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Indonesian Agricultural Exports: Trends and Competitiveness Analysis of Last 2 Decades

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Authors' contributions

This work was carried out in collaboration between both authors. Author PS conducted the study, involved in data collection, analysis and tabulation and writing the research paper. Author RAY is the chairman of the advisory committee involved in planning, constant monitoring throughout the study, analyzing and interpreting the results. Both authors read and approved the final manuscript.

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ABSTRACT

The study aims to evaluate the patterns and competitiveness of Indonesian agricultural exports. The research period covered for this report is from 2000 to 2018. The study is focused on the compound growth rate and the revealed comparative advantage. In terms of quantity, the compound growth rate for agricultural commodities exports from Indonesia is 8.78 percent, and in terms of volume, it is 12.33 percent. According to the report, there is a need to expand the export market by meeting the requirements set by import countries. Seven agricultural commodities groups showed revealed comparative advantage throughout the study period, five showed revealed comparative advantage by the end of the study period, and seventeen showed revealed comparative disadvantage throughout the study period. The study proposed a need to promote the export of agricultural commodities having revealed comparative advantage during the entire or at the end of the period of study.

Keywords: Compound growth rate; trends; revealed comparative advantage.

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1. INTRODUCTION

Indonesia produces a diverse range of agricultural goods. The main agricultural products produced in this country are palm oil, rubber, cocoa, coffee, tea, cassava, rice, and tropical spices. Indonesia is a major exporter of palm oil, rubber, coconut, cocoa, and coffee, among other commodities.

China, the United States of America, Japan, Malaysia, Hong Kong, and Singapore are Indonesia's major agricultural trading partners. Indonesia is a significant exporter of agricultural and seafood products. During the year 2018, it exported animal products worth of USD 3.41 billion, food products worth of USD 7.89 billion and vegetable products worth of USD 26.71 billion which accounted for about 1.89, 4.38 and 14.82 per cent of its total exports, respectively.

In the year 2018, Indonesia imported animal products worth of USD 2.79 billion, food products worth of USD 8.47 billion and vegetable products worth of USD 8.75 billion. The shares of animal, vegetable and food products are 1.48, 4.64 and 4.49 percent of total imports by Indonesia, respectively. Indonesia is a net exporter of animal and vegetable products.

Some of the reviews are discussed for more understanding of tools and concepts.

Suresh et al. [1] used data from 1982-83 to 2009-10 to study the growth and composition of Indian meat exports. In terms of quantity and volume, India's exports grew at a rate of 10.3% and 10.8%, respectively, during the study period. Owing to a rise in the unit price of Indian meat products in the international market, the growth rate was found to be higher in value than in quantity.

From 1990-91 to 2016-17, Acharya [2] looked at the developments in Nepalese foreign trade. Exports, imports, trade volume, and trade deficit all increased rapidly, according to the report. It was discovered that the rate of increase in exports was lower than the rate of increase in imports. The trade deficit was growing due to a rise in consumer goods imports and low export-oriented goods production.

From 2000 to 2014, Obadi [3] used the Balassa index to compare the main trading partners, the EU-28 and the United States. Despite being the world's largest trader of manufactured goods and services, the EU-28 had a competitive advantage in less commodity groups than the US during the study period. The EU-28 has a comparative advantage in 32 commodity groups, while the US has a comparative advantage in 40 commodity groups.

For the period 2003 to 2013, Jagdambe [4] used the Balassa index to examine the export competitiveness of Indian agricultural products with ASEAN (Association of Southeast Asian Nations). Agricultural products' revealed comparative advantage steadily decreased over time during the study period. Meat, vegetables and fruits, tea, rice, and cereal items should all be promoted for export to ASEAN markets, according to the report.

A decline in rubber production in 2009 is due to "adjustment process" in the world market after a record high price of oil and gas during the world economic crisis in 2008. The demand for synthetic rubber was back to normal in 2009, so that the price of rubber dropped significantly to record low of US$ 1.61/kg. This low price level of rubber, couple with pressure to convert rubber trees to oil palm, contribute significantly to the decline in rubber production in 2009 [5].

For Indonesia, agriculture sector is still considered as the economic backbone due to the contribution of this sector to country’s Gross Domestic Product (GDP)and supply around two fifth of country’s labor force. Basedon Statistics Indonesia or Badan Pusat Statistik (BPS), the share of agriculture sector to Indonesian GDP are around 14.43%-15.29% in the last 15 year since 2000 to 2014 [6].

Bala and Sudhakar [7] investigated the success of agricultural products in India's export market. The discovered comparative advantage is used to evaluate the comparative advantage of Indian exports. For cotton, maize, and certain fruits and vegetables revealed comparative advantage increased over time, but for certain spices, rice and wheat it decreased over time. In the case of plantation-based spices and other commodities, India has lost its comparative advantage to Asian countries.

The aim of this study was to determine the rate of increase in agricultural exports from Indonesia. The disclosed comparative advantage values of all of Indonesia's agricultural exports are measured in order to decide which commodities the country should promote in order to earn more foreign exchange.

2. METHODOLOGY

2.1 Commodities Considered for the Study

The trade data based on Harmonized System code (HS 1992) classification is considered for the study and HS two-digit level of classification has been considered for a period of 19 years i.e., from 2000 to 2018.

HS Code 01 to 24, 41, 50, 51, 52 and 53 are the categories of commodities considered for the study. The following are the list of agricultural commodities along with their HS Codes.

01: Live animals;
02: Meat and Edible Meat Offal
03: Fish and Crustaceans, Molluscs and other Aquatic Invertebrates
04: Dairy Produce; Birds' Eggs; Natural Honey; Edible Products of Animal Origin; not elsewhere specified or included
05: Products of animal origin, not elsewhere specified or included
06: Live Trees and other Plants; Bulbs, Roots and the like; Cut Flowers and Ornamental Foliage
07: Edible Vegetables and certain Root Tubers
08: Edible Fruit and Nuts; Peel of Citrus Fruits or Melons
09: Coffee, Tea, Mate and Spices
10: Cereals
11: Products of milling industry; malt; starches; inulin; wheat gluten
12: Oil seed, oleaginous fruits; miscellaneous grains; seeds and fruit, industrial or medicinal plants, straw and fodder
13: Lac; gums, resins & other vegetable saps and extracts
14: Vegetable planting materials; vegetable products not elsewhere specified or included
15: Animal or vegetable fats and oils and their cleavage products, prepared animal fats, animal or vegetable waxes
16: Meat, fish or crustaceans, molluscs or other aquatic invertebrates; preparations thereof
17: Sugars and sugar confectionery
18: Cocoa and cocoa preparations
19: Preparations of cereals, flour, starch or milk; pastrycooks' products
20: Preparations of vegetables, fruit, nuts or other parts of plants
21: Miscellaneous edible preparations
22: Beverages, spirits and vinegar
23: Food industries, residues and wastes thereof; prepared animal fodder
24: Tobacco and manufactured tobacco substitutes
41: Raw hides, skins and leather
50: Silk
51: Wool, fine or coarse animal hair; horsehair yarn and woven fabric
52: Cotton
53: Vegetable textile fibres; paper yarn and woven fabrics of paper yarn

2.2 Nature and Sources of Data

Secondary sources of data are used for the entire study. The data obtained from UNCOMTRADE (United Nations International Trade Statistics Database) through World Integrated Trade Solution (WITS) software [8] of World bank. Time series data for a period of 19 years i.e., from 2000 to 2018 is considered for the study.

2.3 Compound Growth Rate

$$Y = ab^t \quad (1)$$

Where Y=Export variable for which growth rate is calculated [9]

t=time variable taking 1, 2, 3…….,n. and here they are years

$$\log Y = \log a + t \log b \quad (2)$$

a=intercept
b=regression co-efficient of "Y" on t.
by taking log form on both sides, we get

Or

$$\ln Y = \alpha + \beta T \quad (3)$$

Where,

Y=time series data of exports
T= trend term
α= constant coefficient
β= slope coefficient measure relative change in Y for a given absolute change in explanatory variable T.

If we multiply the relative change in Y by 100, we will get percentage change or growth rate in Y for absolute change in variable T,

Compound Growth Rate (CGR) can be calculated by following formula.

$$\text{CGR}\% = (\text{Antilog}(\beta) - 1) \times 100 \quad (4)$$

CGR will be estimated by applying Ordinary Least Square (OLS) method [10]. The t-test will be performed to test the significance of "β"

2.4 Balassa Index-Revealed Comparative Advantage (RCA)

The concept of revealed comparative advantage pertains to the relative trade performance of individual countries in particular commodities. On the assumption that the commodity pattern of trade reflects the inter-country differences in relative costs as well as in non-price factors, this is assumed to "reveal" the comparative advantage of the trading countries. The factors that contribute to movements in RCA are economic: structural change, improved world demand and trade specialization.

Balassa [11] first introduced the concept of Revealed Comparative Advantage (RCA). Balassa's measure of relative export performance by country and commodity, defined as a country's share of world exports of a commodity divided by its share of total world exports. The Balassa index for country i commodity j is calculated as follows:

$$\text{RCA}_{ij} = \left(\frac{X_{ij}}{X_{wj}}\right) / \left(\frac{X_i}{X_w}\right) \quad (5)$$

Where

X_{ij} = i^{th} country's export of commodity j
X_{wj} = world exports of commodity j
X_i = total exports of country i
X_w= total world exports

RCA is calculated for all agricultural commodities of Indonesia for a period from 2000 to 2018 and results are presented in tables. Post-trade data is used for calculating RCA. The revealed comparative advantage has a relatively simple interpretation. If it takes a value greater than one, the country has a revealed comparative advantage in that product whereas the country has revealed comparative disadvantage in that product if RCA value is less than one.

3. RESULTS AND DISCUSSION

3.1 Pattern of Agricultural Exports of Indonesia

The compound growth rate calculated for the export of agricultural commodities for the period from 2000 to 2018 and are presented in Table 1. The agricultural commodity export from Indonesia on an average is 28.37 million metric tonnes in terms of quantity and 23,363.58 million USD in terms of value. Compound growth rate for export of agricultural commodities is 8.78% and 12.33% in quantity and value terms, respectively. Both the growth rates are found to be significant at 1%. The Coefficient of Variation (C.V) of agricultural commodity export from Indonesia is 43.19% and 54.73% in quantity and value terms, respectively. There is increasing trend in Agricultural commodity export due to increase in demand for fruits and vegetables and coffee exported from Indonesia.

3.2 Export Competitiveness of Agricultural Commodities

3.2.1 Categories of agricultural commodities having Revealed comparative advantage

Categories of agricultural commodities having RCA values more than one over the study period i.e., 2000 to 2018 are presented in Table 2. During the period considered under study, RCA for Fish and crustaceans, molluscs and other aquatic invertebrates (HS Code:03) varied from 2.21 to 3.72, for Coffee, tea, mate and spices (HS Code:09) ranged from 2.93 to 5.15, for Vegetable planting materials; vegetable products not elsewhere specified or included (HS Code:14) varied from 3.89 to 18.39, for Animal or vegetable fats and oils and their cleavage products; prepared animal fats; animal or vegetable waxes (HS Code:15) ranged from 8.10 to 24.18. for Cocoa and cocoa preparations (HS Code:18) varied from 2.21 to 5.26, for Tobacco and manufactured tobacco substitutes (HS code:24) ranged from 1.06 to 3.00 and for Cotton (HS code:52) ranged from 1.04 to 2.65 in case of Indonesia. All these commodities have revealed comparative advantage during the entire study period. For all the above specified agricultural commodities Indonesia show strong specialization in export over world market.

3.2.1 Categories of agricultural commodities having revealed comparative disadvantage

Categories of agricultural commodities whose RCA values less than one are presented in Table 3. Out of 29, 17 categories of agricultural commodities show revealed comparative disadvantage over the entire study period.

Table 1. Agricultural commodity exports of Indonesia

Year	Quantity (million MT)	Value (million USD)
2000	11.07	4613.78
2001	11.28	4593.55
2002	13.25	4568.75
2003	13.06	4699.44
2004	17.30	5501.64
2005	20.22	5546.68
2006	23.05	6389.47
2007	23.22	9129.44
2008	26.96	12059.71
2009	28.91	10605.33
2010	28.72	14550.70
2011	30.69	20979.57
2012	34.46	19500.88
2013	37.97	19913.06
2014	41.10	20680.20
2015	45.49	17562.17
2016	41.48	19030.58
2017	39.84	21801.94
2018	50.92	23093.54
Average	28.37	23363.58
Coefficient of variation (%)	43.19	54.73
CGR (%)	8.78**	12.33**

*Note: ** represent significant at 1% probability level*

Table 2. RCA values of agricultural commodities having Revealed comparative advantage

Year	HS Code						
	03	09	14	15	18	24	52
2000	3.71	5.04	6.64	9.07	3.23	1.06	2.64
2001	3.72	4.00	7.51	8.10	3.50	1.43	2.65
2002	3.59	4.80	7.71	11.54	5.26	1.32	2.36
2003	3.67	4.92	8.40	11.25	4.09	1.18	2.28
2004	3.44	4.57	11.28	14.93	3.32	1.36	2.17
2005	3.10	4.84	8.36	15.28	3.67	1.52	2.14
2006	3.06	4.82	9.07	16.06	4.25	1.49	2.02
2007	3.02	4.64	9.94	18.76	3.91	1.69	1.79
2008	3.09	5.15	8.55	18.90	4.33	1.70	1.55
2009	2.52	4.29	7.79	18.47	4.22	1.78	1.40
2010	2.32	3.66	5.68	18.29	3.98	1.81	1.32
2011	2.21	2.93	7.22	16.76	2.66	1.57	1.06
2012	2.71	4.16	3.89	18.34	2.21	1.79	1.04
2013	2.80	4.47	4.48	19.40	2.57	2.25	1.23
2014	2.90	3.95	6.26	22.50	2.59	2.58	1.54
2015	2.81	4.94	10.95	22.67	2.84	2.74	1.62
2016	2.84	4.28	12.80	22.35	2.78	2.75	1.64
2017	2.71	3.89	15.16	24.18	2.36	2.95	1.47
2018	2.70	3.59	18.39	23.73	2.63	3.00	1.43

3.2.3 Categories of agricultural commodities moving from Revealed comparative disadvantage to Revealed comparative advantage

RCA values of categories of agricultural commodities which move from Revealed comparative disadvantage to Revealed comparative advantage during the study period are presented in the Table 4. Meat, fish or crustaceans, molluscs or other aquatic invertebrates; preparations thereof (HS Code:16), Preparations of cereals, flour, starch or milk; pastrycooks' products (HS Code:19),

Miscellaneous edible preparations (HS Code:21) and Food industries, residues and wastes thereof; prepared animal fodder ((HS Code:23) are the categories which have revealed comparative disadvantage i.e., RCA<1, in the year 2000 but gained revealed comparative advantage by the end of study period (2018).

Table 3. RCA values of agricultural commodities having revealed comparative disadvantage

Year	HS Code															
	01	02	04	05	06	07	08	10	11	12	20	22	41	50	51	53
20000	0.43	0.03	0.40	0.16	0.11	0.21	0.46	0.02	0.22	0.22	0.63	0.07	0.50	0.07	0.06	0.04
2001	0.47	0.05	0.55	0.20	0.12	0.22	0.39	0.04	0.18	0.18	0.69	0.07	0.44	0.02	0.06	0.05
2002	0.32	0.06	0.37	0.19	0.14	0.21	0.47	0.03	0.29	0.21	0.69	0.07	0.37	0.03	0.06	0.04
2003	0.28	0.05	0.36	0.12	0.14	0.17	0.46	0.02	0.28	0.19	0.58	0.06	0.39	0.04	0.06	0.14
2004	0.27	0.03	0.34	0.09	0.14	0.23	0.45	0.03	0.96	0.27	0.59	0.07	0.42	0.45	0.09	0.21
2005	0.27	0.02	0.34	0.14	0.12	0.23	0.50	0.05	0.63	0.34	0.64	0.06	0.51	0.38	0.07	0.09
2006	0.17	0.03	0.31	0.13	0.11	0.20	0.50	0.02	0.28	0.37	0.55	0.06	0.62	0.03	0.05	0.09
2007	0.30	0.03	0.27	0.10	0.08	0.21	0.56	0.05	0.29	0.30	0.32	0.06	0.75	0.01	0.04	0.12
2008	0.30	0.02	0.47	0.08	0.06	0.17	0.50	0.05	0.38	0.26	0.58	0.08	0.74	0.04	0.05	0.12
2009	0.25	0.02	0.38	0.08	0.07	0.22	0.41	0.03	0.26	0.23	0.42	0.07	0.65	0.01	0.04	0.22
2010	0.27	0.02	0.32	0.15	0.08	0.15	0.37	0.02	0.31	0.26	0.37	0.08	0.41	0.00	0.03	0.24
2011	0.27	0.02	0.27	0.12	0.09	0.13	0.45	0.01	0.48	0.25	0.38	0.13	0.39	0.00	0.02	0.35
2012	0.28	0.01	0.26	0.16	0.13	0.17	0.44	0.02	0.33	0.22	0.36	0.11	0.42	0.00	0.02	0.37
2013	0.35	0.02	0.24	0.17	0.09	0.17	0.43	0.01	0.47	0.24	0.33	0.13	0.42	0.02	0.03	0.20
2014	0.30	0.02	0.23	0.19	0.10	0.18	0.66	0.01	0.38	0.37	0.40	0.13	0.41	0.05	0.02	0.33
2015	0.30	0.02	0.21	0.22	0.17	0.20	0.82	0.06	0.35	0.30	0.50	0.14	0.42	0.02	0.01	0.29
2016	0.29	0.02	0.33	0.22	0.11	0.14	0.70	0.01	0.32	0.31	0.43	0.18	0.43	0.01	0.02	0.26
2017	0.30	0.01	0.37	0.23	0.09	0.15	0.81	0.00	0.36	0.26	0.47	0.16	0.33	0.01	0.01	0.25
2018	0.28	0.01	0.38	0.19	0.09	0.16	0.72	0.07	0.32	0.35	0.40	0.19	0.36	0.03	0.00	0.31

Table 4. RCA values of agricultural commodities moving from Revealed comparative disadvantage to Revealed comparative advantage

Year	HS Code			
	16	19	21	23
2000	0.72	0.44	0.22	0.47
2001	0.73	0.49	0.20	0.40
2002	0.66	0.51	0.20	0.52
2003	0.74	0.67	0.22	0.58
2004	1.35	0.70	0.25	0.65
2005	1.25	0.71	0.35	0.58
2006	1.25	0.68	0.39	0.60
2007	1.34	0.67	0.48	0.93
2008	1.45	0.68	0.56	0.90
2009	1.59	0.69	0.56	0.49
2010	1.35	0.85	0.74	0.56
2011	1.43	0.85	0.83	0.66
2012	1.63	0.90	1.10	0.79
2013	1.97	0.98	1.04	0.89
2014	2.32	1.07	1.20	0.94
2015	2.20	1.14	1.41	0.81
2016	2.25	1.27	1.53	0.83
2017	2.34	1.37	1.41	0.87
2018	2.59	1.35	1.59	1.04

Table 5. RCA values of agricultural commodities which do not show definite pattern

Year	HS Code:13
2000	1.39
2001	1.23
2002	1.22
2003	1.10
2004	1.02
2005	1.13
2006	1.19
2007	2.05
2008	1.15
2009	0.90
2010	0.79
2011	0.69
2012	0.60
2013	1.01
2014	1.16
2015	1.38
2016	1.32
2017	1.37
2018	1.78

3.2.4 Remaining categories

Lac, gums, resins & other vegetable saps and extracts (HS Code:13) showed revealed comparative advantage during the initial years of study and after that it showed revealed comparative advantage and then again showed reveal comparative advantage. The RCA values of this commodity from 2000 to 2018 are presented in Table. 5

4. CONCLUSION

In this research, we discovered In terms of quantity and volume, the compound growth rate for agricultural commodities exports from Indonesia is 8.78 percent and 12.33 percent, respectively. In order to boost exports, the government should take steps to widen the export market by meeting the import countries' standards. Fish and crustaceans, molluscs and other aquatic invertebrates (HS Code:03), Coffee, tea, mate and spices (HS Code:09), Vegetable planting materials; vegetable products not elsewhere specified or included (HS Code:14), Animal or vegetable fats and oils and their cleavage products; prepared animal fats; animal or vegetable waxes (HS Code:15), Cocoa and cocoa preparations (HS Code:18) Tobacco and manufactured tobacco substitutes(HS Code:24) and Cotton (HS code:52) are the commodities showed revealed comparative advantage during the entire period of study. Meat, fish or crustaceans, molluscs or other aquatic invertebrates; preparations thereof (HS Code:16), Preparations of cereals, flour, starch or milk; pastrycooks' products (HS Code:19), Miscellaneous edible preparations (HS Code:21), Food industries, residues and wastes thereof; prepared animal fodder ((HS Code:23) and Lac; gums, resins & other vegetable saps and extracts (HS Code:13) showed revealed comparative advantage by the end of study period whereas the remaining seventeen categories of commodities showed revealed comparative disadvantage during the entire study period. The government should take steps to encourage the export of agricultural commodities that have shown comparative advantage over the course of the study or at the conclusion. Government initiatives such as increasing infrastructure investments, expanding trade credit access, and implementing cross-border paperless trade reforms can be implemented.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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