia's domestic sugar production, compared to foreign country, is twice costly. Social price of sugar in Indonesia was half of retail sugar price in domestic market. The total social loss of the Indonesian sugar sector was 16 128 thousand rupiahs per hectare per planting season. Farmers, consumers, and the government all have to subsidize the production of domestic sugar. If the domestic price of sugar is equal to world price, consumers do not have to pay 11 772 thousand rupiahs more to meet their sugar needs. Policy scenario of sugarmills revitalization which could increase sugar extraction rate up to 10%, compared to usual rate at 6.9%, could double both private and social revenue of a sugarcane plantation.**

**Keyword - PAM Analysis, Sugar Competitiveness, Sugar Extraction Rate, Import, Production.**

## I. INTRODUCTION

Indonesia as the third most populous country in the world become one of the highest sugar consumption rate. Sugar consumption in 2017/18, both household consumption and food and beverage industry, amounted to 6378 thousand tons. Consumption continues to increase to 6670 thousand tons in 2018/19. Indonesia's sugar consumption is estimated to continue to increase along with population growth, especially the middle class. Sugar consumption is expected to reach 6800 thousand tons until the first semesater of 2020. On the other hand, high consumption is not met by domestic production. Domestic production over the past three years has only reached one third of domestic consumption, which is around 2100 thousand tons in 2017/18. This figure is expected to continue until the middle of 2020. (McDonald and Meylinah 2019).

Low production is mainly due to yearly dwindling sugarcane planting area. Only in 3 years, there was 10 percent declining of Indonesia's sugar cane area. In 2015, the total area of 472.68 ha fell to 420.15 ha in 2017. The largest decrease occurred in state plantations. The area of state sugarcane plantations within 4 years, starting in 2013, decreased to almost 30 percent or decreased by 21.53 ha.

The same thing also happened to smallholder plantations, the area in 2013 amounted to 262.28 ha decreased to 227.85 in 2017. Meanwhile, the area of private plantations had increased in 2015 which was 136.68 ha compared to in 2013 which only to 119.65 ha. However, in the following two years there was a decline. The total area in 2016 became 131.19 ha and returned to 123.75 ha in 2017.

The decreasing of Indonesia's sugarcane productivity is worsen by the sugarcane mills which do not produce efficiently. 40 local sugar cane mills are more than 100 years old. Only 6 factories are less than 25 years old. On average, , the capacity of that sugarmills is only 3,9 thousand tons of sugarcane per day with around 7.1 percent extraction rate. This performance was low compared to the ASEAN one country, Thailand. Thailand has 50 sugarmills, each capacity reach 94 thousand tons of sugarcane per day with around 11.82 percent extraction rate (Wright and Meylinah 2016). Meanwhile, Indonesia's more modern sugar mills aged 3 to 12 years only process imported raw sugar into refined sugar.

Gap between production and consumption requires Indonesia to import sugar to meet its domestic demand. Raw sugar is the most imported sweetener product by Indonesia. Raw sugar import in 2017/18 reached 4154 thousand tons. Imported raw sugar is then processed by Indonesia's sugarmills into refined sugar to supply food and beverage industry needs. Until 2020, Indonesia is expected to continue to import raw sugar for around 4400 thousand tons. Since 2016, Indonesia has become the world's number one sugar importer, beyond China.

The competitiveness or comparative advantage of a region's commodities was the main reason for trade transactions between regions or countries. However, comparative advantage is dynamic. Not always shall a country become the top of productivity. It is mandatory that continuous improvement and technology updating maintain the competitiveness. At the same time, to improve competitiveness, the government could controls and regulates the sugar industry with various regulations. However, various Indonesia's sugar policies generally are

$$DRC = \frac{DFC_{SV}}{(R_{SV} - TIC_{SV})}$$

DRCR: Domestic Resource Cost Ratio ; $DFC_{SV}$: domestic factor cost of social value; $R_{SV}$: total acceptance of social value; $TIC_{SV}$: tradable input costs with social values. PCR:

distorted. Not only in Indonesia, the world sugar market is one of the most distorted agricultural commodity markets.

## II. METHOD

The analyzed variables are variables which theoretically or empirically are able to explain Indonesia's sugar sector performance. Financial value and economic value are calculated based on the average cost structure of Indonesia's sugarcane planting. These values are a source of analysis of Indonesia's sugar competitiveness through indicators of DRCR (*Domestic Resource Cost Ratio*) and PCR (*Private Cost Ratio*). Data sources from various publications and reports published by the *Central Statistics Agency*, Bank Indonesia, USDA, *World Bank* , OECD, Ministry of Trade and Ministry of Agriculture.

### A. Analysis Method

The Policy Analysis Matrix model developed by Monke and Pearson (1990) is a model that can be used to measure comparative and competitive advantage. PAM can also measure government interventions and their impact on commodity agribusiness systems systematically and comprehensively. The stages of the PAM method are: (1) identification of sugarcane farming input, (2) determine the shadow price of sugarcane farming input and output, (3) sorting out costs into tradable and domestic groups, (4) calculating sugarcane farming revenue, and (5) calculate and analyze various PAM indicators.

The equation of shadow price of domestic currency exchange rate is:

$$SER_t = \frac{OER_t}{SCF_t}$$

$SCF_t$ : (Shadow Conversion Rate) = (Xt + Mt) / ((Xt + Txt) + (Mt + TMt)); $OER_t$ : Official Exchange Rate . SER: Year's shadow exchange rate t (IDR / USD); $SCF_t$: Standard conversion factor t; $X_t$: Indonesia's export value in t (Rp); $M_t$: Indonesia's import value in t (Rp); Txt: Export tax receipts for year t (Rp); Tmt: Import tax receipt year t (Rp).

Competitiveness analysis will be carried out starting from the farm level through DRCR and PCR indicators.

$$PCR = \frac{DFC_{PV}}{(R_{PV} - TIC_{PV})}$$

Private Cost Ratio ; $DFC_{PV}$: domestic factor cost of private value; $R_{PV}$: receipt of total private value; $TIC_{PV}$: tradable input costs with private values.

Table 1 Policy Analysis Matrix

| Description | Reception | Cost | | Profit |
|---|---|---|---|---|
| | | *Tradable input* | *Domestic factor* | |
| Private Value | A | B | C | D [1] |
| Social Value | E | F | G. | H [2] |
| Impact of Policies and Market Distortion | I [3] | J [4] | K [5] | L [6] |

1. Private profit D = ABC
2. Social Profit H = EFG
3. Output transfer I = AE
4. Input transfer J = BF
5. Factor transfer K = CG
6. Net transfer L = DH or IJK

## III. RESULTS

Indonesia's sugar performance, from production, harvested area, consumption, to trade, continues to experience ups and downs and changes from time to time. Sugar production by local farmers, decreased significantly in 1998. From 1980 to 1997, sugar production continued to increase with an average growth of 3.68% per year. But in 1998, production fell by 32.10% compared to the previous year. Production fell by 660 thousand tons. Economic data for Indonesia's sugar can be seen in Table 2.

Table 2 Economic Characteristics of Indonesian Sugar in 2007-2016

| Description | Unit | Average value | Average Growth (%) |
|---|---|---|---|
| Production | Thousand Tons | 2,534.08 | 3.75 |
| Harvested area | 000 Ha | 449.53 | 1.67 |
| Productivity | Ton / ha | 5.40 | 1.42 |
| Sugar extraction rate | % | 6.93 | 0.29 |
| Local price | IDR / kg | 9,800 | 14.15 |
| Import Volume | Thousand Tons | 2,079.63 | 17.95 |
| Import Value | USD | 1010.18 | 18.18 |
| Domestic consumption | Thousand Tons | 3,641.93 | 9.87 |

Source: Ministry of Agriculture 2016 (processed)

Best performance of sugar productivity was achieved by private plantations, compared to smallholders' plantations and state plantations, which amounted to 5.71 tons / ha, 5.52 tons / ha, and 5.39 tons / ha. East Java has until now become a national sugar barn with an average production from 2012-2016 of 1.28 million tons or accounted for 49.14% of the domestic sugar supply. Meanwhile, Lampung contributed 768 thousand tons of national sugar production in 2014. (Ministry of Agriculture, 2016)

During 2017, total value of Indonesia's sugar imports is USD 56 968.8 thousand with 109 147.8 tons total volume (BPS a 2017). Thus, the cost of Indonesian sugar imports was USD 0.521 / kg. Social prices at the farm level were obtained by converting the value of imports using shadow exchange rate Rp. 13 481.02 / USD. Social price of sugar is Rp. 6346 / kg. This price was half of retail sugar price in domestic market.

Table 3. Analysis of Sugarcane Plantation's Revenue, Input Costs, Private and Social Profitability, 2017

| Description | Reception | Cost | | Profit |
|---|---|---|---|---|
| | | *Tradable input* | *Domestic factor* | |
| Private Value | 32 114 | 4 060 | 31 610 | -3 556 |
| Social Value | 20 942 | 5 460 | 31 610 | -16 128 |
| Divergence | 11 772 | -1 400 | 0 | 12 572 |

Table 4. Other Indicators

| DRCR | PCR | NPCO | NPCI | EPC | PC | SRP |
|------|------|------|------|------|------|------|
| 2.04 | 1.12 | 1.53 | 0.74 | 1.81 | 0.22 | 0.60 |

DRCR of 2.04 means that every time Indonesia imports sugar worth USD 1, domestic production costs USD 2.04. This figure also means that both consumers and producers will pay double if all sugar demand satisfied domestically. The total social loss of the Indonesian sugar sector was Rp. 16 128 thousand per hectare per planting season. Farmers, consumers, and the government all have to subsidize the production of domestic sugar. If the domestic price of sugar is equal to world price, consumers do not have to pay Rp 11 772 thousand more to meet their sugar needs.

PCR number greater than one indicates that domestic sugar production brings losses to producers, rather than profit. Various causes ranging from limited land area to sugar cane mills which produce inefficiently. In addition to domestic factors, several studies also mentioned that the world's main sugar exporting countries received subsidies from the government. Subsidies in the form of direct transfers or various trade protections. Guaranteed purchase prices to export subsidies make world sugar prices continue to fall, even lower than domestic sugar prices.

Government intervention in the sugar sector can be seen from the value of Output Transfer. A positive value indicates that government policy makes domestic sugar sector less profitable. Policy distortion also occurs by looking at NPCO numbers greater than one. Consumers must pay more than the opportunity cost.

For tradable inputs, domestic policies usually were the taxes or subsidies. Indonesia was a fertilizer exporter country. The same fertilizer is also used in sugarcane farming. The input transfer number which is negative and the NPCI number smaller than one indicates that the government issued subsidies for tradable inputs used by sugar cane farmers. The amount of subsidy is IDR 1,400,000 per hectare per planting season.

Government policies protecting domestic sugar sector can be measured by EPC figure. EPC greater than one shows that the government has not been able to protect producers and consumers from cheaper import output prices. At the same time, the government also failed to protect, especially protect the farmers, from the more expensive domestic inputs price than their export prices.

Meanwhile, SRP illustrates whether government policies have an impact on production costs. The figure of 0.60

shows that the Indonesian government's policy has increased domestic sugar's social revenue by up to 60 percent. Thus, directly or indirectly, Indonesia's sugar policy has provided incentives for other countries to export sugar to Indonesia. Government policies have actually benefited import activities and triggered an increase in sugar imports. This will further hamper food self-sufficiency and national sugar export promotion.

PC numbers, the closer the number to one, the more effective government policy. There is no gap between prices that occur in the market, with or without government interference. For the Indonesian sugar sector, PC numbers almost zero indicate a distortion of government policy that causes significant losses. Losses that have a good impact on producers to consumers. This figure can also be a signal of bias allocation of government subsidies (Nelson and Panggabean 1991).

Not only in Indonesia, world sugar commodity market is one of the most distorted markets compared to other agricultural commodities. Various environmental and social issues affect the sustainability of the sugar industry from production, cultivation, farmers, factories, to food and beverage industry and its policies. The world sugar market has different characteristics, significant and influential at the domestic level such as trade policies, price guarantees, production controls, tariffs, import quotas and export subsidies. Although in 2011 the sugar price began to rise, the world sugar market remained vulnerable to large demand with different levels of price volatility. ( Nyberg 2006)

### B. Impact of Government Policies

Indonesia's sugar sector is inseparable from the impact of government policies that can affect farmers' revenue. The sensitivity analysis aims to see how the effect of changes in social revenue and social costs on the comparative advantage of products in an area. In Table 4 it can be seen that in order to be able to compete with imported sugar, farmers must receive input subsidies of up IDR 10 668 thousand rupiah per hectare per planting season. It was a very high subsidies if they have to be borne by the government. Not only the government, subsidies will also be borne by taxpayers who are also sugar consumers. With subsidies from the government, producers can increase their

social income by 77 percent. Initial revenue of 20 942 thousand rupiah, increased to 37 070 thousand rupiah.

Table 5 Sensitivity Analysis of Changes in Social Revenue

|  | Base value | Current value of DRCR = 1 | Change (%) |
|---|---|---|---|
| Social Revenue | 20 942 000 | 37 070 000 | 77.01 |
| Social Tradable Input | 5 460 000 | -10 668 000 | -33.85 |

Sugar production growth in developing countries was fairly slow, the International Sugar Organization (ISO) states that the growth of sugar production in developing countries was only one percent per year in the last decade. The proportion of production for developing countries decreased from 32 percent in 1989 to 25 percent in 2005. The decline in the proportion of sugar production in developed countries occurred only in European countries because the sugar policy regime continued to be reformed, thereby reducing sugar output and total exports.

Sensitivity analysis can be used to see how policy changes can affect Indonesia's sugar competitiveness. The impact of policy changes both economically and financially can be seen in Table 5.

Table 6 Sensitivity Analysis of Social and Private Values of Indonesian Sugar Sector

| No | Policy Scenario | Reception (000 Rupiah) | | DRCR | PCR |
|---|---|---|---|---|---|
| | | Private | Social | | |
| | Base value | 32 114 | 20 942 | 2.04 | 1.12 |
| 1 | The yield went up to 10 percent | 46 884 | 31 343 | 1.15 | 0.76 |
| 2 | Government Purchase Prices fell 20 percent | 39 458 | 20 834 | 1.88 | 0.92 |
| 3 | Combination of scenarios 1 and 2 | 36 067 | 29 343 | 1.25 | 1.03 |
| 4 | Import tax rises 20 percent | 32 009 | 21 490 | 1.81 | 1.19 |
| 5 | A combination of scenarios 1 and 4 | 46 652 | 34 068 | 1.12 | 0.76 |
| 6 | Combination of scenarios 3 and 4 | 36 067 | 30 268 | 1.20 | 1.03 |

When government renewed sugar cane mills which were able to produce sugar extraction rate up to 10 percent, the results showed that Indonesia's sugar competitiveness was much better than before. The increase in extraction rate increases the sugarcane farmers' social income almost 100 percent, from IDR 20 942 thousand to IDR 32 114 thousand. DRCR figures also improved, from the previous 2.04 to 1.25. The closer DRCR to zero, the more competitive Indonesia's sugar and it will be equal the competitiveness of the world's sugar exporting countries.

DRCR was still far away from one when there was a policy of 20 percent provenue price reduction. When this policy is implemented, the cost of domestic sugar production is almost double that of world sugar prices. Provenue price was one of protection form in the term of price certainty given to producers and sugar factory farmers. According to Sudana (2002), it has been twenty years since it was first implemented, the policy did not benefit farmers. Real provenue prices received by farmers are not able to encourage an increase in sugarcane farming income. Provenue price policy also cannot increase farmers' purchasing power.

When domestic policies are combined with protection policies, we can see beneficial effects for farmers. If the government is able to facilitate farmers to increase sugar extraction rate by 10 percent, on-farm to off-farm , and increase import tariffs by 20 percent, then social revenue at the farm level will almost double compared to before. DRCR was the smallest of all policy scenarios, which is 1.12 percent.

A better improvement also occurs if sugar extraction rate improvement was combined with a 20 percent reduction in provenue prices and import tax increase up to 20 percent. However, the increase in income both socially and privately is not as large as an increase in income of sugar extraction rate improvement. The income earned, social and private, from the combination of these three scenarios is 36 067 thousand and 30 268 thousand rupiah, respectively.

Ups and downs sugar extraction rate depends on several factors. They are the quality of harvesting process, time lag between sugarcane harvesting and sugarcane mill-processing, also the efficiency of processing activity in a sugar mill. Strategies to increase productivity and sugar extraction rate can be pursued through optimization of cultivation systems (seeds, fertilization, planting technique), cutting and milling appropriately, increasing factory efficiency, strengthening farmer institutions, factory-to-farmer transparency, yield absorption guarantee, tightening refined sugar distribution, and synergy between related institutions (Subiyakto and Mulyaningsih 2014).

Factors that significantly influence domestic sugar productivity are sugar extraction rate and sugar mill capacity. Ernawati and Suryani (2013) stated that an increase in sugar extraction rate and production capacity could increase sugar production by 5% and reduce import dependency by 17%. By making improvements in both aspects, on-farm through yields improvements and off-farm through sugarmill capacity improvement, production becomes more efficient and no more postpone in sugarcane milling.

The continues dwindling of land availability is also related to the inefficiency of Indonesia's sugarmills. It was the reason behind farmers preference to plant rice or corn which bring much more revenue. The majority of sugar cane plantations in Indonesia are owned by individuals, almost 95 percent of the sugarcane plantations in Java. The nature of land ownership owned by these individuals is vulnerable to land conversion, where farmers prefer productive plants other than sugar cane and the high land value due surging housing demand as well as commercial buildings, causing a decline in Indonesian sugarcane production. The continous decline in sugar cane planting land has become a significant factor that is hampering the development of the Indonesian sugar industry. (Wright and Meylinah 2016)

The gap between domestic production and consumption makes Indonesia the largest sugar importer country in the world. Indonesia imports two types of sugar white sugar and refined sugar which in the last ten years has been imported for household consumption also food and beverage industries. Types of imported sugar are not differentiated or considered to as the same category as imported sugarcane basis product. Latest regulation of sugar import duty is Minister of Finance Regulation No.116 / PMK.010 / 2017. In this regulation, white sugar for consumption without flavoring or coloring agents addition (1701.99.90) is subject to IDR 0 import duty. Import tax or import tariffs reduction policy will skyrocket Indonesia's total sugar imports by 19.15 percent. The next impactS of high import volume are declining domestic sugar price, dwindle sugarcane plantation area and eventually Indonesia's sugar production will decrease (Rahman 2019).

Indonesia is a country that has a high food import dependency. Because of it, Indonesia easily suffer from food crisis (Kis-Katos and Sparrow 2015; Martin 2017). If food trade liberalization is implemented, Indonesia will pay high costs when the country is unable to guarantee the stability of food supply for the community (Brooks and Matthews 2015; Farsund et al 2015; Gillespie and van den Bold 2017). In addition, labor force in food sector is quite dominant in Indonesia, the number of smallholders reaches 21 million households (Rachbini, 2006). On the other hand, farmers' role and presence as the main actors of agricultural activity are often vulnerable. Weak bargaining position and lack of attention from government (Purwanto 2015; Slimane et al 2016; Tinta et al 2018).

The importance of sugar self-sufficiency is at least caused by several things, such as (1) fulfilment of national sugar demand, both for direct consumption and industry, (2) optimal Indonesia's resources and assets utilization based on the principle of regional competitive advantage and national efficiency, (3) improve farmers' welfare and other stakeholders, finally (4) expand employment opportunities as well as business opportunities in rural areas, it will bring positive impact on poverty eradication.

## IV. CONCLUSION

1. The competitiveness of Indonesia's sugar sector is so low with DRCR reached 2.04, which means domestic sugar production cost is double than imported sugar price.
2. Sensitivity analysis shows that sugar mill capacity improvement can surge Indonesia's sugar competitiveness. Sugar extraction rate up increasing to 10 percent could increase farmers' financial income up to IDR 46 884 thousand per hectare and economic income up to IDR 31 343 thousand per hectare.

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