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The Economic Analysis of the Agricultural Industries: The Case of Indonesia

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ABSTRACT

Background: Food is an essential thing in human activities. Therefore, it is said that agricultural sectors have a crucial role in human life. The purpose of this study is to analyze the role of the agricultural sector in the national economy of Indonesia.
Method: The data used in this study are Indonesian input-output (IO) tables in 1990, 1995, and 2005. The analytical instrument of this research is IO analysis. This study uses more specific parts of the IO analysis such as simple household income multiplication, simple output multiplication, sensitivity distribution index, and power distribution index as analysis tools. The analysis of this research has a period of 1990-2005. In this study, the analyzed sectors are (1) paddy, (2) maize, (3) cassava, (4) other rootlcrops, including sweet potatoes, (5) groundnut, (6) soybeans, (7) other beans, (8) vegetables, (9) fruits, (10) cereals and other food crops, (11) rubber, (12) sugarcane, (13) coconut, (14) oil palm, (15) fibrelcrops, (16) tobacco, (17) coffee, (18) tea, (19) clove, (20) otherlestatelcrops, and (21) otherlagriculture. The first step of the methodology of this study is to describe the data, while the final step is to explain the study's conclusions and suggested further research.
Results: The results show that, by using a simple output multiplier, the analyzed sectors did not include the top five Indonesian industries from 1990 through 2005. Conversely, one of the analyzed sectors, rubber, was admitted in the top five Indonesian industries in the period of the analysis from the point of view of another multiplier. Using both indices, almost all analyzed industries were consistent in the quadrant from 1990 through 2005.
Conclusion: Indonesian government shall prioritize the rubber sector for the next economic development plans.

Keywords: *Agricultural, economy, IO analysis, multipliers, quadrant.*
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INTRODUCTION

Food crops cannot be separated from the consumption activity of humans. Without food crops, it is hard to imagine humans can eat properly. Also, humans will find difficulties in producing various types of food and beverage if there are no food crops. Therefore, it can be said that agricultural sectors have an crucial position in human life. Many previous studies discuss agricultural topics. For example, Grabrucker and Grimm consider how through forward and backward connections, rainfall shocks are conveyed from agriculture to non-agricultural industries. Over a period of five years and three provinces in Thailand, they collected comprehensive provincial panel data from about 2,200 households per year and then correlated it with grid precipitation data. In addition, the indirect impact of rainfall shocks on non-agricultural businesses through forward and backward connections and consumption demand were also investigated.[1] On the other hand, in relatively poor Northeast Thailand, a simple machine learning algorithm based on rich panel data was used by Wagener and Zenker to study its effects on small-scale rice farmers and control their self-selection into the program.[2] Zeng and Herzfeld investigate whether and how mental budgeting can describe diversities in farmers' responses to different incentives for low-toxicity pesticide use. They survey 393 vegetable farmers in the Sichuan province to get the data.[3] Liu et al. farmland renting-in influences crop choice and grain acreage and whether farmland renting-in influences the acreage of different grains differently. Their analysis is based on a survey of 705 households in 25 villages of Gansu province. The survey was conducted in 2015.[4] Knapp et al. consider the connection between risk aversion, aspirations and personality of 568 Swiss fruit farmers in three different decision-making outline. Their results show that the association of farmers' risk aversion, aspirations, and personality to clarify farmers' decision-making is highly specific.[5] Lin et al. analyze the consequence and influence of institutions on the international trade performance of coconuts by applying a model of extended structural gravity.[6] Guyansyah et al. specify the infertility attribute in the agricultural and industrial zones in Karawang Regency, West Java Province, Indonesia.[7]

Meanwhile, Beckman and Countryman examine the weightiness of food away from home (FAFH) in the whole economy. They also examine shifts in agricultural

trade and production due to COVID-19. Their results show that for many regions, the influences from agriculture play a large role in the economy-wide alterations from COVID-19.[8] Hamilton et al. provide theoretical and empirical understandings into the effect of mechanization on productivity and draw consequences for agricultural labor markets and rates of investment in productivity-enhancing technology more generally.[9] Research by Ruan et al. which aimed to quantify and recognize the causal effect of strict lockdown rules on vegetable costs with daily price data from 151 Chinese canvas grocery markets over several years using a combination of the difference-in-difference (DID) method and a time-regression discontinuity (T-RD) design. Despite the easy fluctuations in the same period of a normal year, the lockdown rule has caused a huge and immediate spread and suffering in the price of Chinese cabbage.[10] Tamru et al. study the matter of foreign exchange controls and pricing in the value chain for the coffee of Ethiopia.[11] Katengeza and Holden investigate the effect heterogeneity of drought tolerant (DT) maize technology on maize productivity using an approach of continuous treatment. They employ four waves of household farm panel data from six districts in Malawi for conducting their study.[12] Hirvonen et al. measured price modifications of the four main vegetables from agricultural and consumer prices. His research also adds to the contribution of various parts of the rural-urban value chain in forming urban retail prices. The Ethiopian case was used in their study. Primary data collection was carried out before and a few months into the pandemic.[13] Van Hoyweghen et al. analyzes the Covid-19 pandemic's early effect on the fruit and vegetable supply chain. Their study has focus on the Senegal's case.[14]

On the other hand, Ding et al. analyze Chinese grape growers' time discounting and its consequences for adopting technology that can diminish the negative impacts of increasing precipitation.[15] Eisele et al. by developing and tested a payout-motivated field experiment to see farmer decision-making under climate

change and to analyze how they establish their expectations in a recursive-dynamic situation.[16] Mehraban et al. employ three waves of panel data collected over six years on Sumatra to analyze whether oil palm cultivation assists to average welfare benefits among smallholder farmers.[17] Arisoy investigates the effect of agricultural support in Turkey on the attractiveness of agricultural products.[18] Kopp develops a switching cost (SC) model that describes cost markdowns in a Bertrand deviations and situation from the law of one price (LOP) by a fixed price component experienced by agricultural suppliers when switching consumers. The SC model is used to the market of natural rubber processing in the Jambi province, Indonesia.[19] Using panel data from farm households in Indonesia, Chrisendo et al. test and support the hypothesis that the recent oil palm boom contributes to structural alteration.[20]

Based on the earlier studies, the study as an analysis of the economic aspects of the Indonesian agricultural industries is still needed. This study is done to fulfill the gap. Input-output (IO) analysis is one of the tools for conducting analysis, the instrument for investigating the interrelationships of industrial sectors in one or more nations. To find out the role of the industry which focuses on the Indonesian national economy by using several IO analysis calculation tools is the originality and importance of this research.

This research is used to analyze the agricultural sector's role in Indonesia's economy. The analytical tool used in this research is IO analysis. This study uses more specific parts of the IO analysis such as simple household income multiplier, simple output multiplier, sensitivity dispersion index, and power dispersion index as analysis tools. The analysis of this research has a period of 1990-2005.

This research is further divided into the following sections. The research methodology is discussed in section 2. The calculation results and discussion of the results will be discussed in section 3. Meanwhile, the research conclusions and suggestions for further research are presented in section 4.

MATERIALS AND METHODS

The method of this study is described as follows. Describing the data used is the first step. Indonesia's IO tables in 1990, 1995, and 2005 were used as data for this study. Initially this table consisted of 161, 172, and 175 industries. Then after adjustments were made, there were 159 industrial sectors owned by the table. The industries mentioned are listed in the Appendix. Furthermore, in the second step, the Indonesian agricultural sector used in this study is then described. These sectors are described in Table 1.

The next procedure is to calculate using a simple household income multiplier and a simple output multiplier. The the equations of both multipliers were described by Miller and Blair as follows:

$$m(o)_j = \sum_{i=1}^{n} l_{ij} \qquad (1)$$

$$m(h)_j = \sum_{i=1}^{n} a_{n+1} l_{ij} \,^{21} \qquad (2)$$

A simple doubling of output is shown in the early model while a simple doubling of household income is explained in the last model. More specifically, $m(o)_j$, $m(h)_j$, $a_{n+1,i}$, n, and l_{ij} are simple output multipliers for sector j, simple household income multipliers for sector j, labor input coefficient, the number of industries, and the sector-to-sector multiplier matrix respectively.

Calculations to analyze the characteristics of the Indonesian industrial sector during the analysis period carried out in the fourth step, especially the Indonesian agricultural industry. Calculations were performed using the method of (1) dispersion strength index, and (2) dispersion sensitivity index. To assess the strength of one industry in influencing other industries, the previous index is applied. Higher index values are aligned with greater influence. The Ministry of Internal Affairs and Communications Japan then explains the details of the index as follows:

Index of the power of dispersion by sector= $\dfrac{b_{*j}}{\bar{B}}$ [23] (3)

Each column addition in the inverse matrix coefficient table is indicated by numerator. At the same time, the mean value of all vertical sums in the inverse

Table 1. Indonesian agricultural sectors used in this study

Sector number	Sector name
1	Paddy
2	Maize
3	Cassava
4	Other root crops include sweet potatoes
5	Groundnut
6	Soybeans
7	Other beans
8	Vegetables
9	Fruits
10	Cereals and other food crops
11	Rubber
12	Sugarcane
13	Coconut
14	Oil palm
15	Fibre crops
16	Tobacco
17	Coffee
18	Tea
19	Clove
20	Other estate crops
21	Other agriculture

Source: Based on Zuhdi et al.[22]

matrix coefficient table is indicated by the denominator. The equations between the denominator and numerator are conveyed more specifically as follows:

$$b_{*j} = \sum_i^n b_{ij} \qquad (4)$$

$$\bar{B} = \frac{1}{n}\sum_j b_{*j} = \frac{1}{n}\sum_i\sum_j b_{ij}{}^{[23]} \qquad (5)$$

Furthermore, b_{ij} and n are the Leontief inverse values from sector i to sector j, and also the total of industrial sectors, respectively. The sensitivity of a specific industry to external influences is analyzed by applying the latter index. A larger index values correspond to a greater sensitivity. More specifically, if the value has a higher index, a particular industry is said to be more sensitive to influences from external aspects. The Ministry of Internal Affairs and Communications Japan then explains the details of the index as follows:

Index of the sensitivity of dispersion by sector= $\dfrac{b_{i*}{}^{[23]}}{\bar{B}}$ (6)

By this index, each sum of row in the table of inverse matrix coefficients is the numerator while the mean value of the entire horizontal sum is showed by denominator in the table of inverse matrix coefficients. Futhermore, the association

of the denominator and numerator then are explained as follows:

$$b_{i*} = \sum_j^n b_{ij} \qquad (7)$$

$$\bar{B} = \frac{1}{n}\sum_i b_{i*} = \frac{1}{n}\sum_i\sum_j b_{ij}{}^{[23]} \qquad (8)$$

Equation (7) is slightly modified from the original source in order to gain compatibility with the earlier index. The section denotes the total number of industries, n, more specifically, entered into the equation. In accordance with the previous explanation, b_{ij} is the inverse of Leontief's value from sector i to sector j. Research conclusions and suggestions for further research are described in the last step.

RESULTS

Viewing from the value of simple output multiplier in 1990, 1995, and 2005, the top five Indonesian industrial sectors are described in tables 2, 3, and 4, respectively. Analyzed sectors do not include in the tables. It can be said that these sectors do not have an attractive effect on the Indonesian economy during the analysis period through the final additional demand when viewed using these results. Sectors 66, 111, and 112 are another

interesting aspect of the multiplier and can be seen in the table. The industry is textile goods except for apparel, prime movers, engine, machinery, and apparatus, respectively. This statement consistently supported the industry in attracting the Indonesian economy from 1990 to 2005. In table 3, the machinery and apparatus sector were the second ranked with a value of 2,777. This shows that all Indonesian industrial sectors needed to produce products for which payments reached Rp. 2,777 to satisfy a rupiah's final demand for the sector's output in 1995.

Figure 1 shows the simple output multiplier values of analyzed industries during the analysis period. Based on the figure, it can be showed that some patterns appear. For example, the increasing-decreasing pattern can be seen in sectors 8, 15, 16, and 17. Those sectors are vegetables, fibre crops, tobacco, and coffee. The other example is the decreasing-increasing pattern observed in sectors 12 and 14. Those sectors are sugarcane and oil palm. The other patterns are increasing and decreasing.

The top five industrial sectors in Indonesia, viewed from the simple household income multiplication values in 1990, 1995, and 2005, can be seen in tables 5, 6, and 7, respectively. Miller and Blair clarify that the multiplier explains the economic impact of new final demand as measured by new household income using the exogenous household model.[21] Based on the table information, one can argue that only one industry that appears in both multipliers, namely musical instruments, is industry number 127.

One of the analyzed industries, rubber, includes in the simple household income multiplier tables. Using this result, it can be said that the sector generated an attractive impact on the Indonesian economy as measured by new household income from 1990 through 2005. The values of the sector in 1990, 1995, and 2005 were 0.523, 0.523, and 0.477, respectively. These values provide an explanation that the additional rupiah from the final demand of this sector will generate new household income of Rp 0.523, Rp 0.523 and Rp 0.477 in 1990, 1995 and 2005, respectively, when all direct and indirect impacts are changed into become rupiah estimates of incomes. Another

Table 2. Top five Indonesian industrial sectors regarded from the value of simple output multiplier, 1990

No.	Sector number	Sector name	Simple output multiplier
1	97	Plastic products	2.973
2	112	Machinery and apparatus	2.943
3	66	Made up textile goods except wearing apparel	2.779
4	68	Wearing apparel	2.692
5	111	Prime movers engine	2.685

Source: Based on Zuhdi (with slight modifications)[24]

Table 3. Top five Indonesian industrial sectors regarded from the value of simple output multiplier, 1995

No.	Sector number	Sector name	Simple output multiplier
1	124	Aircraft and its repair	2.792
2	112	Machinery and apparatus	2.777
3	66	Made up textile goods except wearing apparel	2.737
4	68	Wearing apparel	2.685
5	111	Prime movers engine	2.623

Source: Based on Zuhdi (with slight modifications)[24]

Table 4. Top five Indonesian industrial sectors regarded from the value of simple output multiplier, 2005

No.	Sector number	Sector name	Simple output multiplier
1	112	Machinery and apparatus	3.004
2	124	Aircraft and its repair	2.992
3	111	Prime movers engine	2.809
4	127	Musicals instruments	2.608
5	66	Made up textile goods except wearing apparel	2.595

Source: Based on Zuhdi (with slight modifications)[24]

Table 5. Top five Indonesian industrial sectors regarded from the value of simple household income multiplier, 1990

No.	Sector number	Sector name	Simple household income multiplier
1	151	General government	0.952
2	154	Other community services	0.629
3	152	Education services	0.579
4	11	Rubber	0.523
5	140	Railway transport	0.519

Source: Based on Zuhdi (with slight modifications)[25]

Table 6. Top five Indonesian industrial sectors regarded from the value of simple household income multiplier, 1995

No.	Sector number	Sector name	Simple household income multiplier
1	151	General government	0.758
2	152	Education services	0.666
3	154	Other community services	0.659
4	11	Rubber	0.523
5	127	Musicals instruments	0.508

Source: Based on Zuhdi (with slight modifications)[25]

Table 7. Top five Indonesian industrial sectors regarded from the value of simple household income multiplier, 2005

No.	Sector number	Sector name	Simple household income multiplier
1	151	General government	0.643
2	154	Other community services	0.602
3	152	Education services	0.598
4	11	Rubber	0.477
5	155	Private motion picture and its distribution	0.454

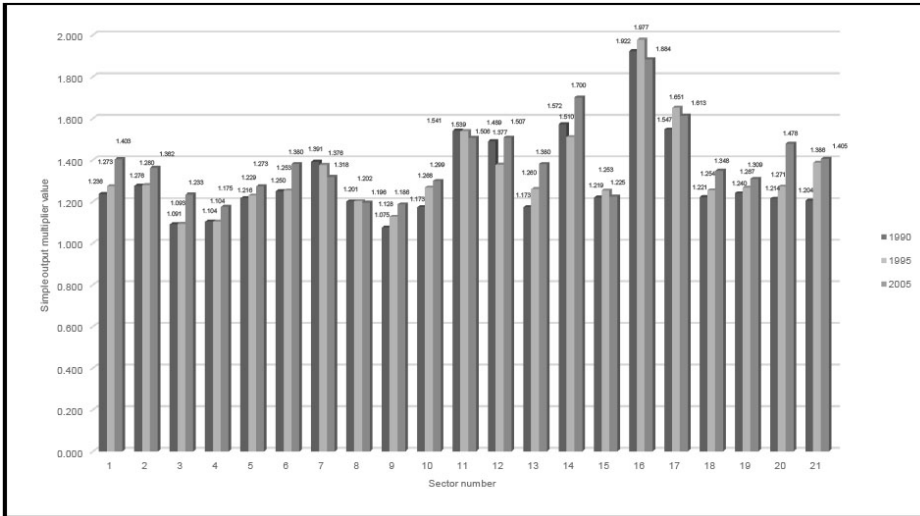Source: Based on Zuhdi (with slight modifications)[25]

Figure 1. The simple output multiplier values of analyzed industrial sectors, 1990-2005.
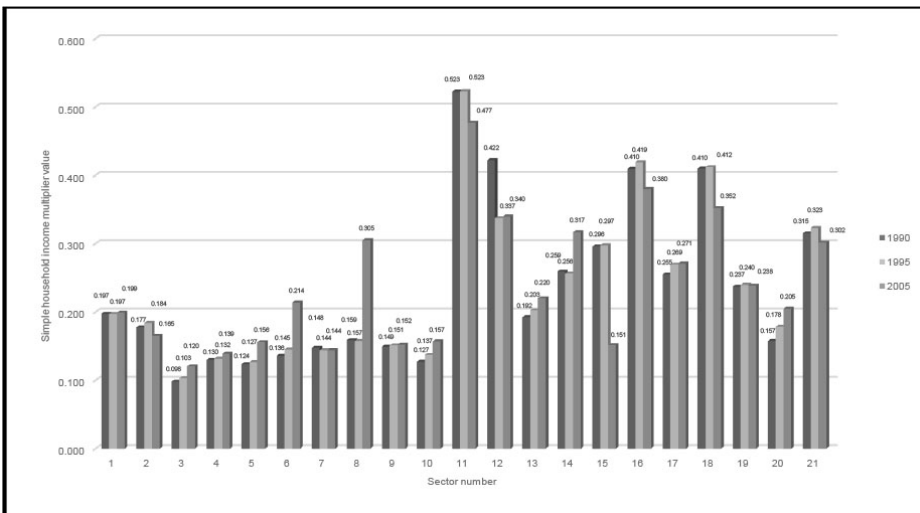Source: Author's own study.

Figure 2. The simple household income multiplier values of analyzed industrial sectors, 1990-2005.
Source: Author's own study.

interesting thing is, industry number 151, general government, is ranked first in the table.

The simple household income multiplier values of analyzed industrial sectors on the period of analysis were clarified by Figure 2. Based on the figure, one pattern that appeared during the analysis period was increasing. One analyzed industry that had the pattern from 1990 through 2005 was industry number 20, other estate crops. The simple household income multiplier values of the sector in 1990, 1995, and 2005 were 0.157, 0.178, and 0.205, respectively.

Table 8 summarizes the quadrants of

analyzed industrial sectors from 1990 through 2005. The quadrants come from the combination of both indices applied in this study: the index of the power of dispersion and the sensitivity of dispersion. The combination itself creates four quadrants.

Each quadrant has its own characteristics. More specifically, the place where the value of the two indices is more than one is quadrant I. In other words, the sectors that are most affected by external aspects as well as having a strong impact on the entire industry are the industrial sectors included in this quadrant. Meanwhile, in quadrant III, the opposite

phenomenon can be seen in industries that are classified as quadrant III. Meanwhile, locations where the power index value is less than one, while the other index values are the opposite is quadrant II. It can be stated that the sectors that have weak impacts on the overall industry are the industrial sectors that are included in this quadrant, but they get high effects from changes in external parts. The opposite characteristic is owned by the industrial sector which belongs to quadrant IV.

Based on the table's information, on the analysis period, one can argue that almost all analyzed industries had consistency in terms of a quadrant. From 1990 through 2005, the different cases were owned by cereals and other food crops, sugarcane, and tobacco industries. For the first industry, the quadrants in 1990, 1995, and 2005 were III, II, and II while the quadrants for the second one in those years were II, III, and II, respectively. On the other hand, for the third sector, the quadrants in those years were III, IV, and III. Among the analyzed sectors, only this sector had quadrant IV on the analysis period.

DISCUSSIONS

The top five industrial sectors in Indonesia, viewed from the simple household income multiplication values in 1990, 1995, and 2005, can be seen in tables 5, 6, and 7, respectively. Miller and Blair stated that the total value of production in all economic industries is the value of the output multiplier for sector j needed to fulfill the final demand for the currency value for the output of sector j. Their study also explains that for a simple output multiplier, the total production value comes from the exogenous household model.[21]

Compared with the previous studies, the current study shows some discrepancies. First, the current study focuses on the Indonesian agricultural industries. As a consequence of this focus, the study can explain the characteristics of those industries rather than the previous studies. Second, this study analyzed the economic aspects of those industries. One of the previous studies also discusses the agricultural topic in Indonesia but not focusing on the economic perspective.

This study uses IO analysis to analyze

Table 8. Thelquadrants of Indonesian agricultural sectors, 1990-2005

Sector number	Sector name	Quadrant		
		1990	1995	2005
1	Paddy	II	II	II
2	Maize	II	II	II
3	Cassava	III	III	III
4	Other root crops include sweet potatoes	III	III	III
5	Groundnut	III	III	III
6	Soybeans	III	III	III
7	Other beans	III	III	III
8	Vegetables	III	III	III
9	Fruits	III	III	III
10	Cereals and other food crops	III	II	II
11	Rubber	II	II	II
12	Sugarcane	II	III	II
13	Coconut	III	III	III
14	Oil palm	III	III	III
15	Fibre crops	III	III	III
16	Tobacco	III	IV	III
17	Coffee	III	III	III
18	Tea	III	III	III
19	Clove	III	III	III
20	Other estate crops	III	III	III
21	Other agriculture	III	III	III

Source: Author's own study

Indonesian agricultural industries' roles in the Indonesian national economy. A simple output multiplier, a simple household income multiplier, an index of the dispersion sensitivity, and an index of the power of dispersion, as analysis instruments were applied for this study more specifically. The analysis of this research has a period of 1990-2005. The analyzed Indonesian agricultural industries in this study are (1)kpaddy, (2)kmaize, (3)kcassava, (4) otherlrootlcropslincludelsweetlpotatoes, (5) groundnut, (6) soybeans, (7) otherlbeans, (8) vegetables, (9) fruits, (10) cereals andkother foodlcrops, (11) krubber, (12) ksugarcane, (13) kcoconut, (14) oillpalm, (15) fibrelcrops, (16) tobacco, (17) coffee, (18) tea, (19) clove, (20) otherlestatelcrops, and (21) otherlagriculture.

The results of the study show that the industries analyzed are not included in the top five industrial sectors of Indonesia from 1990 to 2005 when analyzed using a simple output multiplier. However, from the view of a simple household income multiplier, the opposite phenomenon appeared in the analysis period. By using a simple household income multiplier, rubber, one of the analyzed industries, was included in the top five Indonesian industries in the period of the analysis. Using both indices, almost all analyzed industries were consistent regarding quadrant on the analysis period. From 1990 through 2005, the different cases were owned by three industries, namely (1) cereals and other food crops, (2) sugarcane, and (3) tobacco. Based on the results, one can argue that the Indonesian government shall prioritize the rubber industry for the next economic development plans.[22-25]

This study gains an understanding of the role of the Indonesian agricultural industry in influencing the Indonesian national economy in the analysis period that is acquired from the present study.[26,27] However, if the study can apply a longer period of analysis then it will gain greater insight into the role. Therefore, this study recommends the same analysis using a longer analysis period, such as from 1990 to 2020 as further research. One important aspect in carrying out this further research is that prices and industrial sectors used in the IO table under study must be the same.[22-25]

Research by conducting international comparisons using the same method is another proposed further research. The comparisons can be made between developed, developing, or developed-developing countries. The comparison might explore the role of the agricultural sector of the countries being compared so as to investigate the similarities and differences of these countries regarding the industry. The Indonesia-Vietnam comparison is one such example.[22-25]

The limitations of this study can be seen in several parts. First, this study uses old data. This study uses IO Indonesian table from 1990 through 2005. One can argue that the old data will not give the recent information. Second, this study uses a relatively short period. One can say that the longer period will give more comprehensive information.

CONCLUSIONS

This study uses IO analysis to analyze Indonesian agricultural industries' roles in the Indonesian national economy. From 1990 through 2005, the different cases were owned by three industries, namely (1) cereals and other food crops, (2) sugarcane, and (3) tobacco. Based on the results, one can argue that the Indonesian government shall prioritize the rubber industry for the next economic development plans.

CONFLICT OF INTEREST

There are no anything conflicts.

AUTHOR CONTRIBUTION

All authors contribute to the study.

ETHICAL CLEARANCE

There are no ethical issues in this study.

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Appendix
Indonesian industries used in this study

Sector number	Sector name
1	Paddy
2	Maize
3	Cassava
4	Other root crops include sweet potatoes
5	Groundnut
6	Soybeans
7	Other beans
8	Vegetables
9	Fruits
10	Cereals and other food crops
11	Rubber
12	Sugarcane
13	Coconut
14	Oil palm
15	Fibre crops
16	Tobacco
17	Coffee
18	Tea
19	Clove
20	Other estate crops
21	Other agriculture
22	Livestock and livestock product except fresh milk
23	Fresh milk
24	Poultry and its product
25	Other livestock raising
26	Wood
27	Other forest product
28	Sea fish and other sea products
29	Inland water fish and its product
30	Coal
31	Crude oil
32	Natural gas and geothermal
33	Tin ore
34	Nickel ore
35	Bauxite ore
36	Copper ore
37	Gold and silver ore
38	Other mining
39	Crude salt
40	Quarrying, all kinds
41	Meat and entrails of slaughtered animal
42	Processed and preserved meat
43	Dairy products
44	Canning and preserving oflfruits and vegetables
45	Drying and salting of fish
46	Processed and preserved fish
47	Copra, animal oil and vegetables oil
48	Rice
49	Wheat flour
50	Other flour
51	Bakery product and the like
52	Noodle, macaroni and the like

Sector number	Sector name
53	Sugar
54	Peeled grain, chocolate and sugar confectionery
55	Milled and peeled coffee
56	Processed tea
57	Soya bean products
58	Other foods
59	Animal feeds
60	Alcoholic beverages
61	Non-alcoholic beverages
62	Tobacco products
63	Cigarettes
64	Yarn and cleaning kapok
65	Textile
66	Made up textile goods except wearing apparel
67	Knitting mills
68	Wearing apparel
69	Manufacture of carpet, rope, twine and other textile
70	Leather tanneries and leather finishing
71	Manufacture of footwear and leather products
72	Sawmill and preserved wood
73	Manufacture of plywood and the like
74	Wooden building components
75	Manufacture of furniture and fixtures mainly made of wood, bamboo and rattan
76	Manufacture of other products mainly made of wood, bamboo, rattan and cork
77	Manufacture of non-plastic plait
78	Pulp
79	Paper and cardboard
80	Paper and cardboard products
81	Printing and publishing
82	Basic chemical except fertilizer
83	Fertilizer
84	Pesticides
85	Synthetic resins, plastic and fibre
86	Paints, varnishes and lacquers
87	Drugs and medicine
88	Native medicine
89	Soap and cleaning preparation
90	Cosmetics
91	Other chemical products
92	Petroleum refineries products
93	Liquefied of natural gas
94	Smoked and crumb rubber
95	Tire
96	Other rubber products
97	Plastic products
98	Ceramic and earthenware
99	Glass products
100	Clay and ceramic structural products
101	Cement
102	Other non-ferrous products
103	Basi iron and steel
104	Basic iron and steel products
105	Non-ferrous basic metal
106	Non-ferrous basic metal products

Sector number	Sector name
107	Kitchen wares, hand tools and agricultural tools
108	Furniture and fixed primarily made oflmetal
109	Structural metal products
110	Other metal products
111	Prime movers engine
112	Machinery and apparatus
113	Electric generator and electrical motor
114	Electrical machinery and apparatus
115	Communication and electronical equipment and apparatus
116	Household electronics appliances
117	Other electrical appliances
118	Battery and storage battery
119	Ship and its repair
120	Train and its repair
121	Motor vehicle except motor cycle
122	Motor cycle
123	Other transport equipment
124	Aircraft and its repair
125	Measuring, photographic and optical equipment
126	Jewelry
127	Musicals instruments
128	Sporting and athletics goods
129	Other manufacturing industries
130	Electricity and gas
131	Water supply
132	Residential and non-residential buildings
133	Construction on agriculture
134	Public work on road, bridge and harbor
135	Construction and installation on electricity, gas, water supply and communication
136	Other construction
137	Trade
138	Restaurant
139	Hotel
140	Railway transport
141	Road transport
142	Sea transport
143	River and lake transport
144	Air transport
145	Services allied to transport
146	Communication services
147	Banking and other financial intermediaries
148	Insurance and pension fund
149	Building and land rent
150	Business services
151	General government
152	Education services
153	Health services
154	Other community services
155	Private motion picture and its distribution
156	Amusement, recreational and cultural services (private)
157	Repair shop n.e.c
158	Personal and household services
159	Other goods and services n.e.c

Source: Based on Zuhdi et al. (with slight modifications)[22]