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The Role of Tobacco Agriculture and Manufacturing in Temanggung Regency: An Input-Output Perspective

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Abstract

This paper aims to examine the role of the tobacco agriculture and manufacturing industries in the economy of Temanggung Regency - as one of the largest tobacco producing areas in Indonesia. The role of the industry are analysed from the perspective of inputs and outputs of the tobacco agriculture and manufacturing which include: (1) the sectoral interlinkage of the tobacco agriculture and manufacturing; (2) the structure of domestic and imported inputs used by the tobacco agriculture and manufacturing industries; and (3) the impact of the tobacco agriculture and manufacturing industries to household income and employment. By employing impact analysis on 2017 Temanggung Input-Output table, this study finds the tobacco agriculture and manufacturing have a big role for the economy and welfare. The two scenario simulations - of all sector investments and generate transcend economic and welfare improvement of the tobacco agriculture and manufacturing, and other industries in Temanggung regency.

Keywords: Tobacco agriculture, tobacco manufacturing, Input-Output analysis, economic welfare

1. Introduction

Tobacco has an important role for the Indonesian economy. The tobacco industry absorbed up to 6 million workers [1], including tobacco farmers, cigarette merchants and retailers, as well as workers in cigarette factories. The tobacco manufacturing exports 887,085,7 thousand US dollars [2], and generates 96,11 percent of excise revenue for the Government of Indonesia in 2016 [3].

Temanggung regency has the widest area of farming of tobacco in Indonesia, which produce 29,3% of Indonesia's chopping tobacco [4]. Tobacco farming in Temanggung supports 64,030 farmers livelihood. The government of Temanggung obtains tobacco

excise revenue sharing from Government of Indonesia is 31,714 million rupiah in 2017 [5]. Table 1 displays the development of revenue sharing of tobacco excise of Temanggung regency.

TABLE 1: Revenue Sharing of Tobacco Excise of Temanggung Regency (million rupiahs).

	2011	2012	2013	2014	2015	2016	2017
Indonesia	1,373,444	1,440,820	2,014,930	2,214,000	2,411,144	2,796,355	2,997,560
Central Java Province	329,386	364,243	157,589	481,509	544,412	633,688	690,581
Temanggung	13,366	15,769	24,183	22,581	23,954	27,411	31,714

Source: Ministry of Finance Republic of Indonesia [5]

2. Research Objective

This paper examines the role of tobacco agriculture and manufacturing in the economy of Temanggung Regency, by employing Input-Output analysis.

The role of the industry is analysed from the perspective of input-output of the tobacco agriculture and manufacturing which include:

1. the structure of domestic and imported inputs used by the tobacco agriculture and manufacturing; and

2. the sectoral interlinkage (backward and forward linkages) of the tobacco agriculture and manufacturing;

3. the impact of the tobacco agriculture and manufacturing to household income and employment,

3. Methodology

3.1. Data

The baseline data used in this study is the 2016 Input-Output Table (I-O) of Temanggung regency, published by the Central Bureau of Statistics (BPS) and the Regional Planning and Development Agency/Bappeda of Temanggung Regency [6]. Supporting data includes yearly regional macroeconomic indicators, which published by BPS, and the Regional Government Budget and Expenditure (APBD) which published by Temanggung Regency Governmet and Central Java Provincial Government.

3.2. Method

The research employs I-O analysis, a general equilibrium analysis which represents the inter-connection between markets or blocks. The analysis is based on goods and services transaction matrices, and analyzes the production side data. The inter-block linkage scheme of the Input-Output model is summarized in the Figure 1:
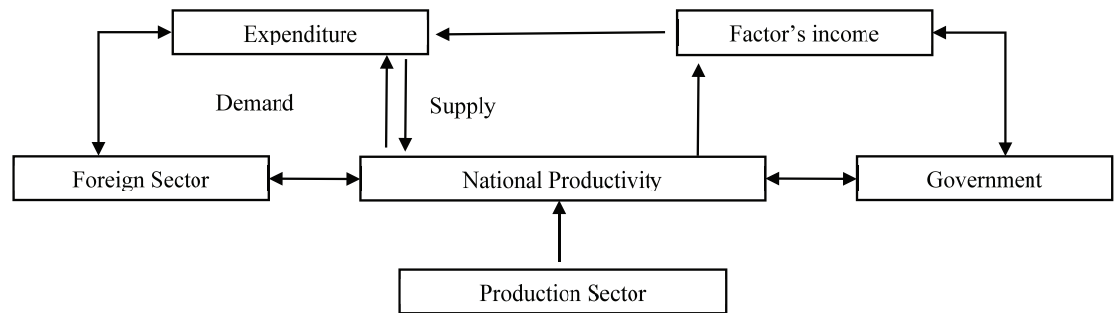

Figure 1: I-O Model Scheme.

In brief, it can be explained that the production sector receives input from households such as capital and labor which are called primary inputs. The household sector obtains final goods from the production sector's output, and the production sector buys intermediate inputs from other production sectors. The production sector also imports goods as input and exports to foreign sector. Households receive income from producers as returns and wages, and transfers from the government. The government receives taxes from households.

The impact of investment on tobacco agriculture and manufacturing or other sectors to sectoral output changes is calculated by the following formula:

$$X = (I - A)^{-1}Y \tag{1}$$

where *Y* represents a vector of changes in the final demand (in our case is investment) and *X* vector of output change. *A* is the technological coefficient matrix and $(I-A)^{-1}$ is Leontief inverse matrix [7].

The output multiplier of a sector j (O_j) is the total value of the output generated by the economy to meet (or as a result) a change of one unit of money of the sector's final demand. In notation, formulated as:

$$O_j = \sum_{i=1}^{n} \alpha_{ij} \tag{2}$$

where O_j is a summarization of the column element of Leontief invers matrix of the row *i* and column *j* (α_{ij}).

A household's income multiplier (H_j) represents a change in the amount of income received by households created by the addition of one unit of final demand money in a certain sector. Matrix of household income multiplier, formulated as:

$$H_j = H_R, O_j Y \tag{3}$$

H_R is the coefficient of wages and salaries which is the ratio between the value of wages and salaries of each sector to its total value of input.

4. The Scenarios of Injection

The policy scenarios which are developed and injected to the Temanggung economy, is the government investment. The first scenario is the government funds injected to all sectors in economy. This investment uses an estimated figure of 1 trillion rupiah. The second scenario is the government investment is distributed to 10 sectors that have the largest labor force multiplier (eg total of 1 trillion rupiah), namely Arabica Coffee (11), Chilli (6), Other Plantation and Other Agricultural Products (13), Other Bulbs (4); Other Industries (30), Tofu, Tempeh, and Other Soybean Industry (25), Tobacco Manufacturing (27), Ground Coffee Miller and Pheeling (24), Drinking Water (32), and Other Food and Beverage Industries (26). Both of these scenarios are to simulate the impact of the policies on the tobacco agricultural and manufacturing sectors, as well as other sectors in the economy.

4.1. Sectoral backward and forward linkage analysis

A sector has a high backward linkage if the growth of these sectors has a strong effect on other sectors or has a strong thrust to other sectors. For inter-sector comparison purposes, the number of backward linkages is normalized in the form of backward linkage index with the following formula:

$$B_j = \frac{n \sum_{i=1}^{n} \alpha_{ij}}{\sum_{i=1}^{n} \sum_{j=1}^{n} \alpha_{ij}} \tag{4}$$

where B_j is the backward linkage index of the j sector, and n is the number of matrix sectors.

The backward linkage index $B_j > 1$ means the backward linkage of the j is above the average of all of economic sectors' backward linkage; $B_j < 1$ means under the sectoral average, and $B_j = 1$ is similar to sectoral average.

Forward linkage is a measure that shows the amount of output that must be pro-
vided by a sector for a unit of change in final demand for the economic sector. For the
purposes of comparison between sectors, the number of forward linkages is normal-
ized in the form of forward linkage index with the following formula:

$$D_i = \frac{n \sum_{j=1}^{n} \alpha_{ij}}{\sum_{i=1}^{n} \sum_{j=1}^{n} \alpha_{ij}} \tag{5}$$

where D_j is the forward linkage index i, and n is the number of matrix sectors.

The forward linkage index $D_j > 1$ means the forward linkage of the j is above the
average of all of economic sectors' forward linkage; $D_j < 1$ means under the sectoral
average, and $D_j = 1$ is similar to sectoral average.

5. Result and Analysis

5.1. Data description of 2016 Temanggung I-0 (44 sectors classification)

The output rank of the Tobacco agriculture and Tobacco manufacturing sectors are
13th and 5th from overall sectors' output, while the value added rank of the two
sectors respectively 11th and 3rd from overall sectors' value added. The higher rank of
value added than output data shows that both sectors have a relatively high level of
efficiency compared to other sectors.

The rank of employment of the Tobacco agriculture and Tobacco manufacturing
sectors is 7th and 1st from overall sectors' employment, which illustrate that both
sectors are the best on labor absorption. The two sectors absorb labor force by 24%
of total employments in Temanggung Regency. On the other side, the households'
income rank of the Tobacco agriculture and Tobacco manufacturing sectors is 11th and
12th from overall sectors' income, not the best, but relatively high on average of 44
sectors.

This sector can be relied to bring in income from outside, which has a high multiplier
for economic growth, relative to other sectors. This is indicated by the high ranking
for the export capabilities of these two sectors – 4th and 2nd - from overall sectors'
exports, as showed in Table 2.

Tobacco agriculture and Tobacco manufacturing inputs originated from imports (for-
eign and outside regions) are 12.21% and 5.1% of the total input. The two sectors
are not in the 10 major sectors of imported sectors (foreign and outside regions). The

dependence of these two tobacco sectors with inputs originating from abroad and outside the region is low

TABLE 2: Ten major sectors according to export Capability in Temanggung Regency 2016.

No	IO Code	Sector	Export	
			Value (Billion Rupiahs)	Share(%)
1	28	Wood Manufacturing	5,116,89	63,52
2	27	Tobacco Manufacturing	910,56	11,30
3	16	Poultry, Other Livestock and its results	489,23	6,07
4	12	Tobacco Agriculture	364,54	4,53
5	9	Other Fruits	309,99	3,85
6	8	Banana	175,29	2,18
7	1	Paddy	159,63	1,98
8	22	Rice Milling	138,41	1,72
9	24	Ground coffee and peelings	124,66	1,55
10	14	Cattle and the results	67,75	0,84
		Other sectors (35 sectors)	199,03	2,47
	Total		8,056,00	100,00

5.2. Simulation results

1. Scenario 1: The tobacco agricultural sector and the tobacco manufacturing have an impact on total output, on the rank of 17th and 24th respectively, of 44 sectors

2. Scenario 1: The tobacco agricultural sector and the tobacco manufacturing have an impact on total sectoral household income, on the rank of 14th and 39th respectively, of 44 sectors

3. Scenario 1: The tobacco agricultural sector and the tobacco manufacturing have an impact on total employment, on the rank of 6th and 16th respectively, of 44 sectors

4. Scenario 2: The tobacco agricultural sector and the tobacco manufacturing have an impact on total output, on the rank of 13th and 8th respectively, of 44 sectors. Despite tobacco agriculture does not receive the investment, but the output of this sector is encouraged to grow quite high

5. Scenario 2: The tobacco agricultural sector and the tobacco manufacturing have an impact on total household income, on the rank of 13th and 10th, respectively, of 44 sectors

6. Scenario 2: The tobacco agricultural sector and the tobacco manufacturing have an impact on total employment, on the rank of 12th and 6th, respectively, of 44 sectors

5.3. Sectoral interlinkage analysis

The tobacco agriculture sector has a backward and forward linkage index <1, which means that its ability to drive the other sectors either through the input or output path is lower than all sector averages. The tobacco manufacturing sector has a backward linkage index > 1, which means that its ability to drive other sectors through input path is greater than the all sectoral averages. This sector has a forward linkage index <1

6. Summary and Recommendation

The tobacco agricultural sector has to have attention by the government as its relatively low backward and forward linkages to other sectors in the Temanggung economy, and tobacco manufacturing sector has the backward linkages index above the average of other sectors. The development of the tobacco manufacturing sector is important, since it drives the local tobacco agriculture and other sectors which supplied the input of tobacco manufacturing. In addition, these two sectors are the source of livelihood Temanggung's workforces, as well as a source of income for the government.

Prioritized investments in the leading sectors scenario, the high-linked sectors – the tobacco agriculture not include in the group), indicates to have better impact for the tobacco agriculture and the tobacco processing industries (including output, income and household impacts), compared to the scenario that distribute equally the investments to all sectors. This shows the high linkages of key sectors in Temanggung with tobacco agriculture and manufacturing.

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