



Structural Change of Indonesian Agriculture: Evidence from Agricultural Census 2003-2013

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Introduction

In Indonesia, the contribution of agriculture on Gross Domestic Product (GDP) has declined from 19% in 1990 to 14.4% in 2013. The decline on GDP's share has been faster compared to the decline on the share on agricultural employment. In 1980, the share of agriculture employment was 56% which declined to 34.7% in 2013. In accordance with the growth of GDP/capita, food consumption is expected to change toward higher consumption of nutrition-rich food. On the production side, it is expected that there will be diversification toward high value commodities such as fruits, vegetables, and livestock products.

This paper highlights the evidence on structural changes on both demand and supply side of Indonesia's agriculture. Data sources for food consumption is from SUSENAS (household consumption expenditure survey) of the Central Bureau of Statistic (CBS). Related to the supply side, we used agricultural census data of 2003 and 2013, which is also published by the CBS.

Structural change on food consumption

According to the SUSENAS data in 1999, 2005 and 2010, the trend in food consumption of Indonesia's household has changed significantly (Table 1). Consumption on cereals in 2010 was only 87% to the consumption level in 1999 (Dyck et al., 2012 as cited by Ikhsan *et al.* 2014). The largest decline was observed for consumption of tubers in 2010 which reached only 61% to the corresponding level of 1999. Contrarily, consumption of nutrition-rich food such as legumes, vegetables, fruits, and livestock products has increased significantly. Vegetable consumption in 2010 reached 120% to that of 1999. Likewise, the consumption of fruits in 2010 reached 125% to corresponding consumption level of 1999. Consumption of processed foods has also increased significantly with an index of 160% in 2010.

The largest increase was observed for consumption of meat, egg, and milk which reached more than 200% in 2010. Meat consumption in 2010 increased to 205% compared to that in 1999. Consumption of milk showed the largest increase with an index of 230% in 2010. However, compared to other ASEAN member states, such as Malaysia and Thailand, consumption level of livestock products in Indonesia is relatively low.

The growth of high-value food products consumption was driven by the growth in income, urbanization, and awareness of households on the importance of better nutrition. Therefore, in accordance with the growth of per capita income, the increase on consumption of high-value products is expected to show strong growth in the future.

Table 1. Trend of index on per capita food consumption, 1999, 2005, 2010 (1999=100)

Groups of food commodities	1999	2005	2010
Decreased in 2010, compared to 1999			
Tubers	100	92	61
Cereals	100	95	87
Beverages	100	107	97
Increased more than 100%			
Spices	100	125	104
Legumes	100	134	107
Fat and oil	100	117	113
Vegetables	100	120	120
Fruits	100	122	125
Fish	100	132	126
Increased more than 200%			
Meat	100	207	205
Other foods	100	184	206
Egg and milk	100	193	230

Source: Dyck *et al.*(2012) as cited by Ikhsan *et al.*(2014)

The change in consumption pattern is also driven by dynamic changes in the middle and downstream segment of the value chain, namely development of supermarkets, other retail business, and food processing industries (Minot, 2013). Sales of modern outlets (hypermarkets, supermarkets, and minimarkets) has increased at an average of 9%/year. The reasons why consumers choose modern outlets is due to good quality, cleanliness, and vicinity to entertainment. At the same time, traditional outlets (traditional markets and street vendor) co-exist with an average growth of sales 5%/year. Traditional outlets are chosen particularly for their lower price and their easy access.

Structural change on supply

Transformation on the consumption side should also be reflected on the supply side which transformed in the same direction, but the empirical evidence shows an opposite story. During 2003-2013 period, the number of agriculture households has declined by 5.1 million (16.3%) from 31.2 million in 2003 to 26.1 million in 2013. Furthermore, the decline on the number of households who were into horticulture and operating livestock was higher than

that of households cultivating food crop households. During 2003-2013 period, the number of households who were into horticulture declined by 37.4% and household operating livestock also declined by 30.3% (Table 2). On the other hand, percentage of households cultivating food crops declined only by 5.2%. This observation shows that in relative terms, Indonesian agriculture is becoming dominated by the food crop sector, at the expense of declining horticulture and livestock sectors.

Further analyses by sub-sectors and commodities show that the number of households who were into rice and sweet potatoes's has increased during that period, but the number of household who were engaged in growing other commodities has declined significantly. The largerst decline are observed for households engaged in planting cassava (35.7%) followed by soybeans (33.9%). Compared to other food crops, the decline on the number of households engaged in horticulture was even larger, particularly those who were growing oranges (69.7%), banana (64.1%) and potatoes (54.4%). The similar pattern is observed for livestock, particularly household who were engaged in growing native chicken which declined by (54.1%), and households engaged in duck production (43.2%). The exeption is for household operating slaughter cows, dairy cows, and hogs which increased by 5.1-26.6%.

Table 2. Comparison of the number of households by sub-sectors and commodities

Crops/Livestock	2003	2013	Changes (%)
Food crops:			
Rice	13,740.1	14,147.9	3.0
Maize	6,339.6	5,057.5	-20.2
Soybean	1,015.8	671.8	-33.9
Groundnut	1,894.0	1,337.4	-29.4
Cassava	4,500.5	2,895.9	-35.7
Sweet potatoe	813.7	866.8	6.5
Horticulture:			
Shallot	328.2	226.2	-31.1
Red chili	741.9	574.9	-22.5
Potatoe	211.0	96.2	-54.4
Oranges	1,830.8	554.4	-69.7
Banana	15,069.3	5,409.9	-64.1
Perennial crops:			
Rubber	1,682.7	2,888.5	71.7
Cocoa	1,900.4	2,186.8	15.1
Coffee	2,409.8	1,962.0	-18.6
Palm oil	678.4	1,458.3	115.0
Sugar cane	227.3	287.1	26.3
Livestock:			
Slaughter cow	4,188.1	5,079.0	21.3
Dairy cow	112.1	142.0	26.6
Buffalo	398.9	355.9	-10.8
Goat	3,070.4	2,728.5	-11.1
Lamb	754.0	645.6	-14.4
Hog	1,209.5	1,271.5	5.1

Native chicken	14,422.6	6,620.4	-54.1
Duck	1,384.9	786.7	-43.2

Source: Agricultural Census 2013 (CBS) as calculated by PUSDATIN (2014)

Structural changes of those who were growing perennial crops show a different pattern. The number of households operating perennial crops increased significantly except for coffee. The significant increase was observed for households cultivating oil palm by 115%, followed by rubber at 71.7%. Strong growth of palm oil demand for both CPO and biofuel has driven significant expansion of oil palm production, particularly in outer Java.

The decline on the structure of households who were operating high-value commodities is inconsistent with relatively high returns of those commodities. During the two agricultural census period, household cultivating food crops showed the lowest average income, estimated at US\$ 204.5/capita in 2003 and US\$ 415.8/capita in 2013 (Table 3). In 2003, the highest income was reached by households who were operating livestock at US\$ 288.8/capita, but in 2013 the highest income was observed for households engaged in growing perennial crops at US\$ 638.7/capita. The households who were engaged in growing perennial crops also showed the largest growth in income at 22.7%/annum, and the lowest was households who were operating livestock at 16%/annum.

Table 3. Level and structure of agriculture household income, 2003 and 2013 (USD)

Household type/source of income	2003	%	2013	%
Food crops:				
Agriculture	388.6	50.0	897.6	56.1
Non-agriculture	62.5	8.0	108.2	6.8
Other income and transfer	138.3	17.8	249.8	15.6
Agriculture labor	98.5	12.7	156.2	9.8
Non-agriculture labor	87.1	11.2	167.1	11.8
Total	775.0	100	1,578.9	100
Total/capita	204.5	-	415.8	-
Horticulture:				
Agriculture	607.2	59.1	1,453.0	64.6
Non-agriculture	82.8	8.1	156.7	7.0
Other income and transfer	150.1	14.6	243.6	10.8
Agriculture labor	103.6	10.1	182.4	8.1
Non-agriculture labor	84.0	8.2	212.3	9.4
Total	1,028.7	100	2,248.0	100
Total/capita	270.4	-	583.9	-
Perennial crops:				
Agriculture	669.3	62.7	1,677.3	68.0
Non-agriculture	84.0	7.9	145.0	5.9
Other income and transfer	145.8	13.7	215.4	8.8
Agriculture labor	103.1	9.7	242.3	9.9
Non-agriculture labor	64.7	6.1	179.2	7.3
Total	1,066.9	100	2,459.2	100
Total/capita	281.9	-	638.7	-
Livestock:				
Agriculture	589.0	53.7	1,189.7	59.4

Non-agriculture	98.0	8.9	131.3	6.6
Other income and transfer	185.3	16.9	302.1	15.1
Agriculture labor	125.7	11.5	171.5	8.6
Non-agriculture labor	99.4	9.1	203.5	10.2
Total	1,097.4	100	1,998.1	100
Total/capita	288.8	-	520.3	-

Source: Agricultural Census 2013 (CBS) and recalculated from PUSDATIN (2014)

In addition to its level, income structures also show an interesting pattern. Household operating food crops show more diversified income as shown by lowest percentage of income from agriculture. Percentage of income from agriculture for households who were engaged in growing food crops increased from 50% in 2003 to 56.1% in 2013. Due to the relatively small percentage of incomes from agriculture motivated households to diversify their incomes into other sources.

For households who were cultivating perennial crops, the percentage of agriculture income is much higher, 62.7% in 2003 and 68% in 2013. The next rank is for households operating horticulture which shows percentage of agricultural income of 59.1% in 2003 and this increased to 64.6% in 2013. For all household categories, the percentage of income from non-farm sector were relatively small and shows a declining trend. This observation indicates that for farm households even though they diversified the sources of income, the largest income still come from agriculture. For these types of households, the transition from agriculture to non-farm sector is not fully realized.

Conclusion

Household consumption pattern has shown dynamic changes toward higher consumption of high-value commodities such as vegetables, fruits, and animal products (meat, egg, and milk). The trend of food consumption responds to the increase in income, urbanization and increase awareness on health as well as food safety. In addition, growing development of modern outlets (*hypermarkets, supermarkets and minimarkets*) help access of household to consume those commodities. The exception is those households who were cultivating perennial crops which show an increasing trend, particularly those households who were cultivating oil palm for both domestic and global markets.

The changes in consumption pattern does not correspond to similar changes in the supply sides. Structure of farm households is dominated by those household who were cultivating food crops. On the contrary, households who were engaged in high-value commodities such as horticulture and livestock are declining. This pattern is also inconsistent with higher incomes shown by households who were engaged in those commodities.

In response to this phenomenon, a strategic and more friendly policies towards development of high-value commodities are needed. Those policies, include: a) priority on increasing productivity utilizing limited natural resources (land, water, and energy); b) priority expenditure policy on general public services (infrastructures, research&development, education&training, natural resource conservation, standard and certification, and trade promotion); c) reduce trade barriers (tariff and non-tariff); d) connecting farmers to value chain through contract farming and partnership; and e) align policy with the typology of small farmers (commercial, transition and subsistence).

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