# Linkage Analysis Of The Palm Oil Plantation Sector On Economy In North Suamtera Province

**Desi Novita**

Departement of Agribusiness, Islamic University of North Sumatera, Indonesia
Corresponding Author : denovita_02@yahoo.co.id

**Abstract.** This research aims to find out the forward linkage and backward linkage of palm oil plantation sector on the economy in North Sumatera Province. Data used are Secondary Data. Data are obtained from Indonesia statistic released by Badan Pusat Statistik (BPS). The analysis method used in this research was Input-Output Analysis. Data used in the form of input output table 2010. The results showed that the forward linkage index of palm oil plantation sector was 1,1330. The backward linkage index of palm oil plantation sector was 1,301. The forward linkage index and backward linkage index of palm oil plantation sector were over than 1. It meant that palm oil plantation sector had high linkage with other sectors on economy in North Sumatera Province.

**Keywords :** Palm Oil Plantation Sector, Forward Linkage, Backward Linkage, Input-Output Analysis

## Introduction

Indonesia, as one of developing country with agriculture as the main source of livelihood of the people. In the fact, most of the land in Indonesia is used for agricultural land and nearly 50% of the total workforce is still dependent their fate by working in the agricultural sector (Dillon, 2004). In addition, the agricultural sector still plays an important role in the national economy. It is based on its role as a provider of food, industrial raw materials, sources of income for millions of farmers who are spread throughout Indonesia, and as source of national earning.

North Sumatra province still continue to prioritize and make the agricultural sector as one of the leading sectors in the economy of the region. Table 1 shows that the economic structure of North Sumatra province is dominated by the agricultural sector and the industrial sector. Contribution of the agricultural sector to the GDP formation is still greater than the industrial sector. The agricultural sector contributes more than 20% of the total GDP of North Sumatra Province. This means that the agricultural sector is one of the leading sectors that still has to be considered for the economy of North Sumatra Province.

**Table 1. PDRB Share of North Sumatera (by Constant Price)**

| Sector | Year | | | |
|---|---|---|---|---|
| | **2006** | **2007** | **2008** | **2009** |
| 1. Agriculture | 26,84 | 23,91 | 23,83 | 23,79 |
| 2. Mining | 1,52 | 1,23 | 1,23 | 1,19 |
| 3. Manufacturing Industry | 24,61 | 23,66 | 22,89 | 22,39 |
| 4. Electricity, gas and water supply | 0,83 | 0,74 | 0,73 | 0,73 |
| 5. Construction | 5,69 | 6,57 | 6,68 | 6,77 |
| 6. Trading, Hotels and Restourants | 18,55 | 18,42 | 18,38 | 18,44 |
| 7. Transportation and Communication | 7,11 | 9,11 | 9,31 | 9,52 |
| 8. Financial, Leasing and Company | 5,91 | 6,73 | 7,04 | 7,12 |
| 9. Other Services | 8,92 | 9,63 | 9,91 | 10,05 |

Source : North Sumatera in Values (2010)

Oil Palm Plantation sector is one of the sectors that have an important role in the North Sumatra Province. This sector is one of the priority sectors of the regional development programs that have been established by local governments. However, the development of regional economy is no longer in the development of leading sectors, but rather is an interconnected system. This condition indicates that the palm oil sector will be able to push the area's economy not only in view of its contribution to GDP, but also see how the interplay between the palm oil sector with other sectors in the economy. Economic linkages essentially describes the relationship between the economy of one sector with other sectors in a regional economy. Palm oil sector linkages indicate that the changes in this sector, such as the output increases or decreases, will have an impact to other sectors.

Input Output Analysis was first developed by Wassily Leontif the 1930s. This analysis is simple but it becomes one of the powerful tools in the analysis, to look the relationship between sectors in an economy. The relationship between the sectors in economy, started to become important in the middle of this century, since the analysis of economic development is no longer only concerned about economic growth, but also saw the growth of the division between the factors of production, and also the sources of growth itself (Nazara, 2005). This study was conducted to determine the relationship of oil palm plantation sector of the economy of North Sumatra Province.

**Research Metologic**

**Research Location**

This research was carried out in North Sumatra Province. This location was choosen because the palm oil sector is one of main sector in economy of North Sumatra Province.

**The Data and Source of data**

The data used in this study is secondary data. Secondary data is the data collected by others or by agencies data collecting  and the data was published to the user community (Kuncoro, 2003). The data used are the Input-Output Data North Sumatra province in 2010 based on producer prices and supported by the data of Gross Regional Domestic Product (GDP), and other data that was supporting. The data is sourced from the Central Statistics Agency (BPS) and other related agencies.

**The Data Analysis Technique**

The method of data analysis that was used in this study was the analysis of the Input-Output by using the Input-Output Data North Sumatra province in 2010 on the basis of producer prices has been aggregated into 10 sectors of the economy. The data of Input-Output North Sumatra province in 2010 that was based on producer prices is projected by using the RAS method (Ricked A Stone). RAS method was a method for projecting an Input-Output table using the new coefficients by using an old Input-Output tables (Basic Input-Output) (Nazara, 2005).

To see how the palm oil sector, both forward linkages and backward linkages used by Linkage Index. Total linkage index used as the basic formulation of an economic development strategy to examine linkages between sectors in an economic system. According to Rasmussen in Nazara (2005), the total linkage index includes the total backward linkages and total forward linkages index. The total backward linkages index of an industry / sector shows the relationships linkage of an  influence was caused by one unit of final demand in the sector to the total purchase inputs in all sectors in an economy. The total forward linkage index shows the linkage relationships of an influence was caused by one unit of  final demand of a sector to the total sales of the output of all sectors in an economy.

**a) Total Backward Linkage Index**

This concept is defined as the ability of one sector to enhance the growth of the upstream industry. sector "j" is said to have a high links back  when BL"j" has a value greater than one. The formula used to find the value of total backward linkages index are:

$$BL_j = \sum_{I=n}^{n} a_{ij}$$

where is :

BLj = total backward linkage index sector j

aij = an inverse matrix element of Leontief

n = total sector

**b) Total Forward Linkage Index**

This concept is defined as the ability of one sector to encourage the growth in the production of other sectors that use an inputs from this sector. sector " i " is said to have a high total forward linkages if FL" i " value greater than one. The formula used to find the value of the total forward linkage indices are:

$$FL_i = \sum_{j=1}^{n} a_{ij}$$

where is :

FLi = total forward linkage index sector i

aij = an inverse matrix element of Leontief

n = total sector

**The Result Of Research**

The existence of the palm oil sector in a regional economy will affect all economic sectors in the regional economy. The magnitude of the effect of the palm oil sector can be seen based on the magnitude of the linkage that occurs between the palm oil sector to other economic sectors. This linkage may be the provision of inputs to other sectors or as a recipient of inputs from other sectors. So actually in the formation of an economy, will be linked from one sector to the other sectors of both the upstream and downstream sectors. This led to the linkage may be a dependence on other sectors and other sectors boosters.

This linkage analysis shows how far the extent of one sector can provide output to other sectors or forward linkages, or the needs of one sector from other sectors to create a specific output. This linkage can be a direct linkage or indirect linkages. Value of direct linkage both frontward or backward is obtained by calculating the coefficient of the input, while the direct and indirect linkages by calculating the inverse matrix of Leontif.

**Forward Linkage Analysis**

Forward linkage index of palm oil sector showed the impact that occurs as a result of changes in the palm oil sector output to input palm oil sector itself, or other economic sectors that act as downstream of the palm oil sector. Based on Table 2 it appears that the total value of forward linkage is greater than 1,0000. This is due to that it already takes into account changes in the value of output of the sector by one unit. In the economy of North Sumatra in 2010 by looking at the matrix inverse of the Input-Output Tables North Sumatra in 2010 (Updating) it appears that the sector has the largest forward linkage value is the manufacturing sector with the linkages value of 1.6497. This value means that if the final demand increased by 1 unit, then the increase in the output of the manufacturing sector are allocated to other sectors and the manufacturing sector itself in total (direct and indirect) of 1.6497 units.

The value of this Forward linkage is then followed by trading sector, hotels and restaurants sector, non-palm agriculture, transportation and communications sector, construction sector , palm oil plantations sector, electricity, gas and water supply sector, mining sector, financial, leasing and services company sector and the services sector. Palm oil sector has forward linkage value of 1,330 or in the sixth rank. This is due to that in general, the characteristics of the products derived

from the plantation sector is a product that requires further treatment through processing and not many products that used the palm oil as a main raw material.

**Table 2. The Value of The Total Forward Linkage 10 Sectors classification Year of 2010**

| No | Sector | total Linkage Index | |
|----|--------|---------|------|
| | | Forward | Rank |
| 1 | Palm Oil | 1,1330 | 6 |
| 2 | Non Palm Oil Agriculture | 1,2628 | 3 |
| 3 | Mining | 1,1261 | 8 |
| 4 | Manufacturing Industry | 1,6497 | 1 |
| 5 | Electricity, Gas, and Water Supply | 1,1302 | 7 |
| 6 | Construction | 1,1355 | 5 |
| 7 | Trading, Hotels, and Restourant | 1,3682 | 2 |
| 8 | Transportation and Communication | 1,2522 | 4 |
| 9 | Financial, Leasing and Company Services | 1,1730 | 9 |
| 10 | Other Services | 1,1443 | 10 |
| | **Average** | **1,2375** | |

Source : Input-Output table Tahun 2010 (edited)

**Backward Linkage Analysis**

A backward linkages of one sector (j) with other sectors (sector i) is a linkage indicator in which the sector 'J' is able to attract the growth of sector ' i ' by utilizing the output of sector ' i' that is used as an inputs by sector j in the production process.

Based on Table 3 below, it is appears that the sectors that have the largest backward linkages is electricity, gas and water supply with backward linkages value of 1.4407. This means that each of an increase in the final demand sectors of electricity, gas clean water by 1 unit, then the electricity, gas, and water utilities require additional inputs for the production of electricity, gas, and water itself and other sectors in total by 1.4407 units. Meanwhile, the value of the oil palm plantation sector backward linkages is in 8th rank with a value of 1.1301 backward linkages. This condition indicates that the palm oil sector has linkage with many other sectors of the upstream, but many others sector has higher linkage of the upstream.

**Table 3. The Value of Total Backward Linkage 10 Sector Classification Year of 2010**

| No | Sector | Total Linkage Index | |
|----|--------|---------|------|
| | | Backward | Rank |
| 1 | Palm Oil | 1,1301 | 8 |
| 2 | Non Palm Oil Agriculture | 1,1677 | 6 |
| 3 | Mining | 1,1102 | 9 |
| 4 | Manufacturing Industry | 1,4150 | 2 |
| 5 | Electricity, Gas, and Water Supply | 1,4407 | 1 |
| 6 | Construction | 1,3745 | 3 |
| 7 | Trading, Hotels, and Restourant | 1,2844 | 4 |
| 8 | Transportation and Communication | 1,2134 | 5 |
| 9 | Financial, Leasing and Company Services | 1,1544 | 7 |
| 10 | Other Services | 1,0846 | 10 |
| | **Average** | **1,2375** | |

Source : Input-Output Table Year 2010 (edited)

**Conclution**

Based on the research that has been done, it can be concluded that the palm oil sector has linkages index forward and backward at 1.1330 and 1.1301. The magnitude of these two values are above 1,0000, that means that the palm oil sector has high forward or backward linkage with the other sectors of the economy of North Sumatra Province.

North Sumatra provincial government is expected for continuing focus on development in the palm oil sector that must has a sinergity with the downstream industries of oil palm plantations results, so it can improve the linkage and create a better derivative product.

**References**

BPS Propinsi Sumatera Utara. 2004. Tabel Input-Output tahun 2003 Sumatera Utara. BPS Sumatera Utara

_____. 2010. Sumatera Utara dalam Angka 2009. BPS Sumatera Utara.

Dillon, H.S. 2004. Pertanian Mandiri. Penebar Swadaya. Jakarta

Kuncoro, Mudrajad. 2003. Metode Riset Untuk Bisnis & Ekonomi. Erlangga. Jakarta

Nazara, Suahasil. 2005. Analisis Input-Output. Jakarta : Lembaga Penerbit FE UI