Supply Chain Management for Value Added in Agriculture Sector of Indonesia

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***Abstract*— macroeconomic aspects of preferred value chains. This paper introduces the concept of SCM and illustrates its applications in agroindustries, with a focus on Value Added Tac (VAT) in Indonesia. VAT is one of the main sources of tax revenue in Indonesia, which is a percentage applied to the sale price charged for goods or services at every point in the supply chain. Currently, the tax revenue is one of the fiscal risks that must be mitigated by the Government, since it never reached the target in the last ten years except in 2008. One discourse being raised to increase tax revenue is to charge VAT on all goods and services, including the agriculture sector. This paper uses the latest of Indonesian social accounting matrix (SAM) multiplier model to quantify the economic impact of the supply chain system for imposition of VAT on the agriculture sector. The overview of agriculture value chain in Indonesia was done and supply chain risk management and logistics cost were described. Then, the recommendation was provided for optimizing the agricultural value chain. The results is the imposition of VAT on agricultural sector in all supply chains will give a positive impact if all VAT revenue distributed to the poor**

***Keywords*—** *Supply chain management, agriculture business, value added Tax.*

1. Introduction

The autonomy and independence of international food supply chains is shifting toward interconnected systems with a large variety of complex relationships. Changes in sourcing, producing and marketing as a result of the increased globalization of food trade, leads to exposure to new risks and greater potential consequences of food-borne illness outbreaks. Indonesia is one of the countries with a small tax ratio to GDP in the world. Tax Ratio Indonesia in 2017 is only 10,7%, continues declined from year to year, although in term of nominal, it always grows. In 2008 tax revenue only Rp658.7 trillion (USD46.1 billion), then in 2017, tax revenue has reached Rp1,343.5 trillion or USD 94 billion (See figure 1 and figure 2). Obviously, these developments will change the position and role of all parties and other stakeholders in international food supply chains.

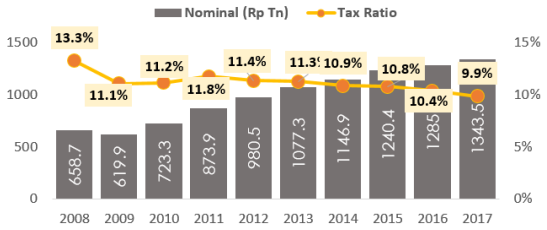

Figure 1: Ministry of Finance

With this tax ratio, the tax revenue is one of the fiscal risks that must be mitigated by the Government, since it never reached the target in the last ten years except in 2008, when there was the sunset policy, and oil prices were at the highest point. If there are no big changes in tax performance and the government maintains a spending policy like today, then it is sure that the budget deficit will exceed the permissible limit of 3 % .

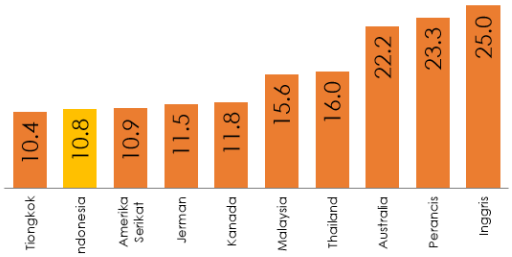

Figure 2. Tax Ratio Comparison 2015

VAT is one of the main sources of tax revenue. Over the last few decades, VAT revenue contributed as the second most significant tax revenue in Indonesia after income tax. The proportion of VAT revenue also continued to increase but start to decline in recent years (Figure 3).

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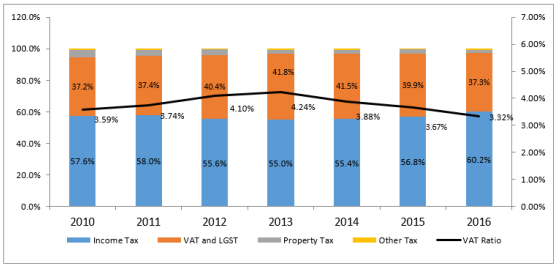

Figure 3. Tax Revenue Proportion and VAT Ratio

Agriculture value chain manages the flow of products and information along the supply chain by capturing the value added in each stage. It also offers the opportunity to reduce the cost and risk along the supply chain. Trends in many countries, VAT become the primary source of tax revenue. This is due to the increasing competition of the income tax rates, especially rates on corporate income tax. The same thing happened in Indonesia. Indonesia's President Mr. Jokowi has repeatedly said that there will be a decrease in corporate income tax tariff, which of course has the potential to reduce the tax revenues. Moreover, the current structure of Indonesia's tax revenue still relies on corporate income tax. Therefore, to be able to raise the tax ratio to become 14% in 2021 as stated in "macroeconomic policies and the main principles of fiscal policy document" (Republic Indonesia, 2017), the government is required to find a breakthrough method, one of which is through VAT.

At present, there are two main issues on VAT in Indonesia, namely (i) too many facilities provided by the Indonesian government (Table-1), and (ii) the length of time for a tax refund. The first problem makes the role of VAT getting smaller since it decreases the tax base. Moreover, the performance of Indonesian VAT is not very good compared to neighboring countries (Table-2). Therefore, the government plans to expand the VAT base, one of which is through revoking all the exemption including from the agricultural sector. Currently, there are 36 items given VAT facilities [1-3].

Table-1. Types of VAT Facilities Currently Provided in Indonesia

A. Facilities with creditable input VAT (Zero-Rating)	VAT Not Collected
	Borne by the government
	Zero-rating
B. Facilities with no creditable input VAT (Exemption)	VAT not charged
	Exemption
C. Other facilities	Deferral payment
	Other value as the basis for determining VAT
D. Excluded from VAT	Non-Taxable Goods/Services

Table 2. VAT Performance in ASEAN Countries – 2016

Indicator	**ASEAN Countries**				
	Indonesia	**Thailand**	**Singapore**	**Malaysia**	**Philippines**
Standard VAT Rate	10.0%	7.0%	7.0%	6,0%	12.0%
VAT Ratio	3.32%	3.99%	2.71%	3.13%	2.29%
VAT Productivity	33.22%	56.99%	38.65%	52.16%	19.07%
Consumption ratio in GDP	55.48%	46.18%	37.50%	54.86%	73.56%
C-efficiency	59.89%	123.40%	103.07%	95.08%	25.93%

The value added can be enhanced in each tier by optimizing every activity undertaken along the supply chain. Based on in-depth interview, the current practice of catchment fish supply chain is not optimal yet since inadequate infrastructure and inefficient activity are the main obstacles. In order to improve the value added along the supply chain, recognizing the most valuable activity is necessary to decide which activity could be improved to provide competitive advantage. The contribution of Indonesia's agricultural sector to GDP has decreased significantly from 51.41% in 1967 to only 12.8% in 2018. This is a challenge for Indonesia as the 4th largest population in the world reaching 269 million by 2019 in terms of ensuring food security. Although the government has implemented various policies through budget allocations for agricultural subsidies, improving agricultural technology, and also tax

incentives, yet fulfill food needs still depends on imports [4]. The contribution of the agricultural sector also has a strategic role in poverty alleviation [5, 6] including in Indonesia [7] mainly because it involves small farmers.

One of the efforts to increase food production is through VAT exemption facilities or a reduction in VAT rates on agricultural products. The effectiveness of these policies empirically proved effective for increasing agricultural production [8]. In addition to the purpose of increasing production, VAT exemptions on agricultural products are carried out on the consideration of simplification of tax administration because it involves many small farmers. Moreover, the VAT exemption is expected to reduce the VAT burden for lower-income customers, although in practice the non-creditable VAT input will be charged into the price of agricultural products.

On the other hand, development requires tax revenue mobilization so that tax incentives are considered to be abolished, including VAT on the agricultural sector. In addition to financial reasons, the elimination of VAT exemptions will simplify the tax administration system and reduce the incentive to cheat for those who should not be entitled to receive the facility [9].

However, this policy can have a different impact on the economy. In Lithuania, the change of standard VAT rate and the abolition of VAT exemptions has harmed the Lithuanian vegetable sector [10] as well as in South Africa [11]. Although [12] said that exemption for meat, fluid milk or bread has a much negative impact especially for the tax efficiency and equity. In Nigeria the conservation of VAT exceptions in the food crop agriculture sector and combined with tax base expansion in other sectors has increased public income and also take into account the national goals of poverty alleviation [13] by establishing a high VAT threshold to minimize the VAT burden on basic unprocessed foods for the poor [14]. The European Union applied a flat-rate scheme to compensate farmers for the uncompensated VAT on inputs [15] and he said that full taxation even for the agriculture products is the preferred choice.

Therefore to provide an optimum result for VAT revenue mobilization, as well as agricultural sector contribution for food resilience and poverty alleviation, the measurement on VAT impact on the agricultural sector is the first thing to do also in Indonesia. This paper will quantify the economic impact of the imposition of VAT on the agriculture sector. At present, there is no one calculating the economic impact of imposing VAT on the agricultural sector in Indonesia although the value of the VAT exempted has been calculated in the tax expenditure report of Indonesia.

2. Methodology

Social accounting matrix (SAM) is a data framework arranged in the matrix that records all economic transactions between agents, especially between sectors in production blocks, sectors within institution blocks (including households) and sectors within production factors in the economy on a specific time period [16-20]. A SAM is a comprehensive, flexible, and disaggregated framework, which elaborates and articulates the generation of income by activities of production and the distribution and redistribution of income between social and institutional.

SAM is an essential tool for analysis since: (1) its multiplier coefficients are able to adequately describe economic or government policy impacts on a household's income, hence illustrating the economic policy impact on income distribution, employment and poverty; and (2) the application is relatively simple; thus, it can easily be applied to various countries. At least there are five purposes of using SAM to look at the socio-economic performance of a region in a macro, which are:

- economic development performance of a region, such as Gross Domestic Product (GDP) at the national level or Gross Regional Domestic Product (GRDP) at the regional / provincial level.
- factorial income distribution, namely the distribution of income received by factors of production, labor and capital.
- household income distribution specified according to various household groups.
- household expenditure patterns.
- distribution of labor according to the sector or business field in which they work including the distribution of labor income that they earn in return for the labor services they contribute.

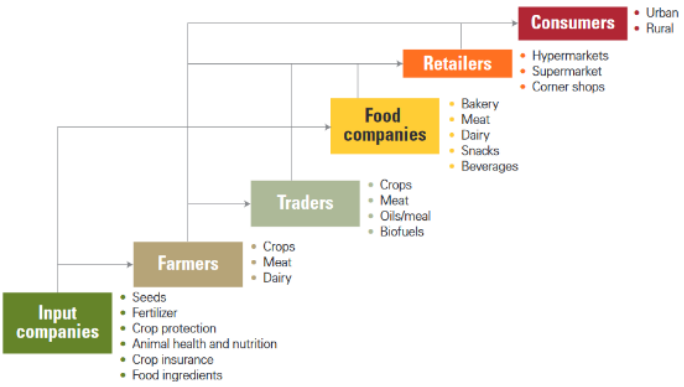

Figure 4: Supply chain in agri industry

Table 3. SAM Framework

			EXPENDITURES				
			Endogenous Accounts			Exogenous Account	TOTAL
			Production factors	Institutions	Production Activities		
RECEIPTS	Exogenous Account	Production factors	0	0	T_{13}	Z_1	y_1
		Institutions	T_{21}	T_{21}	0	Z_2	Y_2
		Production Activities	0	T_{32}	T_{33}	Z_3	y_3
	Exogenous Account		T_{41}	T_{42}	T_{43}	Z_4	z
	TOTAL		y'_1	y'_2	y'_3	y'_4	

The basic framework of a SAM is a 4x4 partition matrix (Figure-4). The accounts in a SAM are grouped into endogenous and exogenous accounts. The main endogenous accounts are divided into three blocks: production factor, institutional and production activity blocks. The row shows income, while the column shows expenditure [21].

This paper used 2008 SAM from the Central Agency on Statistics since it is the latest version of Indonesia SAM. It consists of 105 x 105 matrix with 24 sectors. Multiplier Ma is a tool to estimate the impact of an exogenous shock on the income of the endogenous accounts. It will capture the direct and indirect effects from the shock.

y"n = " A"n " y"n + " x=(I- A"n")"-1 " x=M"a" x 1

The matrix of multiplier Ma shows the impact of an external shock on any given sector to the economy. The result of matrix multiplier is a comparison of how the economy looks before and after a change in economy policy such as imposing new tax rates, imposing a new tax based, or an alteration in some other external condition such as the change on import. From the viewpoint of understanding the process of economic adjustment to these external shocks, the information provided by these multipliers alone is limited [3].

Actually the effect of a sector change on other sectors does not just happen in the form of a balance multiplier (Ma), but occurs through several stages, namely transfer multipliers (which describe the effects of transfers within the economy – M1), open-loop multipliers (which captures the cross effects of the multiplier process whereby a shock into one part of the system has repercussions on other parts – M2), and through closed-loop multipliers (describing the full circular effects of a shock going round the system and back to its point of origin in a series of repeated cycles – M3) [2].

The Matrix of M1 that contains the owns or intragroup or direct effects multipliers is:

$$\mathbf{M_1} = \begin{vmatrix} (I-A)^{-1} & 0 & 0 \\ 0 & I & 0 \\ 0 & 0 & (I-H)^{-1} \end{vmatrix} \quad [2]$$

The Matrix of M2 provides extra group, indirect or open loop multipliers is:

$$\mathbf{M_2} = \begin{vmatrix} [I-(I-A)^{-1}C(I-H)^{-1}YV]^{-1} & 0 & 0 \\ 0 & [I-V(I-A)^{-1}C(I-H)^{-1}Y]^{-1} & 0 \\ 0 & 0 & [I-(I-H)^{-1}YV(I-A)^{-1}C]^{-1} \end{vmatrix} \quad [3]$$

Where:

A = matrix of technical coefficients

V = matrix of value added (VA) coefficients

Y = matrix of VA distribution coefficients

C = matrix of expenditure coefficients

H = matrix of institutional and household distribution coefficients

The next step is denote Stone's three sub multipliers as N1, N2, and N3, they are:

Own or intragroup effects: N1 = M1

Extra groups effects (off diagonal matrix) : N2 = M2M3M1 - M3M1

Closed loop or intergroup effects (diagonal) : N3 = M3M1 – M1

Afterward, multiplier Ma is used to calculate the overall economy impact from policy implementation in this study.

The scenarios simulated are categorized into two groups. Group A consists of six scenarios simulating the impact of imposing all agricultural product and Group B also consists of six scenarios simulating the impact of imposing selected agricultural product. The scenarios are as follows:

Scenario A1: Simulates a situation in which all the agricultural products imposed by 10% VAT rate with no threshold for taxable entrepreneur and distributed 50% of the VAT revenue to the poor.

Scenario A2: Simulates a situation in which all the agricultural products imposed by 10% VAT rate with no threshold for taxable entrepreneur and distributed 100% of the VAT revenue to the poor.

Scenario A3: Simulates a situation in which all the agricultural products imposed by 10% VAT rate with no threshold for taxable entrepreneur and distributed 100% of the VAT revenue to the agricultural sector.

Scenario A4: Simulates a situation in which all the agricultural products imposed by 10% VAT rate with VAT threshold applied and distributed 50% of the VAT revenue to the poor..

Scenario A5: Simulates a situation in which all the agricultural products imposed by 10% VAT rate with VAT threshold applied and distributed all the VAT revenue to the poor.

Scenario A6: Simulates a situation in which all the agricultural products imposed by 10% VAT rate with VAT threshold applied and distributed 100% of the VAT revenue to the agricultural sector.

Group B scenario is chosen because of some of the agricultural product consist of very sensitive product, such as staple goods. Therefore, imposing VAT on those products will give bad image on the society. Hence the scenario in group B removing staple goods product such as rice, fish, vegetables, fruits, livestock, and poultries. All the scenarios are the same with the group A scenarios, but the VAT only imposed on the selected agriculture products. So there will be scenario B1 – B6.

3. Results and discussion

In this part, we elaborate and analyze the results from the two groups scenarios. There are three main issues to discuss: (i) value added impact or GDP, (ii) income impact, and (iii) sectoral output impact. Table 3 shows the value-added impact on Group A scenarios.

Table 3. Value added changes based on groups A scenarios (Billion Rupiah, %)

Production Factors		A1	A2	A3	A4	A5	A6
Labor	Agriculture	-1,437	648	11,063	-156	71	1,204
		-0.24%	0.11%	1.86%	-0.03%	0.01%	0.20%
	Production, operators of transportation means, unskilled labors	-883	226	-125	-96	25	-14
		-0.10%	0.03%	-0.01%	-0.01%	0.003%	0.00%
	Administration, sales, and services	-1,242	297	-420	-135	32	-46
		-0.14%	0.03%	-0.05%	-0.01%	0.004%	-0.01%
	Leaders, military, professionals and technicians	104	177	-204	11	19	-22
		0.03%	0.06%	-0.07%	0.00%	0.01%	-0.01%
Non-labor		-2,817	562	2,780	-307	61	303
		-0.11%	0.02%	0.11%	-0.01%	0.002%	0.01%
TOTAL		-6,275	1,911	13,094	-683	208	1,425
		-0.12%	0.04%	0.25%	-0.01%	0.004%	0.03%

Scenario A3 produce the biggest positive impact value added or GDP. Imposing VAT on agricultural products and distributed 100% of the fund to the agricultural sector will increase GDP by 0.25%. It means that agricultural sector has a big portion on the GDP. On the other hand, scenario A1 gives the biggest negative impact on the GDP.

Table 4. Household income change based on groups A scenarios (Billion Rupiah, %)

Production Factors			A1	A2	A3	A4	A5	A6
Agriculture	Labor		917	3,144	-356	100	342	-39
			0.52%	1.78%	-0.20%	0.06%	0.19%	-0.02%
	Entrepreneur		-2,662	1,444	903	-290	157	98
			-0.36%	0.20%	0.12%	-0.04%	0.02%	0.01%
Non-Agriculture	Rural	Low income	-972	2,039	-2,552	-106	222	-278
			-0.20%	0.41%	-0.52%	-0.02%	0.04%	-0.06%
		Non-labor	-1,051	-882	-96	-114	-96	-10
			-0.61%	-0.51%	-0.06%	-0.07%	-0.06%	-0.01%
		High income	-2,725	-1,964	-245	-297	-214	-27
			-0.58%	-0.42%	-0.05%	-0.06%	-0.05%	-0.01%
	Urban	Low income	-1,638	1,736	-3,795	-178	189	-413
			-0.23%	0.24%	-0.53%	-0.03%	0.03%	-0.06%
		Non-labor	-1,387	-1,166	-1,154	-151	-127	-126
			-0.57%	-0.48%	-0.47%	-0.06%	-0.05%	-0.05%
		High income	-3,906	-2,819	-2,945	-425	-307	-321
			-0.47%	-0.34%	-0.36%	-0.05%	-0.04%	-0.04%
TOTAL			-13,423	1,532	-10,240	-1,461	167	-1,115
			-0.35%	0.04%	-0.29%	-0.04%	0.004%	-0.03%

However, while these scenarios applied to income, then scenario A3 produce negative impact especially to the poor. Only scenario A2 giving the positive impact (Table 4). It means that distribution VAT revenue from the agriculture sector to the poor will increase their income and of cource will decrease the poverty. This A2 scenario will minimize the objections from the society especially the poor.

Changes in the output in each production sector due to group A scenarios are shown in Table 5. Boosting the agricultural sector by distributed 100% of the VAT revenue to this sector (A3) giving the biggest positive impact on the sectoral output changes. While distributed the VAT revenue to the poor (A2) also giving positive impact although not as much as scenario A3. This means that redistributed all the VAT revenue to the poor still able to compensate the loss on many sectors. The loss can be seen on scenario A1, while only 50% of the VAT distributed to the poor, causing negative impact on almost all sectoral output, except for government, defense, education, health, film, and other social services sector.

Table 5. Sectoral output changes based on groups A scenarios (%)

Production Factors	A1	A2	A3	A4	A5	A6
Crop Farming	-0.25%	0.14%	1.77%	-0.03%	0.01%	0.19%
Other Crop Farming	-0.18%	0.07%	2.04%	-0.02%	0.01%	0.22%
Livestock and Livestock Products	-0.28%	0.08%	2.04%	-0.03%	0.01%	0.22%
Forestry	-0.08%	0.01%	1.83%	-0.01%	0.00%	0.20%
Fishery	-0.30%	0.08%	1.81%	-0.03%	0.01%	0.20%
Mining	-0.04%	0.00%	0.00%	0.00%	0.00%	0.00%
Food, Beverages, and Tobacco Industry	-0.24%	0.09%	-0.05%	-0.03%	0.01%	-0.01%
Other industries	-0.10%	0.01%	-0.04%	-0.01%	0.00%	0.00%
Electricity, Gas, and Drinking Water and Construction	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Trade	-0.18%	0.04%	-0.02%	-0.02%	0.00%	0.00%
Restaurant and hotel	-0.24%	-0.03%	-0.20%	-0.03%	0.00%	-0.02%
Transportation and Communication	-0.17%	0.02%	-0.08%	-0.02%	0.00%	-0.01%
Bank and Insurance	-0.18%	0.01%	0.00%	-0.02%	0.00%	0.00%
Real Estate and Services	-0.18%	0.04%	-0.12%	-0.02%	0.00%	-0.01%
Government, Defense, Education, Health, Film, and other Social Services	0.16%	0.09%	-0.14%	0.02%	0.01%	-0.02%
Individual Service, Household, and Others	-0.16%	0.03%	-0.11%	-0.02%	0.00%	-0.01%
TOTAL	-0.12%	0.03%	0.17%	-0.01%	0.00%	0.02%

Based on the three economic issues of imposing VAT on the agricultural sector, it can be shown that the scenario A2 giving the positive impact on the three main issues, although the impact on the GDP and sectoral output is not as big as scenario A3. But the scenario A2 giving the most appropriate results to be implemented in Indonesia, since this scenario also increase the income of the society especially the poor.

In accordance with scenario A4 to A6, the impact is so small either on GDP, income and sectoral output. It happens because most of agricultural product in Indonesia is produced by micro entrepreneur. Almost 90% of the farmers are non-taxable entrepreneur or has turnover below the VAT threshold. So, the impact is only 10% of the impact on the scenario A1-A3 because of the linearity nature of SAM analysis.

The same thing happens on the Group B scenarios. The selected agricultural products are only 19.4% of all agricultural product, therefore the result on group B scenarios also only 19.4% of the impact on group A scenarios (Figure 5).

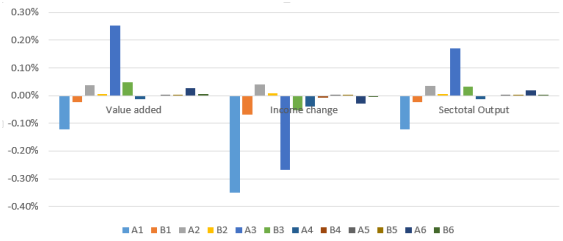

Figure 5. The comparison of the impact on Group A and Group B Scenarios

4. Conclusion

This paper using Indonesian SAM has elaborated the impact of SCM on the agricultural sector. This paper aims to provide an extensive methodology on the practice of supply chain management and sustainability in agriculture sectors to identify the extent of the discipline in this field and to highlight areas that need further research. There are some constraint concerning this study: (i) the SAM using in this study are SAM year 2008 which mean already too old and does not reflect current conditions including the price, and (ii) the general equilibrium of the SAM in this model is static, while in reality, the system structure changes over time meaning that the parameters of the matrix change, therefore less reliable for long-run forecasting. Furthermore, another issue is on the reliability and validity of the Indonesian SAM namely whether or not the Indonesian SAM covers the whole of the Indonesian

economy, including those in rural areas and informal sectors. Although BPS already tries to overcome this issue by a survey as much as possible the informal sectors and rural economies in the socio-economics survey which is one of the primary input sources for the SAM. Considering all these weaknesses, the important conclusions that can be drawn from this study is the imposition of VAT on agricultural sector will give a positive impact if all VAT revenue distributed to the poor. Based on this study, it means that the government can consider to implement this policy as long as the VAT revenue redistributed to the poor. Otherwise, the will only has negative impact. It is mainly caused by revenues goes to the government that has a low impact on the economy.

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