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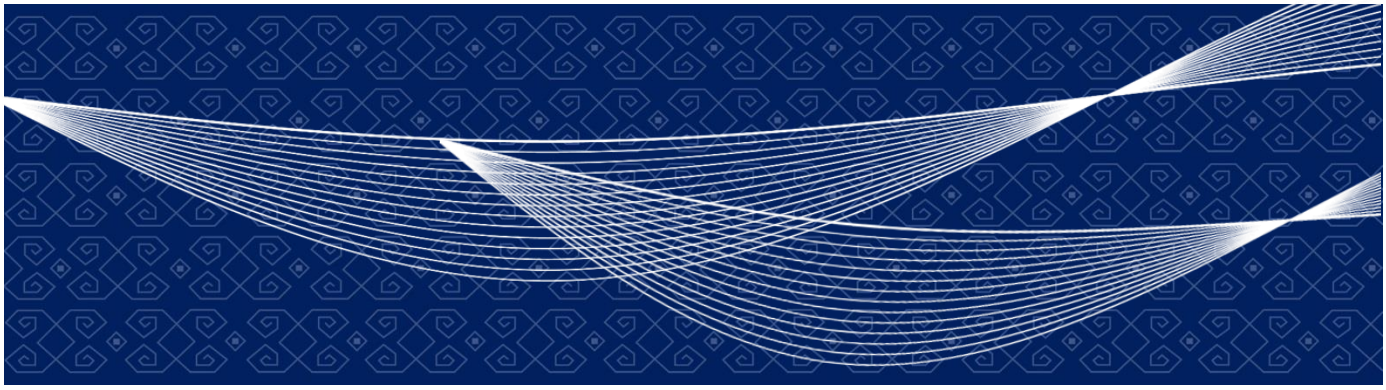

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WORKING PAPER

GREEN TRANSITION RISKS ON EXPORT COMPETITIVENESS: CIRCULAR ECONOMY APPROACH

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ABSTRACT

Transition risks include market and reputational risks, if materialized, can result in loss of markets. This study pictures the dynamics of potential export market movement and transition as the consumer preference for green products grows globally. We find that the export market for Indonesia's superior commodities increased due to past global growth and past increase in global demand for particular products, while still lacking in real product competitiveness. Under the scenario that illustrates the green agenda only arise mostly from developed countries and still limited from developing countries, it is estimated that the export market transition towards the new balance would find an equilibrium. Subsequently, this study exploratively discusses undergoing efforts in the exporting industry to make a green transition. We elaborate opportunities and challenges to circular economy adoption for the exporting industry. It is suggested for Indonesia's trade diplomacy to not only maintaining market position in traditional markets, but also in seizing non-traditional markets, including markets that reject Indonesian products by improving the competitiveness of Indonesia's export products via circular economy.
adoption.

Keywords: inflation dynamics, transaction cost, velocity of money, digital money, digital currency, digital payments, central bank digital currency (CBDC).

JEL Classifications: E31, E32, E42, E52, E58

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1. Introduction

Indonesia has a great opportunity to develop low carbon development (LCD) to achieve net zero emissions. However, so far the existing opportunities have not been comprehended optimally. The transition to low-carbon development is faced with various obstacles, such as social, cultural, economic, technological, and governance[1]. Success towards low-carbon development will be determined by good literacy to encourage a change in the development paradigm, for example from linear to circular economy development[2].

Efforts to realize LCD, manifested in various commitments. To achieve Indonesia's Nationally Determined Contribution (NDC) target, the government has made a roadmap related to the full implementation of the circular economy (Figure 1) and Indonesia has just published the first Green Taxonomy Edition 1 in early 2022. However, the pattern of development so far is still lacking in supporting sustainable development goals (SDGs), especially goal number 12, namely responsible consumption, and production. The achievement of SDGs 12 will be faster if efforts to advance the implementation of a circular economy are more massive[3].

UNIDO defines the circular economy as "*a new way of creating value, and ultimately prosperity. It works by extending product lifespan through improved design and servicing, and relocating waste from the end of the supply chain to the beginning—in effect, using resources more efficiently by using them over and over, not only once*". Thus, circular economy is related to efforts to create added value from the use of resources repeatedly (continuously) [4]. The three principles of circular economy are to control the use of finite resources and balancing them with renewable resources; to make optimal use of resources as far as they are able to provide value; and to minimize the occurrence of leakage of material utilization and externalities that can occur. Furthermore, circular economy does not only have dimensions of better economic and environmental conditions, but also opens up better access to poverty alleviation or inclusivity.

[1] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3900939
[2] https://indonesiacef.id/en/presentation/low-carbon-development-path-through-circular-economy/
[3] https://www.unep.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-12
[4] https://www.unido.org/sites/default/files/2017-07/Circular_Economy_UNIDO_0.pdf

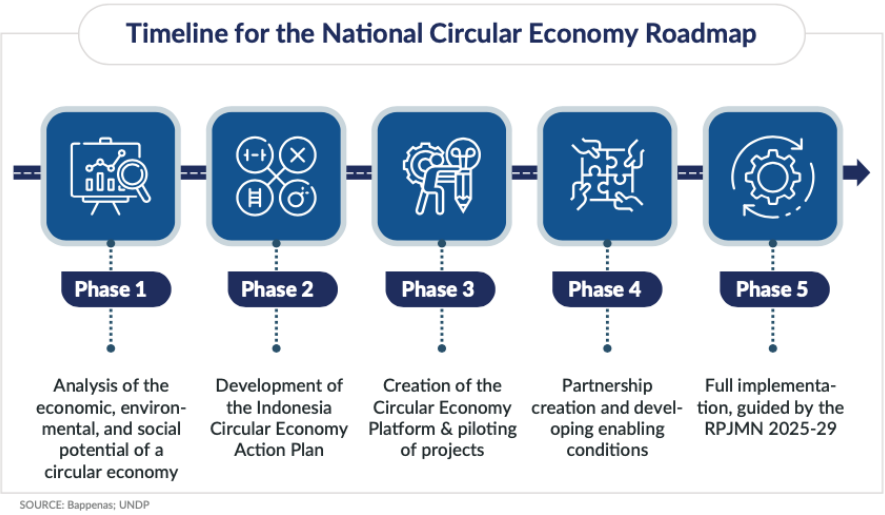

Figure 1 Circular Economy Roadmap in Indonesia[5]

Indonesia has five sectors that have great potential to implement a circular economy, namely food and beverage, textiles, construction, wholesale and retail trade, electrical and electronic equipment[6]. Until 2030, the benefits of implementing a circular economy in the five sectors amounted to Rp 593 – 638 trillion; environmental benefits in the form of reducing waste by 18 – 52%, reducing carbon emissions by 126 million tons, and saving water by around 6.3 billion cubic meters; in terms of social benefits, implementing a circular economy in the five sectors potentially creates net job opportunities as much as 4.4 million and additional household savings of 9% of household spending or around Rp. 4.9 million per year[7]. The circular economy model is an opportunity for Indonesia to build economic strength and minimize exports of low added-value natural resources. Thus, circular economy offers an opportunity for Indonesia to perform economic transformation towards a more sustainable and inclusive economic growth.[8]

Previous study argues the three main challenges to adopting circular economy in Indonesia are difficulties in changing culture and habits, lack of infrastructure, and failure to enforce laws (Figure 2). Thus, it appears that changing the mindset becomes a big challenge towards a circular

[5] https://lcdi-indonesia.id/wp-content/uploads/2021/02/Full-Report-The-Economic-Social-and-Environmental-Benefits-of-a-Circular-Economy-in-Indonesia.pdf
[6] https://lcdi-indonesia.id/wp-content/uploads/2021/02/Full-Report-The-Economic-Social-and-Environmental-Benefits-of-a-Circular-Economy-in-Indonesia.pdf
[7] Ibid. Model pendekatan Input-Output modeling, dan incremental capital – output ratio (ICOR) modeling.
[8] https://development.asia/explainer/how-indonesia-can-transition-circular-economy-through-5-key-sectors

economy. Regarding the mindset, a growth mindset is required to support the achievement of a circular economy[9].

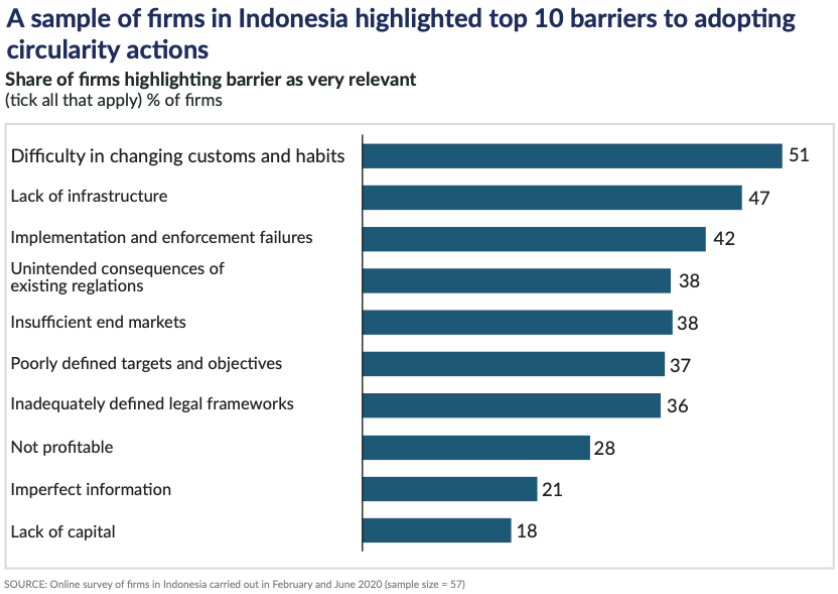

Figure 2. Barriers to Adopting a Circular Economy[10]

Some studies focuses on the importance on changing the linear production system to be circular in industries. For example, Pagotto and Halog (2015)[11], conducted a study on the food industry in Australia. This sector consumes quite a lot of water, causes land degradation, emits greenhouse gases, consumes energy, and generates waste. They found that there had been inefficiencies in the production cycle of the food industry. Thus, a more sustainable production process is needed, namely by changing the liner production system to be circular. The paper industry in Italy also does the same thing, which has good competitiveness at the global level. As stated by Rizzi and Danesi (2021)[12], this industry carries out a restructuring and rationalization process through recycling and sustainability efforts. However, not all processes meet the circular economy criteria, namely the recovery of production waste. Thus, as stated by Rizzi and Danesi, there are three things that need to be done by this industry, namely, phase out landfilling of

[9] https://online.hbs.edu/blog/post/growth-mindset-vs-fixed-mindset
[10] https://lcdi-indonesia.id/wp-content/uploads/2021/02/Full-Report-The-Economic-Social-and-Environmental-Benefits-of-a-Circular-Economy-in-Indonesia.pdf
[11] https://onlinelibrary.wiley.com/doi/abs/10.1111/jiec.12373
[12]

recyclable waste, implement an energy recovery strategy, and promote the use of renewable sources. However, limited studies have focused on how to benefit the circular economy opportunities from the perspective of export competitiveness.

Focusing on Indonesia case, this study is intended to answer the following questions, namely: what export products have a comparative advantage? What are the dynamics of potential export market movement and transition as the consumer preference for green products grows globally? What are the challenges for the exporting industry to make a transition towards circular economy and to improve competitiveness? One of the novelties of this study is the application of the Markov Chain Transition Matrix method that utilizes blue ocean strategy. It is to assess the possibility of changes in demand for Indonesian products in traditional markets due to strong green standard requirements by the importing countries. The underlying assumption of blue ocean paradigm employed in this study is that under strict green standard imposed by importing countries, Indonesian producers will then shift to sell the products to countries that have lower green standards. Few literatures yet focuses on simulating transition matrix equilibrium under possible shifting scenarios in the future.

2. Methods

To address the research questions and objectives, this study employs quantitative and qualitative analysis. Quantitative methods are based on various applications in calculating the competitive position of export commodities. This approach is carried out as a tiered screening strategy, so that the most superior export products can be found. Furthermore, on the basis of the screening information, an in-depth study will be carried out on the inputs needed to produce these commodities. This is common and much done by researchers.

To measure export competitiveness, the formula of Revealed Comparative Advantage (RCA) is used. The calculation of RCA is carried out using the Balassa Index approach as follows[13].

[13] https://eprints.ugd.edu.mk/20247/1/Revealed%20comparative%20advantage%20in%20trade%20between%20the%20Republic%20of%20Macedonia%20and%20CEFTA%202006%20pdf.pdf

$$RCA = \left(\frac{X_{ij}}{X_{jt}}\right) / \left(\frac{X_t}{X_n}\right) \quad 1$$

Where X is export level, i – country index, j – commodity index, n – country group, t – commodity group. Next, considering the failure of the theoretical framework of the Balassa model, improvements were made in the form of Revealed Symmetric Comparative Advantage (RSCA) as follows:

$$RSCA = (RCA - 1)/(RCA + 1) \quad 2$$

Further, experts propose to perform normalization of RCA (NRCA). Other experts also proposed the Trade Balance Index (TBI) model, which is calculated by the following formula:

$$TBI_{ij} = \frac{X_{ij} - M_{ij}}{X_{ij} + M_{ij}} \quad 3$$

TBI shows the trade ratio of country i for product j. If the value of TBI = 1, then the country is called a net export, and if TBI = -1, then the country is a net importer. Furthermore, to compare exports between two countries, the Comparative Export Performance (CEP) formula can be used.

$$CEP = \left(\frac{X_{ia}}{X_a}\right) / \left(\frac{X_{ib}}{X_b}\right) \quad 4$$

Where a and b represent the country. Furthermore, other methods can also be applied to see the increase in exports in the composition of three effects, namely: (i) growth effect on the global market; (ii) export destination market effects; and (iii) residual effect representing competitiveness, then constant market share analysis (CMS) is used with the following formula:

$$\sum\left(V^2{}_{ij} - V^1{}_{ij}\right) = rV^1{}_{ij} + \Sigma_i\Sigma_j\left(r_{ij} - r_i\right)V^1{}_{ij} + \Sigma_i\Sigma_j(V^2{}_{ij} - V^1{}_{ij} - r_{ij}V^1{}_{ij}) \quad 5$$

in which: $V^2{}_{ij}$ = commodity i export value from a country focused on market j, during period 2; $V^1{}_{ij}$ = commodity i export value from a country focused on market j, during period 1; r = growth rate percentage of worldwide exports for commodity i between countries 1 and 2; and r_{ij} =

growth rate percentage of worldwide export values for commodity *i* for country *j*, from period 1 (tahun 2010) to period 2 (tahun 2016).

Using the indicators which are based on the export competitiveness, we identify the 6 superior commodities with the following process.

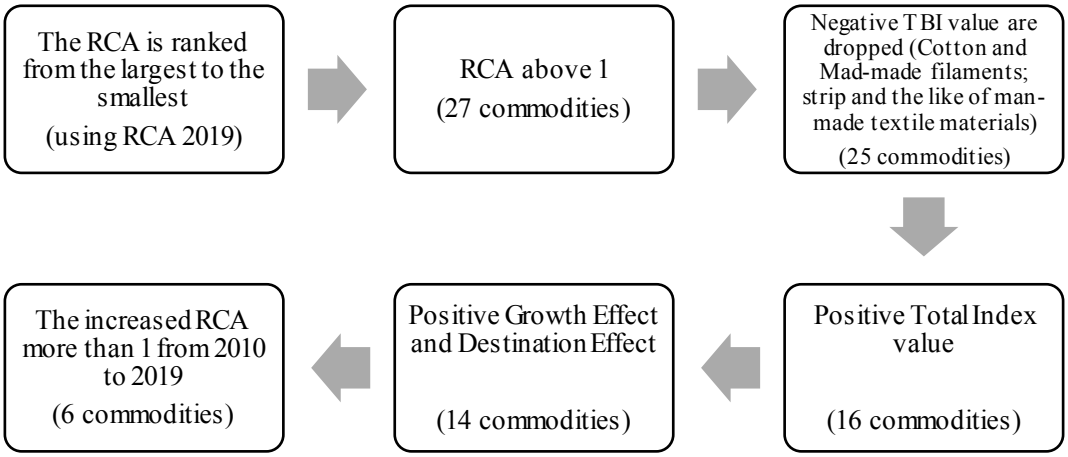

Figure 3. Steps to identify superior commodities

After identifying the competitive position of Indonesian commodity exports, further analysis is performed related to production inputs. Exploration of production inputs will be established using the the input output tables, which are tables I-O year 2016 and 2010. Thus, synchronization between export commodity codes and KLBI codes is performed. The I-O table application will provide an indication of the potential for a circular economy that can be developed.

The results of the mapping will be discussed with reference to the Indonesia Green Taxonomy. The Indonesia Green Taxonomy Edition 1 published by Indonesian Financial Services Authority (OJK)[14], is one of the important documents to disclose information about financing, funding, or investments that have met the green criteria and as an effort to support climate change mitigation and adaptation. There are 885 sub-sectors that can be mapped in detail and classified according to the green and non-green thresholds, structured based on Indonesia Standard Industrial Classification (KBLI level 5). The classification criteria are divided into three categories, namely green (do no significant harm), yellow (slight harm), and red (do significant harm). This green

[14] "Indonesia Green Taxonomy Edition 1.0 – 2022" by Indonesian Financial Services Authority (OJK) https://ojk.go.id/id/berita-dan-kegiatan/info-terkini/Documents/Pages/Taksonomi-Hijau-Indonesia-Edisi-1---2022/Taksonomi%20Hijau%20Edisi%201.0%20-%202022.pdf

taxonomy is also useful in obtaining information related to financing, financing, or green investment as well as an understanding of risk management.

To gain insight into the role of 'superior' commodities in the long term, a Markov model was built to answer two questions, namely: (i) whether a 'steady state' for superior commodities will be achieved; (ii) how quickly to reach the 'steady state' condition. Applications for these two questions are applied to existing or potential users. In general, the product does not only have prospects for current or traditional users, but also for other potential users (potential and non-traditional users). In the perspective of the blue ocean shift, Kim and Mauborgne (2019) [15], stated the importance of shifting organizations from a busy market with intense competition (red ocean) to a new, uncompetitive, and wide-open market (blue ocean). Furthermore, Kim and Mauborgne (2019) develop three tiers of noncustomers that can form the total demand potential in the following equation:

> Potential total demand = function (old consumers + level I non-customers (who soon become non-customers) + level II non-consumers (rejecting non-consumers) + level III non-consumers (non-consumers who have not been explored))

Level I non-consumers are those who soon become non-consumers of Indonesian products. They (trading partner countries) become customers because they have to or are forced to. If they find another country that is superior (running a production process based on a circular economy) then they will move. Level II non-consumers are those who reject Indonesian export products, because there are other better offers or because the price offered by Indonesian products is too high. Level III non-consumers, namely consumers who have not been explored or have not been considered as potential consumers. Thus, it is important for Indonesia to understand the three types of non-consumers.

Based on the views of Kim and Mauborgne, the analysis of export products will be divided into three, as shown below. Of course, each market contains demand conditions at home and abroad. Thus, the commodity 'state' will be divided into three interests as follows:

[15] Kim, C. Chan, dan Mauborgne, R. (2017). *Blue Ocean Shift*. Hachette Book Group.

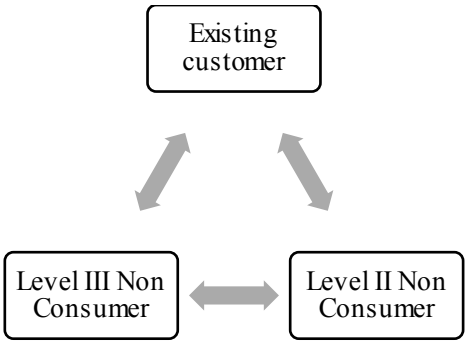

Figure 4. Transition Matrix: State Space Demand Modelling

Superior commodities are aimed at the needs of these three types of consumers, both in domestic and export locations (traditional and non-traditional). By taking several scenarios, such as the traditional market applying 'trade restrictions' or consumers who are increasingly concerned with green products, the trade transition in the 'state space' will change. Meanwhile, the stages of the Markov Model analysis is as follows:

1. Determine the share of state space (share of total state space must be 1), this condition is called the initial state vector, for example X1
2. Create a transition diagram. This condition describes how changes occur in the configuration, for example how many portions will remain in the domestic, traditional market, and non-traditional market sectors; and what proportion will move to other markets. With this information, a Markov transition matrix is created with the following properties: (i) all elements are between 0 and 1; (ii) row sum is always equal to 1
3. $X_2 = X_1$ x Markov Transition Matrix (MTM)
4. $X_3 = X_2$ x MTM; dan seterusnya or in general $X^t = X^{t-1}P = X^0P^t$
5. Then we need to show goodness to the actual data
6. Find stationary state $X^{t+1} = X^tP$; stationary state $X^{t+1} = X^t$

   (X1*, X2*, …) = (X1*, X2*, …) x MTM

   We obtain linier simultaneously equation, and X1* + X2* + … = 1 (conditions because it shares); then we obtain stationary state vector (equilibrium state)
7. General expression $X^t = X^0P^t$, if t approach to infinity then $X^{infinity} = X^0P^{infinity}$
8. $P^{infinity}$ is a limit state distribution; then by getting the Pinfinity matrix, transpose the matrix
9. Multiply the initial condition matrix by Pinfinity (note limit is always stationary state, but stationary state is not always limit)

10. Finding the eigenvalue of MTM (property: MTM always has an eigenvalue of 1; all eigenvalues for MTM are between 0 and 1; the 'convergence speed' to a stationary state corresponds to the second largest eigenvalue.

Based on the state space matrix, the development of interaction conditions is performed, as shown in the figure below. A 3 x 3 matrix will be built that reflects product flow from superior commodities, for example, products can be intended for traditional market represented by (X1); then the superior product can meet the non-traditional market (X2), and it is rejected (X3). Based on the Markov matrix, a transition diagram will be built, the arrows show the flow of products to the market (X1 to X3), for example, product 'M' enters the market X1, X2, and X3.

Table 1. 'State Space' Markov Matrix for 'Superior Products' – Initial Condition (derived from production, consumption, export and import data information)

	Market-tradisional (X1)	**Market - non tradisional (X2)**	**Decline/Reject Market (X3)**
Market-tradisional (X1)	X1 -> X1	X1 -> X2	X1 -> X3
Market-non tradisional (X2)	X2 -> X1	X2 –> X2	X2 -> X3
Decline/Reject market (X3)	X3 –> X1	X3 -> X2	X3 -> X3

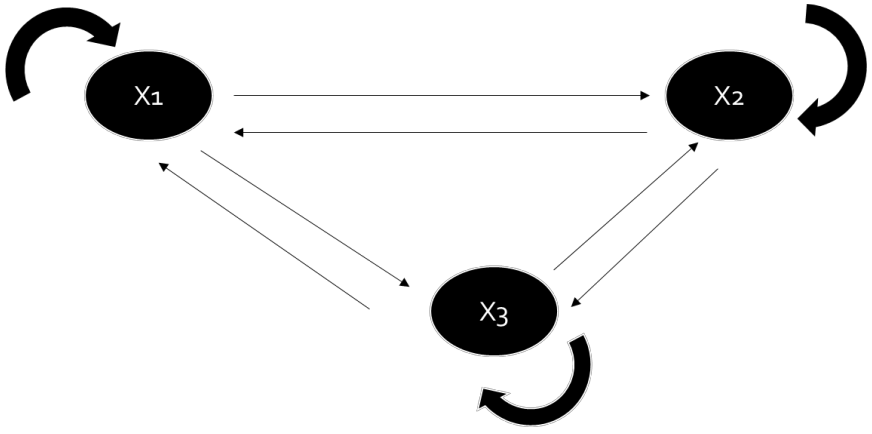

Figure 5. Transition Diagram Visualization from Table 1

Overall, the quantitative analysis are conducted in following stages:

1. Mapping of Export Dynamics Based on the 'Share and Growth Approach'
2. Identify the dynamics of global competitiveness of Indonesian commodity exports based on the index approach
3. Selection of superior commodities based on the previous two stages
4. Examine the input-output table-based superior commodity input supply chain
5. Superior Commodity Markov Model Analysis
6. Review inputs and outputs of superior commodities based on green taxonomy

The quantitative study uses sets of data: (1) export-import value (2-digit HS Code) year 2010, 2016, 2019, 2021 sourced from UN Comtrade. The datasets are Indonesian exports per Indonesian commodity to all countries in the world, Indonesia's total exports, total world exports per commodity, Indonesian imports per commodity from the world; (2) Input Output Table 2010 and 2016 sourced from BPS (Indonesia Statistics); (3) Indonesia Green Taxonomy 2022 from Indonesian Financial Services Authority (OJK).

The quatitative analysis is then followed by qualitative analysis exploring the potential and challenges from a circular economy perspective. The qualitative analysis utilizes in-depth virtual research through the documents from World Wide Web to explore circular economy perspective in the superior commodities' sectors and Focus Group Discussion. The Focus Group Discussion was conducted online through video conference application in September 2022, attended by 6 stakeholders at the mid to high management level in the industries that implementing circular economy. Their identifications are kept anonynomous. The main objective of the Focus Group Discussion was to develop a shared understanding of what the current potentials and challenges in adopting circular economy practices particularly in footwear industries.

3. Analysis and results

The superior commodity selection process starts at calculation of the RCA value ranked from the largest to the smallest value; the ranking is based on the RCA index in 2019. Those with RCA values above 1 are 27 commodities. Commodities with negative TBI value both in 2010 and 2019, are dropped (Cotton and Mad-made filaments; strip and the like of man-made textile materials).

Thus, the remaining commodities are 25 commodities. Next filter is total index value to be positive. Using the filter, 16 commodities are selected. Furthermore, commodities that have positive growth effects and destination effects are selected, and 14 commodities are obtained. Final selection is by choosing the commodities with an increase in the RCA index greater than 1 between 2010 and 2019, and 6 commodities were selected (Table 2).

Table 2. Superior Commodities

HS	Commodity	RCA_2010	RCA_2016	RSCA_2010	RSCA_2016	TBI_2010	TBI_2016
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	19,26	22,66	1,11	0,90	0,9155	0,98
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	5,77	12,74	1,42	0,70	0,8544	0,98
91	Musical instruments; parts and accessories of such articles	7,33	9,90	1,32	0,76	0,8166	0,59
67	Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair	4,14	5,91	1,64	0,61	0,7105	0,74
64	Footwear, gaiters and the like; parts of such articles	2,53	4,08	2,31	0,43	0,6061	0,81
46	Manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork	1,91	3,47	3,21	0,31	0,5521	0,97

These six superior commodities controlled an export share of around 12.4% in 2010 and increased to 17% in 2019. This increase in market share indicates that these six commodities have played a major role in improving Indonesia's export performance. For HS 14 commodities, there

has been a shift in the export market between 2010 and 2019, if previously around 70% was absorbed into the Chinese market (51%), Thailand (12%), and Singapore (6%); in 2019, around 90.6% were absorbed into the markets of Japan (58.6%), Thailand (18.7%), and the Republic of Korea (13.3%). In the changing map of market position dominance, Thailand's position is still quite important, and the role of developed countries Japan and Korea in the HS 14 product market is getting bigger.

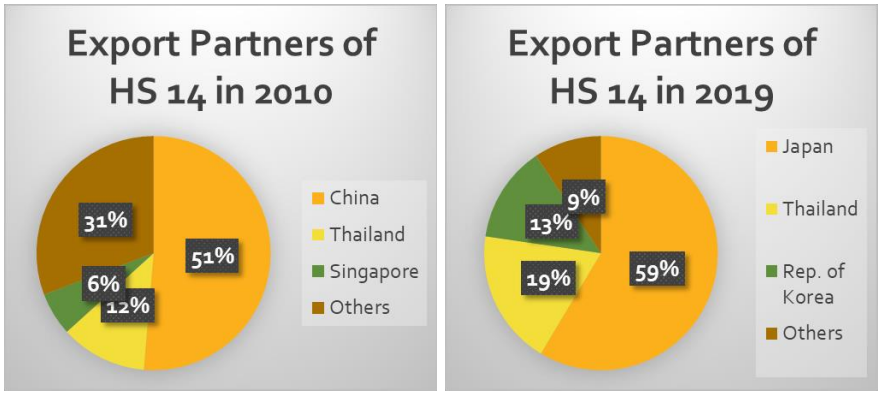

Figure 7. H14 commodities

Indonesia's export market for HS 15 products in 2010, around 63% was concentrated in the Indian market (28%), China (15%), Malaysia (12%) and Netherlands (8%). Meanwhile in 2019, around 21% was allocated to the Chinese market, and about 13%, 7%, and 5% respectively were allocated to the Indian, Pakistani, and Malaysian markets. Thus, for HS 15 products, it is still dominated for markets in developing countries.

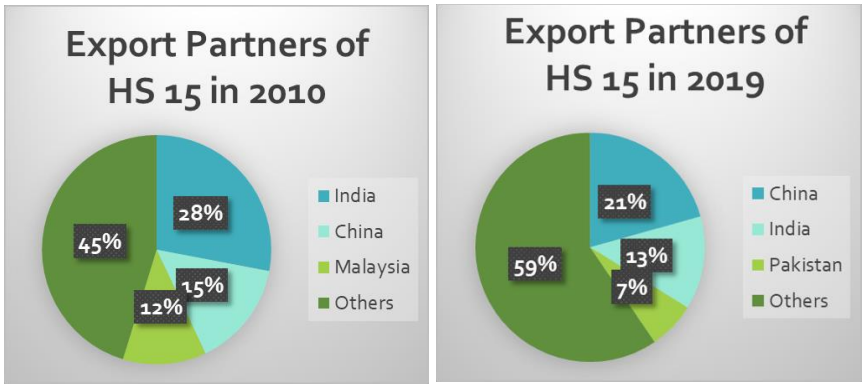

Figure 8. H15 commodities

HS 46 products, about 57% were concentrated in the USA (30%), Netherlands (13%), Japan (10%) and France (5%) markets in 2010. This shows that HS 46 products are more concentrated in developed markets. Furthermore, in 2019, around 56% of the market share was dominated by the USA (30%), Netherlands (14%), Germany (6%), and United Kingdom (6%). Thus, the market share of the HS 46 product remains concentrated in the developed country market.

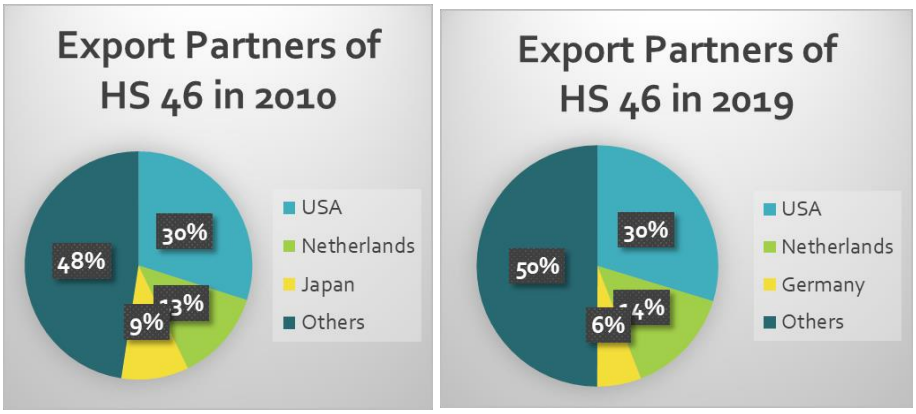

Figure 9. H46 commodities

Furthermore, HS 64 products, in 2010, around 54% were concentrated in five countries, namely: USA (23%), Belgium (9%), Germany (9%), United Kingdom (8%), and Italy (7%) . Thus, the role of the developed country market is very important for HS 64 products. In 2019, there was an increase in market share to 65% and was dominated by the USA (33%), China (12%), Germany, Belgium, and Japan respectively in 7% range. The interesting thing is the position of China which is included in the position of the second largest player. China's role in increasing market share is very important, because in 2010, China's role only reached 2%.

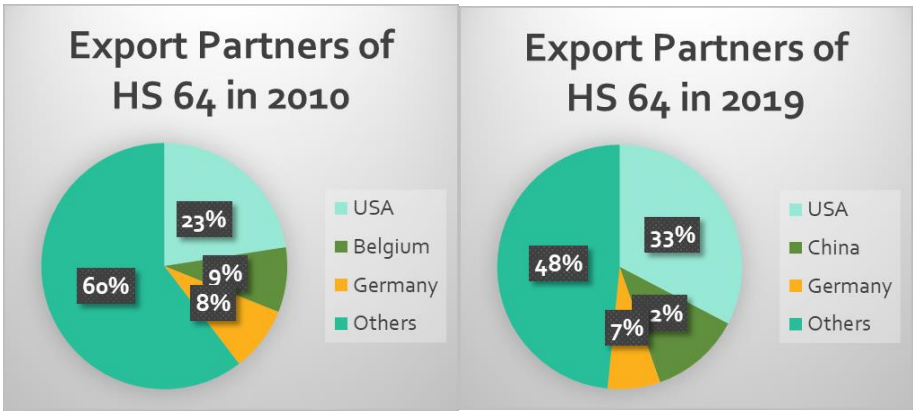

Figure 10. H64 commodities

HS 67 products, in 2010, about 75% were concentrated in the USA market, and then around 7%, 4%, and 2%, were concentrated in the United Kingdom, Germany and Republic of Korea markets. In 2019, around 80% of the export market share was concentrated in the USA (60%) and Malaysia (20%) and followed by Germany (4%), United Kingdom (3%), and Republic of Korea (3%). Malaysia's growing role for the HS 67 market share has caused the USA's role to decline.

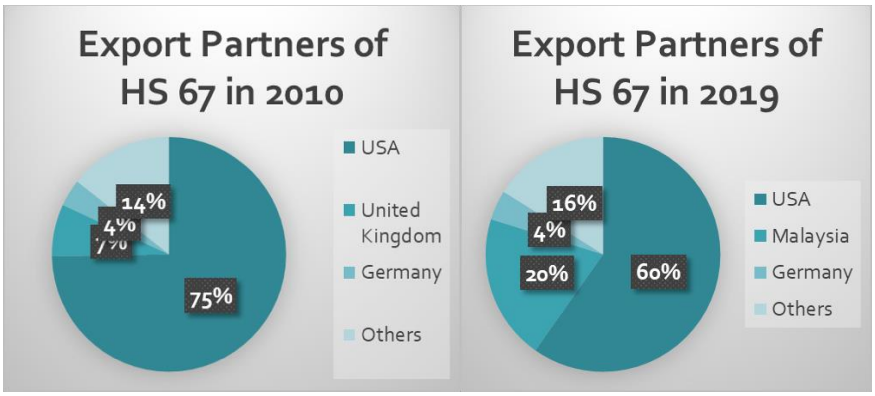

Figure 11. H67 commodities

Lastly, with HS 92 products, in 2010, around 69% were concentrated in the USA (23%), Japan (21%), Germany (11%), Malaysia (8%), and France (5%). In 2019, around 76% of the market share of this product was distributed in 5 countries, namely: USA (24%), China (17%), Japan (16%), Germany (12%), and Netherlands (4%). Thus, China's market share for HS 92 products has increased quite rapidly from the previous only around 4%.

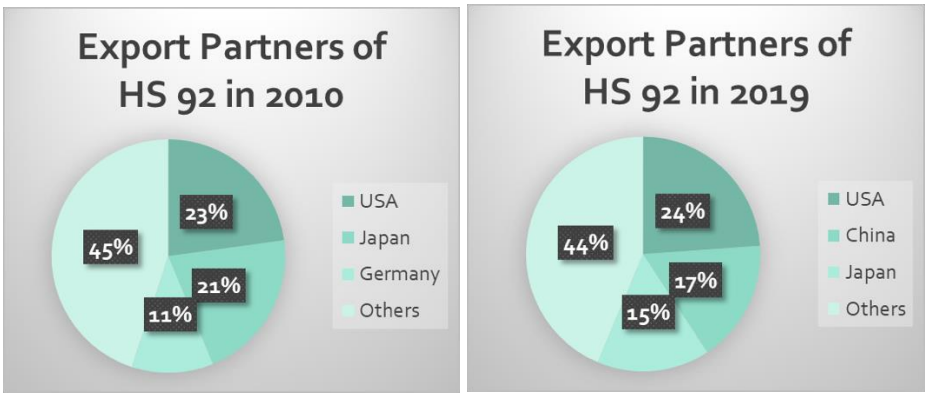

Figure 21. H92 commodities

Thus, considering the dynamics of commodity supper products between 2010 and 2019, four conclusions can be drawn. First, the export market share is still dominated by markets in developed and developing countries. Second, for some products, it appears that the role of market share in Japan and the Republic of Korea is increasing. Third, the role of large developing countries such as China and India is also a promising market share. Finally, in the context of developed countries, it appears that the role of the USA and several countries in the European Union remains important as Indonesia's export market.

The current challenge is, in the position of Indonesia's better competitiveness for these superior commodities, constant market share analysis shows that the growth effect has a major influence on commodities HS 15, and HS 67. Related to commodities in HS 15, from the analysis in the previous section shows that China's role is getting bigger, and for commodity HS 67, it cannot be separated from the role of the Malaysian market which shows a significant increase.

Meanwhile, export destination effect seems to play a major role for HS 14, HS 92, HS 46, and HS 64. For HS 14 products, there is a significant market shift from the dominance of China and Singapore to Japan and the Republic of Korea. For the HS 92 product, it appears that China's position can shift the position of Japan, and Germany and the Netherlands which can shift the position of Malaysia and France. Meanwhile, for HS 46 products, although they are still concentrated in developed countries, the German and United Kingdom markets are able to shift the markets of Japan and France. Finally, for product 64, it appears that China's role is getting bigger and able to expand the market share of Belgium, Germany, United Kingdom, and Italy.

We then analyze the growth effect, export destination effect, and residual effect of the 6 Superior Commodities as in Table 3. Out of the 6 Superior Commodities, all have positive growth

effect and export destination effect. However, the challenges faced by the six superior commodities are the negative residual effect condition.

This implies that the position of the six commodities improved due to the boost from the increase in world exports or changes in demand in several countries that increased. On the other hand, the residual effect is defined as a change caused by a change in competitiveness, it seems that it still needs attention. The residual effect reflects the interaction between changes in a country's micro share and changes in the composition of commodities in the market. Thus, the residual effect shows the level of success of Indonesia in adapting the composition of its exports in response to changes in the composition of commodities in the global market. Thus, in terms of strengthening the role of visible superior commodities, the challenge lies in strengthening product competitiveness. Indonesia needs to ensure a transformation to increase the competitiveness of products that are increasingly environmentally friendly. Thus, the fulfillment of the export market can be done by improving the ability of production technology and also becoming more efficient. Furthermore, it is important to see to what extent the application of a circular economy can be done to increase product competitiveness.

Table 3. Growth effect, export destination effect, and residual effect

HS		Growth Effect	Export Destination Effect	Residual Effect	Total
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	23.921.525.638	6.604.916.494	(28.606.997.295)	1.919.444.838
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	29.983.382	617.107.919	(594.408.705)	52.682.597
92	Musical instruments; parts and accessories of such articles	306.557.148	1.248.922.522	(1.453.720.865)	101.758.805

67	Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair	1.494.477.119	803.164.046	(2.114.262.140)	183.379.025
64	Footwear, gaiters and the like; parts of such articles	11.910.879.259	15.216.035.775	(24.988.905.318)	2.138.009.716
46	Manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork	19.204.095	348.916.435	(340.832.237)	27.288.293

Furthermore, to find out the composition of production inputs from each of these superior products, synchronization between the HS code and KLBI is performed (Table 4).

Table 4. Synchronization between the HS code and KLBI

No	HS	Description HS	IO
1	14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	
2	15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	019; 021; 058; 059
3	46	Manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork	
4	64	Footwear, gaiters and the like; parts of such articles	085

5	67	Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair	
6	92	Musical instruments; parts and accessories of such articles	139

To capture the dynamics of potential export market movement and transition as the consumer preference for green products grows globally and see to what extent the adoption of circular economy can be done to improve the competitiveness of Indonesia's export products, we take one (1) case studies out of the 6 superior commodities. They are HS 64 (Footwear, gaiters and the like; parts of such articles) and this is simly because it has the highest total effect.

Case study: HS 64

Based on information from table I-O, the HS 64 commodity is related to sectors 085. The HS 64 commodity has inputs from 10 main sectors as in table 5 (the selection of these 10 main inputs is based on the largest difference in the increase level of inputs between 2010 and 2016).

Tabel 5. Input-Output Table for HS 64 with the Base Price of 2010
(in Million Rupiah)

No	KLBI - IO	Commodity	Difference between 2016 and 2010	KLBI	Green Taxonomy (automatically green)
1	83	Products Of Preservation And Tanning	10.229.881	15112 - Leather Tanning Industry	No
2	156	Trade other than Cars and Motorcycles	2.965.952		
3	96	Basic chemistry except fertilizer	2.661.313	20116 - Organic Basic Chemical Industry for Dyestuffs and Pigments Raw	No

				materials, dyestuffs and pigments	
4	108	Crumb rubber and smoked rubber	1.785.379	22123 - Crumb rubber industry	No
5	170	Banking financial services	782.005	-	No
6	104	Other chemical goods	669.794	20299 - Other chemical goods industry	No
7	161	Air Freight Service	610.201	511 - Air Freight	No
8	145	Electricity	562.237	351 - Electricity	No
9	81	Knitted Items	466.737	139 - Knitted Items	No
10	85	Footwear	466.129	152 – Footwear industry	No

In green taxonomy, this industry falls into the classification number 152, which is "footwear industry for daily use; sports shoe industry; field engineering shoe industry/industrial needs; and other footwear industries". According to the Ministry of Environment and Forestry (KLHK – Ditjen PPKL and Ditjen PSLB3), this classification is not automatically green. This classification should obtain a green or gold rating or obtain environment permits as follows:

I. Have an Environmental Permit or Environmental Approval

II. Air Pollution Control

1. Have Technical Approval for fulfillment of Emission Quality Standard
2. Adhere to Emission Quality Standards
3. Carry out emission monitoring
4. Have human resources who have competence in charge of controlling air pollution.
5. Having human resources who have competence in charge of the operation of air pollution control installations.
6. Have documents and implement Environmental Management System
7. Prepare the cost of maintenance and operation of emission control devices

III. Water Pollution Control

1. Have a Technical Approval for the fulfillment of Wastewater Quality Standards
2. Having human resources who have competence in charge of controlling water pollution and WWTP operators.
3. Adhering to the Wastewater Quality Standards for Disposal and/or Utilization in accordance with the provisions of laws and regulations
4. Carry out monitoring of waste water 5. Have documents and implement Environmental Management System
5. Prepare maintenance and operation costs for WWTPs
6. SOP for WWTP Operation and Maintenance
7. SOP for WWTP Emergency Response, which includes leaks, anticipation if wastewater or processed wastewater does not meet wastewater quality standards, and others.

IV. Hazardous Waste Management

1. Mandatory to manage the B3 waste it produces
2. Every stage of B3 waste management that is capable of being carried out by businesses and/or activities, except for storage, must obtain technical approval and a letter of operational feasibility (Operational Eligibility Letter).
3. If you are unable to carry out one or more of the B3 waste management activities produced, you must submit it to a licensed B3 waste management service.

V. Beyond Compliance

1. Implement more efficient use of resources (Resource Efficiency and Cleaner Production/RECP).
2. Implement 5R waste water.
3. Reduction of GHG and non-GHG emissions.
4. Include the intensity of the pollution/energy load in the product or publication.
5. Reduction of the burden of water pollution.
6. At least do Ecolabel Type II (Self declaration)

Referring to the decree of the director general of pollution and environmental damage control number SK.69/PPKL/SET/WAS.8/11/2021 concerning determination of gold candidates for the company performance assessment program in the 2020 – 2021 environmental management, no footwear company included in the gold candidate. This condition shows that HS 64

commodities have a big risk to enter markets that increasingly require green. For example for the market in the European Union, which is preparing the European Green Deal, to ensure that products entering the European market meet sustainable development standards[16]. In the Circular Economy Action Plan, it provides norms regarding the need to fulfill three conditions for goods entering the EU market, namely: more friendly to the environment, circular, and energy efficient. The European Union pays great attention to textile products that enter their market[17]. Still part of the green deal package, efforts to increase consumer literacy are also being encouraged by the European Union commission, so that consumers will be better able to fight greenwashing practices. Thus, efforts to realize the achievement of a green economy in the footwear sub-sector become very important.

Superior Commodity Markov Model Analysis

Based on the view that there will be increasing attention to the environment in trading partner countries, from 143 trading partner countries of Indonesia for HS 64 products, 82 countries showed an increase in transaction value between 2010 and 2016, 44 countries showed a decrease in transaction value, and 17 countries no longer make purchases of the product. Furthermore, by considering 82 countries showing an increase in exports, it appears that there are six countries, namely the USA, China, Japan, Rep. of Korea, Belgium, and Germany with the highest export increase of more than 100 million USD. These six countries can be considered as Indonesian traditional markets. Furthermore, the rest are categorized as non-traditional markets. For 44 countries that show a decrease in transaction value, it is assumed that they reject Indonesian products. For the other 17 countries that do not purchase Indonesian products, it is also assumed that they reject Indonesian products (for the time being these 17 countries have not been taken into account in the transition matrix).

Thus, a 3 x 3 matrix can be constructed to reflect: 1. Traditional markets; 2. Non-traditional markets; 3 'reject' Indonesian products. Based on the export information in 2010, the export share

[16] https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2013
[17] The European Union Commission also has the importance of maintaining sustainability and circularity for textile, clothing, leather and footware (TCLF) products (https://cor.europa.eu/en/news/Pages/circular-transition-textiles-clothing-leather-footwear-industry-.aspx).

positions for the three market categories were built. Considering the export conditions in 2010, around 48% of exports were directed to traditional markets; 38% in non-traditional markets; and 15% in the reject market. Thus, the initial state vector can be written as follows: Initial state vector [0.48 0.38 0.15].

It is assumed that concern on green agenda is not symmetrically raised between developed and developing countries as each country has limitations and own targets (OECD, 2021). Asumptions below shows that as developed countries have green requirements, this makes Indonesian producers to shift their target market from traditional market share (mostly developed countries) to non-traditional market (assumptions number 1). Consequently, the share of non-traditional market share (mostly developing countries) is shifted to traditional market (assumptions number 2). The 2% of the traditional market share that refuses is assumed to stay as it is (assumptions number 3). It is assumed that there is about 12% of the non-traditional market share (mostly developing countries) that shifts to those who refuse as the concern on green agenda in developing countries is not widespread (assumptions number 4). It is assumed that 44% market share that refuses to shift to traditional and non-traditional markets (assumption no 5).

1. There is about 50% of traditional market share shifting to non-traditional.
2. There is about 50% share of non-traditional market which shifts to traditional
3. There are about 2% of the traditional market share that refuses
4. There is about 12% of the non-traditional market share that shifts to those who refuse
5. Each of them has about 44% market share that refuses to shift to traditional and non-traditional markets

The construction of this assumption can be debated because the transition is driven by green motivation. The intention of this assumption shows that in the long-term traditional markets will increasingly care about the importance of green products and this condition is reflected in a significant decline in the share of traditional markets. Meanwhile, the decline in market share in traditional markets will be filled by growth in market share from non-traditional markets which will become traditional markets. This transition indirectly illustrates the attention to the importance of green products, moving asymmetrically between traditional and non-traditional markets. This scenario also shows that there can be a decline in market share in both traditional and non-

traditional markets and the largest portion is assumed to occur in non-traditional markets. This scenario shows that the green product factor is starting to grow in many non-traditional countries.

Hence, the transition matrix is as follows:

Tabel 6. Transition Matrix

	I	II	III
I	0,48	0,50	0,02
II	0,50	0,38	0,12
III	0,44	0,44	0,12

Based on that information, calculate $X_t = X_{t-1}$ x Markov Transition Matrix (MTM), with the following result:

Tabel 7. Markov Transition Matrix

	Sum of matrix Xi
X2	1,060050
X3	1,060050
X4	0,994481
X5	0,994481
X6	0,994481
X7	0,994481
X8	0,994481
X9	0,994481

The calculation can be continued up to Xn, and the condition is stable. Thus, it can be concluded that the scenario / assumptions built can show stable conditions for the HS 64 product market. Transition towards circular economy in sector HS 64 would find equilibrium. How fast to reach steady state (eigen value): 1; 0,1; dan 0,0748. The second largest eigen value is 0,1; it is relatively small, and it implies a very fast approaching to equilibrium. Thus, when the sentiment about the

importance of green products does not move symmetrically between countries, the process of finding a new balance for footwear products will be easier. In this case, the role of the state to implement green standards will be much more effective than 'market punishment'. In such an industry, the great attention of business actors to make green shoe products will also be an important factor.

Synthesis of the qualitative study: Circular economy practices in footwear industry

Subsequently, this study exploratively discusses undergoing efforts in the exporting industry to make a green transition. We elaborate opportunities and challenges to circular economy adoption for the exporting industry.

Footwear products knowns as one of the most polutting industries and projected to emit carbon emissions more than 60 percent or more than 2.8 billion tons per year by 2030 (Design4circle, 2019). The experience of the footwear industry center in the Packaging Village, Krian District, Sidoarjo Regency, East Java, Indonesia, shows that processing waste such as rubber (or also called ethylene vinyl acetate / EVA) and imitation or in the local language called "serean" is handled by burning or sold to other parties. On the other hand, global consumers are increasingly concerned about the environment and affect their purchase[18]. To address the issues, some well-known footwear brands have initiated circular economy projects for their production process, as well as developing environmental-friendly products. Some examples are Nike, which has the largest factory in Indonesia and controls estimated 20 percent shares of the combined value of global athletic and casual footwear market, cyclon and some other local brands (Merk, 2022).

Nike is focusing on developing environmental-friendly products by innovating to use recycled materials from its own manufacturing process. Their raw materials are derived from old shoes, plastic bottles, and factory scraps and processed through “Nike Grind”, where all the waste materials are grinded and transformed into fabric pellets and used in other shoes, track courts, playgrounds, and aothe athletic padding surfaces[19]. They also invest in technology to use 100 percent renewable energy for its factories. Moreover, they try to innovate through their product design such as using lighter weight, higher yield materials, increasing patter efficiency, simplifying

[18] https://www.retaildive.com/news/nike-hm-join-circular-fibres-initiative-promoting-circular-economy/442685/
[19] https://recycle.ab.ca/newsletterarticle/nike-embraces-circular-economy/

molded components to reduce defects, and many others[20]. In order to support other footwear industries to implement the circular economy and environmental-friendly products, Nike publishes "Circular Design guide" for other designers and product creators[21]. Nike also try to collaborate with the suppliers by requiring them to follow Supplier Climate Action Program (SCAP), The Zero Discharge of Hazardous Chemicals (ZDHC) Wastewater Guidelines, and ZDHC Manufacturing Restricted Substance list (MRSL) for their supplier to keep their supply chain more environmentally friendly. Their manufacturing suppliers are also required to increase the efficiency of their facilities by using renewable energy and eliminating coal. For the raw materials, Nike uses recycled polyester and 100 percent organic cotton that is certified organic, recycled, or Better Cotton-Sourced through the Better Cotton Initiatives. For the logistic and transportation division, they urge their partners to use the renewable energy, as well as reduce the use of air freight. In the downstream, they try to switch to reusable cartons and phasing out unnecessary filler material used in shipping.

In the downstream, Nike piloting new program to help their consumers to recycle and refurbised they products. The recycled and refurbished products will then process in their "Nike Grind". Nike also create a program called "Re-Creation" which collects vintage and dead stock pieces, and then using them to create new locally designed and manufactured products[22]. In London, they relases B.I.L.L. (Bot Initiated Longevity Lab) to extend the life of their products by cleaning and repairing shoes using a robot-augmented system design[23]. Nike also attempt to conserve the water by reducing water consumption from their organic cotton farming, reducing water-use to dye and finish textile and treat wastewater, and developing guidelines to control microfibers and microparticles in textile wastewaters. These initiations are in collaboration with an NGO, The Nature Conservancy.

Other footwear brand, such as Cyclon, also initiates circular economy through a concept of shoescription, where customers allowed to rent EU 29.95 per month a pair of running shoes that are made from 100 percent recyclabe and 50 percent biobased materials[24]. Then, the circularity initiatives also allow custmers to exchange their old pairs for a new set from someone's else's

[20] https://about.nike.com/en/impact/initiatives/eliminating-waste
[21] https://www.plasticclimatefuture.com/circular-economy-cases
[22] https://about.nike.com/en/newsroom/releases/nike-re-creation-program
[23] https://about.nike.com/en/newsroom/releases/bill-bot-initiated-longevity-lab
[24] https://www.plasticclimatefuture.com/circular-economy-cases

recycled shoes. Meanwhile, Adidas creates an environmental-friendly product that are made from just one material and assembled it using high temperatures[25]. More on that, they adopt the circular activities by allowing the customers to not owned the products, instead, they return it once they are finished. Some local brands in Indonesia have developed not only environmentally friendly products, but also adopt the circular economy. A brand of Indosole exploits artisan skills to recycle the tire waste and create a handmade tires-based sole[26]. Another brand called "NODE" or "No Deforestation" that creates a biodegradable product[27].

The Indonesian government has regulations on the shoe industry standard practices, the Regulation of the Director General of Pollution and Environmental Damage Control No. P.12/PPKL/SET/KUM.1/9/2019. It requires the company to follow the standard practices and fall into the category "proper" standards, which then accordingly relates to the company's performance rating assessment program in environmental. The shoe industry must meet six standards related to energy intensity, emissions, wastewater, water, hazardous and toxic waste (B3), and non-hazardous and toxic solid waste. Furthermore, the regulation also states that the shoe industry, which will benchmark its environmental performance at the world level, must have a performance that is in the range of the best 25% of the benchmark benchmark that has been set. This regulation needs to be a reference for environmental performance that must be implemented. The role of the Indonesia Footware Association (Aprisindo) is very important to assist members in achieving Proper targets.

[25] https://www.weforum.org/agenda/2020/12/circular-economy-examples-ikea-burger-king-adidas/
[26] https://indosole.com/blogs/indosole/tagged/indonesia
[27] https://katadata.co.id/happyfajrian/ekonomi-hijau/60a3881032fd7/bio-sneakers-sepatu-ramah-lingkungan-lokal-yang-dipuji-sandiaga-uno

Table 8. National Benchmarking for Footware Industry

Intensity	Mesurement	the best P25
Energy	GJ/Pair	0.0096
Emission	Ton CO2/pair	0.00161
Waste water	%	55.43
Recycle domestic waste water	%	49.5
Water used in production	M3/pair	0.00152
Domestic water used	M3/person	0.0308
B3 Waste	Kg/pair	0.0081
Non-B3 Waste	Kg/pair	0.149

Source: Peraturan Direktur Jenderal Pengendalian Pencemaran dan Kerusakan Lingkungan No P.12/PPKL/SET/KUM.1/9/2019

According to the stakeholders, footwear industry has a big potential to utilise its byproducts – such as fabrics, rubbers, plastics, leathers – to be re-used in other footwear products. Some of the footwear companies have re-used plastic byproducts for their materials and been exported to other countries. However, other byproduct materials – such as fabrics and leathers – still yet be re-used.

The barriers of circular economy adoption in Indonesian footwear industry are as follows. First, there is no specific regulation to incentivice the circular economy practices. This makes the companies hesitate to implement circular economy practices. For instance, the companies are not sure whether they can sell their byproducts to other companies and if they can, they will be imposed by additional tax by the government. Furthermore, the regulation of national standard of Safety, Health, and Environment for exported products imposed by Ministry of Trade is still limited for virgin-material products. Second, there is uncertainty among virgin material suppliers about how much the impact of the implementation of re-use and re-cycle in footwear industry will affect their business. Third, the lack of consumer awareness about sustainable products, including products from circular economy pratices. The circular economy practices is considered costly for the companies, since they need more lead time in the production process to select good quality materials, cleaning process, and other pre-process before production. Therefore, the product prices tend to be higher than products from virgin material while the Indonesian consumer behavior still tends to choose products lower price. If the domestic demand for sustinable products are still low, it will discourage most of the companies to adopt circular economy practices. At the same time, in

order to be more efficient in terms of cost, circular economy practices cannot be adopted only by one company, the whole industry should also adopt it. Fourth, the Indonesian waste value chain is still lacking. Hence, the re-used and re-cycle application between sectors are disintegrated, while the actual potential of using the waste and byproducts from one sector as inputs for other sectors are huge.

Way Forward

From the analysis conducted, we find that some of the superior commodities that Indonesia has are quite diverse, ranging from those based on natural resources, labor intensive, and several manufactured products with a medium level of technology. Based on the dynamics of the proportion of partners of the 6 superior commodities, the export market share of the products are dominated with developed and developing countries market. On some products, there are an increased exports to Japan and Rep. of Korea, while China and India have promising market shares for Indonesia. US and EU are still an important market destination for Indonesia's products.

Furthermore, it appears that the role of non-traditional markets will increase; however, traditional markets are still strong. It is interesting that the position of the resisting market will show a significant decline (back to buying from Indonesia). This indicates that Indonesia's position for footwear commodities is still quite strong. This is despite the fact that Indonesia has an opportunity to 'escape' from traditional markets due to large 'environmental standards' or other policies, and shift to non-traditional markets. Although this change can happen rapidly, the role of the 'growth effect' and 'export destination effect' may be stronger than that of competitiveness.

The role of the superior commodities in Indonesia's export market is further strengthened by the role of the growth effect and export destination effect compared to the residual effect (competitiveness effect). The challenge is that the residual effect of all commodities has negative values. It indicates that Indonesia needs to increase the competitiveness of environmentally-friendly products by increasing the efficient production technology. From the market transition scenario, it can be concluded that there is still a great opportunity to shift to non-traditional markets, and also to rework markets that 'reject Indonesian products'. In the developed scenario, it appears that a long-term balance can be established.

The strength of competitiveness seen from economic attributes, does not reflect the good behavior of the industry in handling waste. The competitiveness of Indonesian exports of products

in the superior product category, has not been greatly affected by great attention to the need for green products of existing market. This may be a blessing disguise condition, but it may not last long if competitors are able to offer products with better environmental integrity conditions. With the case study of HS 64 'footwear, gaiters and the like; parts of such articles' and synchronizing the data with IO data, it is shown that main inputs of the sector is not yet 'green' rated based on Indonesia green taxonomi. This raise a reg flag for the sustainability achievement in sector HS 64 especially amid the rising demand for green products in global economy. As one of superior commodities, it is important for Indonesia to develop the greenness of footwear industry and animal or vegetables fats or oil and derivative products, which includes palm oil industry. The government should provide more support so that the industry afford to to comply the "greenness" standard.

Thus, focusing on developing green products can be a strategy for Indonesia's trade diplomacy, not only in maintaining market position in traditional markets, but also in seizing non-traditional markets, including markets that reject Indonesian products. While switching to green products requires efforts to continue to improve the competitiveness of Indonesia's export products. The transition process from linear to circular business processes is not easy and full of risks. Thus, the state needs to provide incentives, set-up the systems, provide technological opportunities and assist investment at an early stage which is sometimes not small. Those supports are to encourage and nudge the private sector as well as the wider community to be interested in developing a circular economy ecosystem. Likewise, the state can reduce the transition risks by providing as much information as possible to business actors, so that they are better informed when making business decisions.

Furthermore, the government should strengthen the waste value chain between sectors to get more efficient and lower cost, so that the circular economy system from one sector can be integrated with others. Other incentives – such as green financing and investment, tax deduction – should be considered by the govenrment, as well as specific regulations about circular economy practices, to increase the implementation of circular economy practices in Indonesia and to raise Indonesian consumer awareness about sustainable products. The role of the Indonesia Footware Association (Aprisindo) is very important to assist members in achieving the green targets.The application of the circular economy in the footwear industry needs to be encouraged, especially with the cooperation between the government and industry associations. To be able to develop

circular economy ecosystem in Indonesia nation-wide requires economies of scale and economies of scope. Amid the rising green and sustainability trend in the global economy, one way to benefit the opportunity is by prioritizing the establishment of circular economy ecosystem in Indonesian products that has good export competitiveness potential.