

Down-Streaming Impact to the Competitiveness of Indonesia Cocoa

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Abstract

The objective of this paper is to provide qualitative and quantitative analysis on the competitiveness of Indonesia cocoa beans post down-streaming push by the Government of Indonesia. Indonesia cocoa has been part of the top three producers and exporters of global cocoa beans and had been shifting into cocoa processed products to create more value. Quantitative analysis from upstream perspective measures the supply concentration and competitive advantage using The Four-Firm Concentration (CR4), Herfindahl-Hirschman Index (HHI), and the model of Revealed Comparative Advantage (RCA) while value creation impacted by down-streaming is based on published data during the period of 2012-2021. The qualitative analysis uses the framework of Global Competitiveness Index to measure the competitiveness gap of Indonesia cocoa sector based on interview with Indonesia cocoa experts consisted of respected government officer, academic, researcher, cocoa trader association, and cocoa farmer association. The result concludes the domination of top four countries on supply side has shifted from “moderately concentrated” to “highly concentrated”; and confirms the improvement of Indonesia cocoa from value creation perspective by down-streaming the export product. Competitiveness gap analysis compares the current condition with ideal condition of industry; as a result, identify there are one area that in line with sectoral environment and three major areas that need to be resolved to close the competitiveness gap especially in the area of productivity and efficiency, institutional framework, and prices. Government should continue the capacity building program to improve smallholders’ capability and monitor the implementation of warehouse receipt program to ensure the partiality to cocoa smallholders.

Keywords: Competitiveness, Down-streaming, Indonesia Cocoa, Supply Concentration

Abstrak

Tulisan ini bertujuan untuk menyajikan analisa kualitatif dan kuantitatif dari daya saing kakao Indonesia pasca upaya hilirisasi yang dilakukan oleh Pemerintah Indonesia. Kakao Indonesia selalu menjadi bagian dari tiga besar produsen dan eksportir biji kakao secara global dan dalam kurun beberapa waktu terakhir melakukan upaya pergeseran dari ekportir biji kakao menjadi produk turunan kakao dalam rangka menciptakan nilai tambah. Analisa kuantitatif dari perspektif hilirisasi mengukur konsentrasi pasokan dan keunggulan daya saing menggunakan *Four-Firm Concentration* (CR4), *Herfindahl-Hirschman Index* (HHI), *Revealed Comparative Advantage* (RCA) serta nilai tambah dari dampak hilirisasi dengan menggunakan data yang dipublikasikan selama periode 2012-2021. Analisa kualitatif menggunakan kerangka kerja *Global Competitiveness Index* untuk mengukur kesenjangan daya saing dari sektor kakao Indonesia melalui proses wawancara dengan para pakar kakao antara lain pejabat terkait, akademisi, peneliti, asosiasi pedagang kakao, dan asosiasi petani kakao. Hasil penelitian menyimpulkan bahwa dominasi dari empat besar negara pemasok kakao telah bergeser dari cukup terkonsentrasi menjadi sangat terknsentrasi; dan memberikan konfirmasi bahwa kakao Indonesia berhasil menciptakan nilai tambah melalui hilirisasi produk ekspor. Kesenjangan daya saing yang membandingkan antara kondisi saat ini dengan kondisi ideal terutama di area produktivitas dan efisiensi, kerangka kelembagaan, dan harga. Pemerintah perlu melanjutkan program peningkatan kapasitas petani serta melakukan pengawasan terhadap program resi gudang bisa berjalan dengan baik dan memastikan keberpihakan kepada petani kakao.

Kata kunci: Daya Saing, Hilirisasi, Kakao Indonesia, Konsentrasi Pasokan

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INTRODUCTION

It has been decades since some countries dominated the supply of cocoa beans. According to the availability of data at FAO, the top three exporter countries (Cote d'Ivoire, Ghana, and Indonesia) dominated the global market share of cocoa bean production in the range of 67% to 69% during the decade of 2012-2021 (Food and Agriculture Organization of the United Nations, 2023) The domination of those countries is presented in Table 1.

Table 1. Global cocoa beans production market share (Food and Agriculture Organization of the United Nations, 2023)

Market Share	Percentage (%)									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Côte d'Ivoire	32,21	32,30	34,54	37,28	35,19	39,42	38,86	40,69	38,06	39,42
Ghana	19,06	18,62	18,11	17,83	18,49	18,79	16,64	14,78	18,11	14,73
Indonesia	16,05	16,07	15,36	12,32	14,14	11,45	14,11	13,38	12,47	13,05
Nigeria	8,30	8,18	6,96	6,27	6,42	4,85	4,96	4,55	5,02	5,02
Brazil	5,49	5,71	5,77	5,78	4,61	4,57	4,40	4,72	4,67	5,41
Cameroon	5,83	6,13	5,68	6,43	4,54	4,77	4,60	5,10	4,84	5,20
Rest of the countries	24,39	24,83	25,04	26,31	25,76	25,49	25,43	26,60	26,35	27,78

Some studies explore the country's competitiveness of global cocoa and highlight that although the comparative competitiveness of Indonesian cocoa beans and processed cocoa is lower than that of other producing countries, Indonesia still has the potency to develop the market for its cocoa products in several countries (Fahmid et al., 2022a). Some research shows that Indonesia has a comparative advantage as an exporter of cocoa beans in the international market (Nisa et al., 2023) as well as derivative products such as cocoa paste, cocoa butter, and cocoa powder (Hariyati & Daqianus, 2023), focus on Indonesia's competitiveness by comparing the RCA of other three countries and concluded that top four exporter countries have a comparative advantage. However, some countries have higher RCA (Fahmid et al., 2022b; Hapsari & Yuniasih, 2020). It concludes that expansion to processed cocoa export could improve the competitiveness of Indonesian cocoa, while Field Hariyati & Daqianus (2023) state that the benefit of value added in processed cocoa should be appropriately distributed to the smallholders. Some facts from another country are that from 1995 to 2018, Nigeria's cocoa exports were still competitive despite experiencing some declining stages (Abdullahi et al., 2022). The RCA of cocoa exports from Nigeria fluctuated from the 1990s to the 2000s, triggered by the political condition in this country (Azorji et al., 2021). There was an Implementation of a Structural Adjustment Program (SAP) in the 1990s with a positive impact on the RCA, followed by the change in government from military to civilian along with a decreasing trend in RCA in the 2000s. The relatively lower RCA figures for processed cocoa exports in the period of 2000s compared to the previous period could be attributed to the increasing global demand for cocoa beans for grinding (which attracts the export of raw products) (Abukari & Cunfeng, 2021; Boamah et al., 2019; John-Eudes et al., 2021), inefficiencies in domestic processing due to low capacity, the decreasing share of Ghana in world grindings due to intensifying competition from uprising and significant competitors, and increasing domestic demand for processed cocoa products which consequently reduces the quantity of processed cocoa products exported (Abukari & Cunfeng, 2021; Boamah et al., 2019; John-Eudes et al., 2021), and revealed the fact that most of the producer countries are developing countries while the producer countries of final products are based in developed countries as can be seen on Table 2, implies the existence of technology gap on cocoa global value chain (Nabhani et al., 2015).

This article will analyze the market structure of global cocoa beans from an upstream perspective using HHI and CR4 to measure the supply concentration on the production side, which also implies the ability of such countries to manage or improve their productivity level, an additional tool is the Revealed Comparative Advantage (RCA) with the purpose to compare the production of respective countries as percentage of GDP to determine their dependency on this commodity to total export value, and lastly a comparison of upstream and downstream value to get a profile on the impact of down-streaming effort by specific country to the value-added into total export value.

Table 1. Top Ten Chocolate Producers (Candy Industry, 2021)

Company	Net Sales 2020 (US\$ millions)
Mars Wrigley Confectionery, division of Mars Inc (USA)	20,000
Ferrero Group (Luxembourg / Italy)	13,566
Mondelēz International (USA)	11,467
Meiji Co Ltd (Japan)	10,075
Hershey Co (USA)	8,066
Nestlé SA (Switzerland)	7,636
Chocoladenfabriken Lindt & Sprüngli AG (Switzerland)	4,574
Pladis (UK)	4,655
Lindt & Sprungli AG	4,331
Ezaki Glico Co. Ltd.	3,311

RESEARCH METHOD

Quantitative Analysis

Quantitative methodologies measure the supply concentration of cocoa beans throughout 2012-2021 (based on the availability of data in the FAO Stat site) and the competitive advantage of the respective country in cocoa beans commodity. Another variable to compare with is the average contribution to GDP (AVGDP) during that period. Data to be analyzed is available on FAO and UN Comtrade sites.

The concentration ratio is a standard tool to measure how much of the total output in an industry is produced by the largest firms in that industry. This paper uses the model of four-firm concentration ratio (CR4) and Herfindahl–Hirschman Index (HHI), which are normally used to measure the concentration in specific industries, but in this case, will be applied to the global market level and put the producer countries as the players on the market.

Comparative advantage analysis is a tool to compare relative production costs and identify species and markets with the greatest likelihood of success. There are two different approaches to measuring comparative advantage: the Domestic Resource Cost (DRC) and the Revealed Comparative Advantage (RCA) methods. The DRC approach is dynamic but requires data on production costs, which may not be visible. The RCA method is more descriptive and has less predictive potential than the DRC approach but the data requirements are normally available (Hemphill & Banerjee, 2015; Wohlers, 2016). This paper uses the RCA method as a measurement of the comparative advantage.

a. The Four-Firm Concentration (CR₄)

The four-firm concentration ratio (CR₄) is the most common tool to explain the concentration. The four-firm concentration ratio is the fraction of total industry sales produced by

the four largest firms in the industry and is calculated by the sum of the market shares of the top four firms (Sudheer, 2022; Wilkinson, 2022).

b. Herfindahl-Hirschman Index (HHI)

The Herfindahl–Hirschman Index (HHI) is another measurement of concentration and calculated by the sum of the squared market shares of firms in a given industry, multiplied by 10,000 to eliminate the need for decimals. The value of the HHI lies between 0 and 10,000. This method is an economic concept widely applied in competition law, antitrust and also technology management. Increases in the Herfindahl index generally indicate a decrease in competition and an increase of market power, whereas decreases indicate the opposite. The major benefit of the Herfindahl index in relationship to such measures as the concentration ratio is that it gives more weight to larger firms (Sudheer, 2022; Wilkinson, 2022).

c. Revealed Comparative Advantage (RCA)

The RCA index shows the extent of commodity specialization in a country's exports relative to the share of that commodity in world exports. A high value indicates comparative advantage of a country in the production of a particular good. When the RCA index of a country is greater than 1, this means that the share of that commodity in the country's exports is higher than the world's average and the country has a comparative advantage on the product. Meanwhile when the RCA is less than 1, it means that the country has no comparative advantage on the product (Kuzman et al., 2016; Purwono et al., 2022). RCA uses the following formula:

$$RCA = \frac{x_{ij}/x_i}{x_{wj}/x_w} \quad (1)$$

where:

- X_{ij}: value of country i's export of commodity j
- X_i: value of country i's total exports
- X_{wj}: value of world exports of commodity j
- X_w: value of world exports

d. Down-streaming Relative Value to Production

The down-streaming impact is a new concept introduced in this paper to compare the added value generated from down-streaming raw products into processed products from a market share perspective. The added value from the down-streaming process will provide more monetary benefit to the country of origin. We limited the analysis to top three producer countries with the following formula:

$$DRVP = \frac{MSPP}{MSRP} x \quad (2)$$

where:

- MSPP: Market Share of Processed Product
- MSRP: Market Share of Raw Production

Qualitative Analysis

A Questionnaire was developed using the WEF (World Economic Forum) competitiveness framework to analyze the gap between current and ideal conditions in Indonesia's cocoa sector. The ideal condition is achievable within a year horizon (Nabhani et al., 2016). In-depth interviews and questionnaires (based on a Likert scale of 1–9) methods were conducted to gather opinions from the stakeholders representing the government (two persons at DG level from the Ministry of Agriculture and Ministry of Industry), academic (an IPB University Professor with extensive

research on the cocoa sector), research institute (Head of Puslitkoka), cocoa trader association (Chairman of Askindo), and cocoa farmer association (Chairman of APKAI). The questionnaire was developed using the competitiveness framework developed by WEF only for the main pillars and sub-pillars considered relevant to the industry by the respondents. The primary data are a cross-sectional type of data and arrange the experts' opinions into a table. The gaps between the current and ideal conditions of the industry for main pillars and sub-pillars are calculated, and to measure the significant differences between these two conditions, we use non-parametric Mann-Whitney at $\alpha=5\%$.

RESULTS AND DISCUSSION

Quantitative Analysis

Based on FAO data, Figure 1 shows the supplier concentration of cocoa beans at the global level using the four-firm concentration ratio (C_4) and Herfindahl–Hirschman Index (HHI). From 2012 to 2021, the four countries dominated the market share of cocoa beans at the range of 72% - 75%, and according to the Horizontal Merger Guidelines (Becker, 2015), the HHI was shifted from “moderately concentrated” (1500 and 2500) at 2012-2014 to “highly concentrated” at 2015 – 2021. It can be concluded that the incumbents could maintain and increase their domination in cocoa bean production by managing their productivity level.

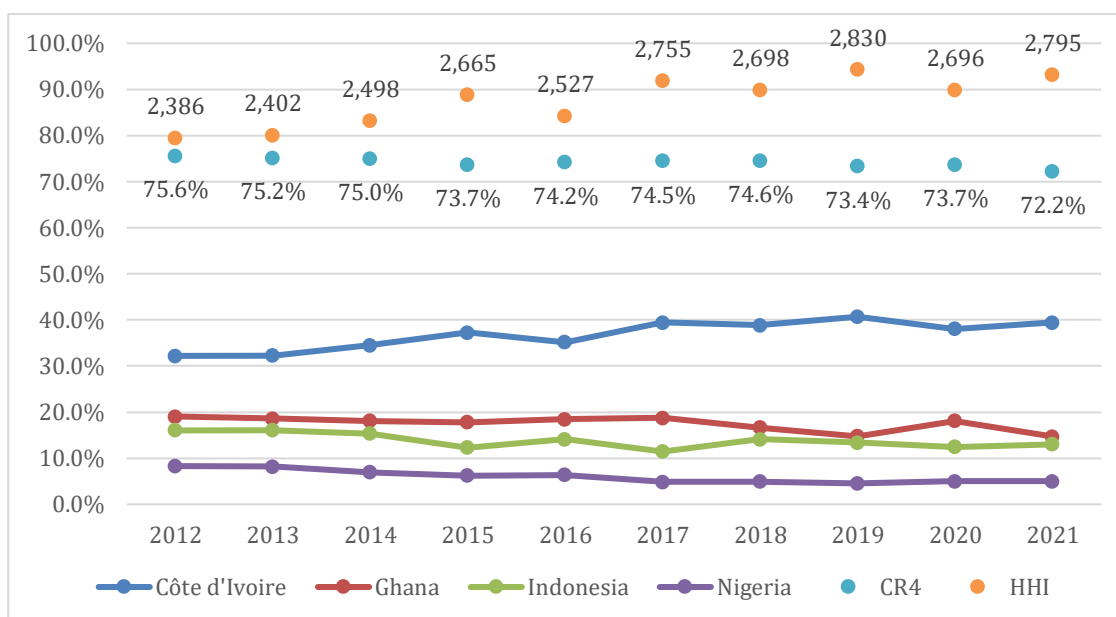


Figure 1. Supplier concentration and market share of global cocoa beans (Food and Agriculture Organization of the United Nations, 2023)

Figure 2, provides the different market share situation by country as Indonesia processed cocoa can outcompete the other top countries even the highest market share in 2018. The significant improvement was in 2014-2015 after five years of implementing a down-stream policy on cocoa export. It is concluded that the Government of Indonesia's effort to down-stream the cocoa beans into derivative products is on track with the result.

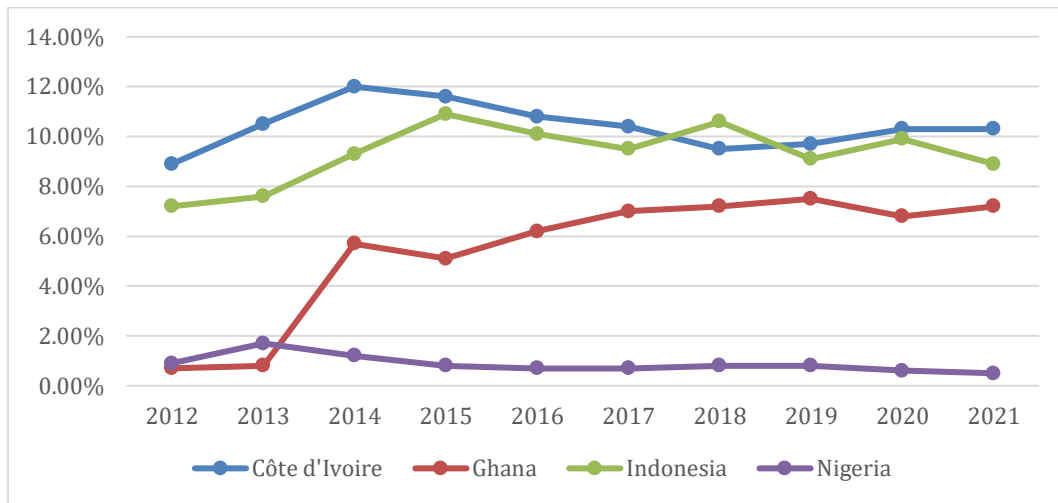


Figure 2. Global Market Share of Processed Cocoa (Food and Agriculture Organization of the United Nations, 2023)

Calculation on each country's RCA showed that during the period of 2012-2021, the average RCA scores for Côte d'Ivoire, Ghana, Indonesia and Nigeria, respectively are 389, 184, 6, and 13 implying that the contribution of cocoa export value to total export value in Indonesia and Nigeria are very low as can be seen in Figure 3. It is implied that countries like Côte d'Ivoire and Ghana have high dependability on this commodity on their total export value, both countries have been maintaining their productivity to secure their domination, but if we combine the Figure 1 and Figure 3, we can conclude that Ghana has succeed on maintaining both their productivity level and down-streaming the beans into processed products.

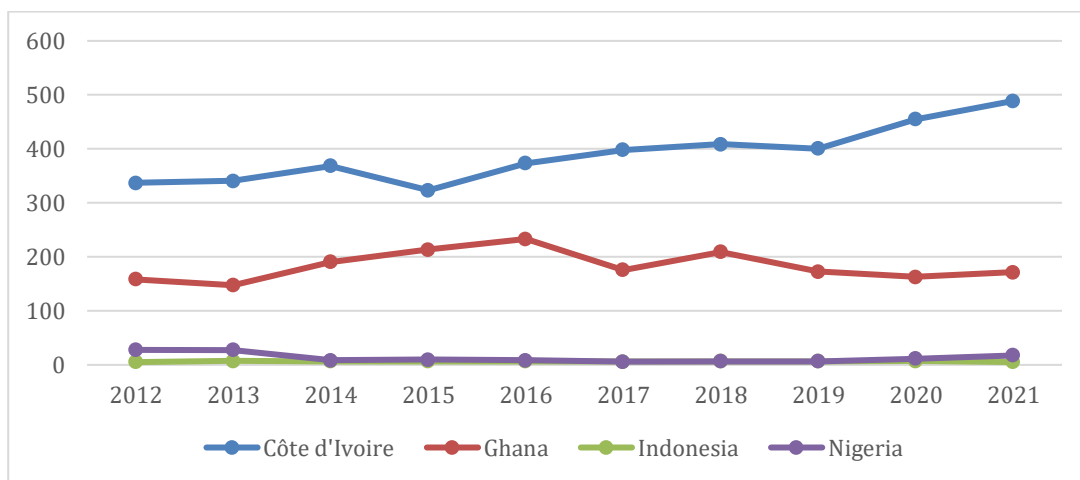


Figure 3. RCA Index of Côte d'Ivoire, Ghana, Indonesia, and Nigeria, 2012-2021

Calculating downstream relative Value to Production during 2012-2021 provided a success story for Indonesia to create added value by shifting from raw processed products. By early 2012, the government of Indonesia had a national campaign for the fermentation movement and provided

technical assistance to smallholders to create processed cocoa from fermented beans. As shown in Figure 4, the relative value of Indonesia's cocoa production improved in 2014.

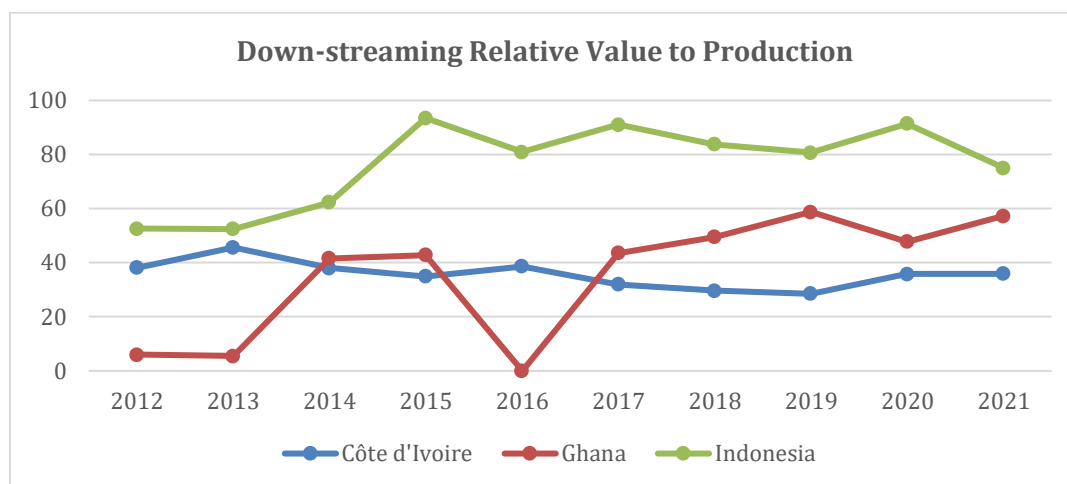


Figure 4. Down-streaming Relative Value to Production 2012-2021

Qualitative Analysis

a. In-depth interview and questionnaire

Advances in the use of technology information and various business models in the industry have increased the degree of competition in the cocoa sector. The Government of Indonesia has an objective to make Indonesia become the top producer in the world. It aims to develop this sector to respond to any external changes to maintain or improve sustainable competitive advantage with the main initiative of down-streaming into processed products.

This qualitative analysis aims to summarize the opinions of the industry's main stakeholders on the current and ideal condition of the industry. The result of this section is based on in-depth interviews and questionnaires. Table 3 and Figure 6 show the arithmetic means of expert's opinions on the current and ideal condition of the industry. All the current conditions of all WEF pillars are significantly below the ideal condition. The pillar that has the biggest gap is productivity and efficiency (44%); the average productivity per three of Indonesia is still below the average of global productivity; capacity building on innovation and R&D need to be in place to improve the gap 44% to reach the ideal condition. According to the expert from the research institute, they have already implemented some innovation initiative plans, including the production of the best cocoa clones and technical assistance to create more productive cocoa plants.

Table 2. GCI gap analysis on Indonesia cocoa sector

Factors and Sub-Factor	Current	Future	Gap
Basic requirements			
Institutions	4.71	7.32	36%
Infrastructure	5.57	7.63	27%
Macroeconomic environment	4.50	7.50	40%
Health and primary education	5.00	6.88	27%
Efficiency enhancers			
Higher education and training	5.00	6.88	27%
Goods market efficiency	5.07	6.89	26%
Labor market efficiency	5.08	7.13	29%

Factors and Sub-Factor	Current	Future	Gap
Financial market development	4.63	6.75	31%
Technological readiness	5.56	7.50	26%
Market size	5.88	7.13	18%
Innovation and sophistication factors			
Business sophistication	4.55	7.61	40%
Innovation	4.23	7.60	44%

*Score: 1=extremely poor, 2=very poor, 3=poor, 4= nearly poor, 5-average, 6=nearly good, 7=good, 8=very good, 9=extremely good

The second gaps of WEF competitiveness pillars are Institutional Framework and Prices with the gap of 40% on each element to reach the ideal condition of industry. The main elements that create the gap on this pillar are the non-existence of specialties of Indonesia cocoa in the global market with clear value proposition. Although Government of Indonesia charged export duty to encourage the processing of raw material to be conducted domestically but financial inclusion at smallholder level is very important. The concept of warehouse receipt needs to be implemented properly and requires a lot of bureaucracy as it is regulated by different ministries (there is an intersection of agriculture and banking industry). According to government expert, there should be a similar roadmap as Indonesia coffee products, there are uniqueness product of coffee based on geographical segmentation. In 2016, there was a collaboration between the government, cocoa associations and research institutes to develop some cocoa clusters. The Cocoa farmers association emphasized on simplifying the value chain from farmers to the buyers to optimize the farmer's benefit and proposes to develop sounds like agri-tourism to bring more benefit to the farmers. Other factor that might have indirect correlation with this pillar is farmer's adoption capability/eagerness on adopting new technology, it might be due to – as raised by almost all cocoa stakeholders – low interest of young generation on continuing parent's legacy to become or enter into cocoa plantation business while their adoption capability on absorbing new technology is much more higher than their parents especially on the utilization of internet to get the latest technology on both culturing and post-harvest processing.

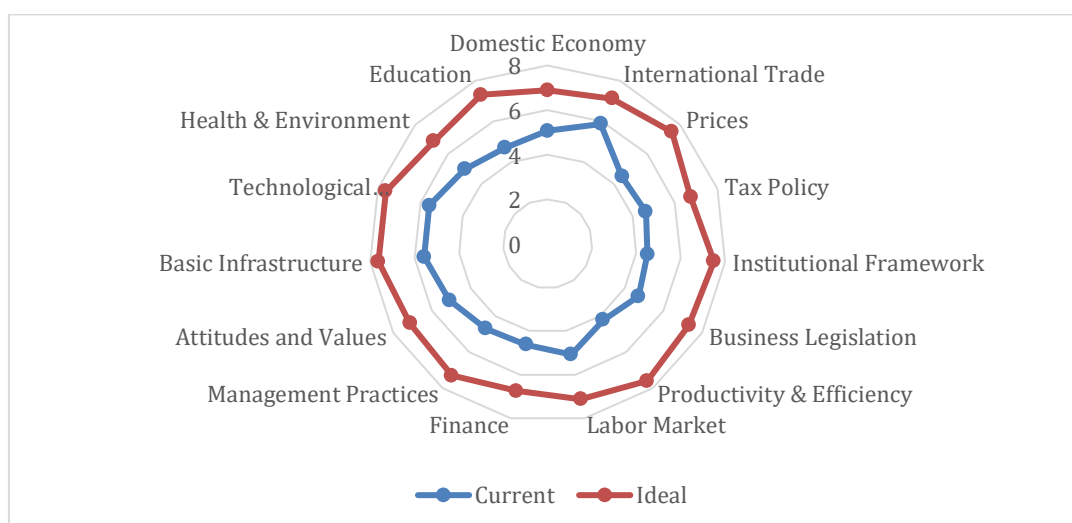


Figure 5. GCI gap model analysis of Indonesia cocoa

b. Non-Parametric Mann-Whitney Test

The objective of this non-parametric Mann-Whitney test is to reveal the differences between current and ideal condition of Indonesia cocoa industry, a common tools as an alternative test tool to the t-test without any restriction and can be applied for a different number of samples tested in two groups (Das et al., 2023). Table 4 shows median of the current and ideal condition of industry and p-value of each element of WEF competitiveness pillars. It can be concluded that all the elements have significant difference between current and ideal state of the industry at $\alpha = 5\%$.

Table 3. The Non-Parametric Mann-Whitney Test Result

Factors and Sub-Factor	Score-Median		Mann-Whitney p-value
	Current	Future	
Economic Performance			
Domestic Economy	5.00	8.00	0.0001*
International Trade	5.00	8.00	0.0001*
Prices	5.00	8.00	0.0001*
Government Efficiency			
Tax Policy	6.00	7.00	0.0081*
Institutional Framework	5.00	7.00	0.0005*
Business Legislation	5.00	8.00	0.0001*
Business Efficiency			
Productivity & Efficiency	5.00	8.00	0.0001*
Labor Market	6.00	8.00	0.0011*
Finance	6.00	8.00	0.0011*
Management Practices	6.00	8.00	0.0011*
Attitudes & Value	6.00	8.00	0.0011*
Infrastructure			
Basic Infrastructure	5.00	8.00	0.0001*
Technological Infrastructure	5.00	8.00	0.0001*
Health & Environment	5.00	8.00	0.0001*
Education	4.00	8.00	0.0000*

CONCLUSION

Côte d'Ivoire, Ghana, Indonesia, and Nigeria have dominated the global market of cocoa beans for decades, with a total market share between 72-75% during 2012-2021 and creating “moderate concentrate” to “highly concentrated” at the supply side. The top four countries have comparative advantages in producing cocoa beans, with Côte d'Ivoire having a higher index and export value. Since 2012, Ivorian cocoa producers have enjoyed locally guaranteed prices and new quality control giving the right to a country-of-origin label under the 2QG (Quality, Quantity, Growth) program Field while Indonesia enjoys the benefit of processed cocoa 2014 due to success story of down-streaming policy. It can be concluded that a sector’s competitiveness can be measured not only from the plant productivity but also the profitability along the value chain.

From all the figures presented, it can be concluded that Côte d'Ivoire focused on productivity to maintain production, Indonesia focused more on down-streaming into processed products to create added value, and Ghana focused on productivity improvement and down-streaming. At the same time, Nigeria did not have a clear strategy for its cocoa sector. It is recommended to have a collaboration model among the cocoa producer countries to get more symmetric benefits along the cocoa value chain, especially for cocoa grower countries.

The Ministry of Agriculture of the Republic of Indonesia initiated the cocoa down-streaming project in 2009 to improve the sector’s competitiveness. This initiative is supported by all cocoa

stakeholders (corporation, smallholder association, and research institution) to ensure the execution. The downstream value impact, which started in 2014, is strong evidence that this initiative has a positive effect on the competitiveness of Indonesian cocoa. However, the added value from downstream has not been appropriately distributed to the smallholders, and there will be room for improvement for the government by strengthening the institutional approach, pushing financial literacy and inclusion, and continuing smallholders' capability through the building model. One of the comprehensive models already in place is the warehouse receipt model (a collaborative model of three ministries), and further study is needed to assess the effectiveness of the implementation.

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