An Analysis of the Economic Structure and the Linkage Among Production Sectors of Kalasin Province
การวิเคราะห์โครงสร้างทางเศรษฐกิจและความเชื่อมโยงระหว่างสาขาการผลิตของจังหวัดกาฬสินธุ์

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ABSTRACT

The study aims at investigating the economic structure and the linkage among production sectors, as well as prioritizing the production sectors of Kalasin Province. The coefficient table of Kalasin's Input-Output Productivity was also constructed in 2012 including 45 production. The linkage indices were eventually calculated. Subsequently, the calculation results have been used to prioritize the production sectors based on production impacts. Therefore, the economic development guidelines should be emphasized to increase the linkages in agricultural sectors and to support more investments in the sectors, such as agriculture services, livestock, and poultry and other livestock. Additionally this should be applied for, in non-agricultural sectors, such as the food manufacturing and trade. The promotion of these sectors is likely to push the Kalasin's economy forwards as this will stimulate other manufacturing sectors to get involved. As a result, its provincial productivity can eventually be increased, and the Gross Provincial Products (GPP) can also be expanded which will make the provincial development plan effective and will increase the population's income within the limit of the provincial development budget.

บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาโครงสร้างทางเศรษฐกิจของจังหวัดกาฬสินธุ์ ความเชื่อมโยงของสาขาการผลิตและจัดลำดับความสำคัญของสาขาการผลิต โดยการสร้างแบบจำลองปัจจัยการผลิต-ผลผลิตของจังหวัดกาฬสินธุ์ สร้างตารางค่าสัมประสิทธิ์ของตารางปัจจัยการผลิต-ผลผลิตของจังหวัดกาฬสินธุ์ ปี พ.ศ. 2555 ขนาด 45 สาขา คำนวณดัชนีการเชื่อมโยง นำผลที่ได้จัดลำดับความสำคัญของสาขาการผลิต สรุปแนวทางการพัฒนาเศรษฐกิจ ได้ว่าโครงการพัฒนาควรส่งเสริมการลงทุนสาขาการผลิตภาคเกษตรกรรม คือ สาขาบริการทางการเกษตร สาขา ปศุสัตว์ สาขาการเลี้ยงสัตว์ปีก และภาคนอกเกษตรกรรม คือ สาขาอุตสาหกรรมอาหาร สาขาการค้า จะทำให้ระบบเศรษฐกิจของจังหวัดกาฬสินธุ์ขยายตัวด้านการผลิตเนื่องจากจะกระตุ้นสาขาการผลิตอื่น

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ที่เกี่ยวข้อง ให้มีการผลิตที่เพิ่มขึ้นในระดับจังหวัดและมีผลต่อการขยายตัวของผลิตภัณฑ์มวลรวมจังหวัด
ที่เพิ่มขึ้น เพื่อให้แผนพัฒนาจังหวัดกาฬสินธุ์มีประสิทธิภาพ สร้างรายได้ประชาชนเพิ่มสูงขึ้น ภายใต้งบประมาณ
การพัฒนาจังหวัดกาฬสินธุ์ที่จำกัด

Key Words : Economics structure, Input-output productivity model, Linkage index
คำสำคัญ : โครงสร้างทางเศรษฐกิจ แบบจำลองปัจจัยการผลิต-ผลผลิต ดัชนีการเชื่อมโยง

Introduction

Thailand's economy has been steadily developed since the first National Economic Development Plan (1961 - 1966) by The Office of the National Economic and Social Development Board [1] with the objectives to strengthen national economic growth and to focus on building economic infrastructure by the investment of the government in order to promote the establishment conducted by private sectors, which has contributed to increasing productivity of many manufacturing sectors. The second National Economic Development Plan (1967–1971) focused on decentralization, especially spreading its prosperity to the Northeastern region. Planning was jointly made by ministry level with an emphasis on sectoral analysis as a guideline for the development of projects and plans which were set by the Central Department (Top Down Planning). The development objective was to enhance gross production, thus increasing more national income. The economy had been continuously developed in response to the 3rd–9th National Economic Plans until the administration shifted to the integration on 1 October 2003 which decentralized more operations to the local level. (Office of the National Economic

and Social Development Board [Internet]. 2014 [updated 2014 March 10]. [2] Available from: http://www.nesdb.go.th/Default. aspx?tabid=62). Governors from each province were appointed as the Presidents of the CEO boards. The administrative focus was changed from units complying with a central command to strategic units responding to the policies of provincial integration. Furthermore, in accordance with changes to The Constitution of the Kingdom of Thailand B.C. 2005 section 78(2), it was prescribed that the state had to support the provinces to have their own plans and budget to develop the communities for the sake of their people. Moreover, according to the Amendment of the Administrative Act (No.7) B.C. 2007 Section 52/3, Section 53/1 and Section 53/2, it prescribes that each province must set up a budget to develop its economy, so that each province turns to bottom- up planning for economic development investment in response to its characteristics and limitations. The past provincial development plans were aimed at agricultural sectors since the majority of the people (80 percent) was farmers making low incomes. Meanwhile, The National Economic and Social Development Plan supports higher rates of productivity to enhance national

income. Generally, the economic system includes many production sectors, but most of them are linked to one another in both the agricultural and industry sectors. In other words, one product can be used as a part of another product. Therefore, developing one production sector contributes to the productivity of other involved sectors. As a result, the higher level of linkage among involved sectors can bring about the expansion of Gross Provincial Products (GPP) thereby, increasing the communities' incomes. In addition, the coefficient value of the linkage among production sectors is used to direct the development proportion in different certain production sectors to increase the population's income.

Kalasin is located among the Central Northeastern Provinces of the region and has infrastructure that includes an economic route (the East–West Economic Corridor: EWEC) which, as a part of a network, connects to other provinces and nearby foreign countries. The transportation and delivery can quickly proceed thereby, benefiting international investment with neighboring countries. Moreover, according to The ASEAN Economic Community (AEC) which Thailand will join in 2015, Thai marketing can be expanded into other nearby foreign countries. However, at present, it has been difficult to find the linkage analysis among production sectors by means of using the coefficient value to prioritize the linkage level of each sector in order to find out which particular sectors need special attention.

The data is a great contribution in making an economic development plan for Kalasin. The priority of each production sector is based on the coefficient value of the linkage in order to prioritize different development projects within the limits of the budget, and thereby, lead to the creation of a development plan that can make Kalasin effective and successful in terms of economic growth and can increase the income of the population.

Research objectives

1. To study economic structure of Kalasin Province.

2. To study the linkage among production sectors in Kalasin Province.

3. To prioritize the production sectors in Kalasin Province.

According to the unbalanced growth theory by Albert Hirschman (Hirschman, 1958), it has been found that developing countries face deficiencies in both their resources and in their abilities to invest within the limited resources. Albert Hirschman suggested that the developing countries use the unbalanced growth strategy which focuses on investing in fast-growing sectors that are linked to other industries for more productivity.

Furthermore, Wassily Leontief (Leontief, 1966) [3] proposed the theory of input–output productivity table for economic problem analysis by employing input–output productivity model as a tool to examine the relationship among different economic

sectors in a domestic economic system in terms of increasing productivity or planning certain important economic sectors, such as agriculture, industry, or transportation. For regional development planning, the first Input-Output Productivity Table for Thailand emerged in 1975. There are 180 of them that have been created by National Account, Office of the National Economic and Social Development Board. [1] The Input-Output Productivity Table has always been remade every 5 years beginning in 1975, and then 1980, 1985, 1990, 1995, 2000, 2005, and lastly, in 2010. The tool, which is always used by economists to analyze the linkage of industrial sectors, is the input-output productivity table. The result from the table reveals how the linkage values are both forwards and backwards. According to inter-sector linkages, forward linkage happens when certain industries yield materials which are used in other industries (upstream). On the other hand, backward linkage happens when the production is the final stage of certain products (final goods) which are able to be consumed (downstream).

The study, which used the regional input-output productivity model, began in 1978 by Atikul C. (1978). [4] [5] It was entitled "Regional Accounts and Input – Output Account of Cholburi Province, Thailand" for United Nations, Asian and Development Institute. It was aimed to make an input-output accounting of Chonburi Province consisting of 14 production activities without exploring. The input-output of Thailand in 1971 with size of 33 x 33 sectors was adapted by means of simple location quotient to find location coefficient. Thereafter, the another constructed the input-output table of Chiang Mai with size of 14x14 sectors in 1979 by using the coefficient derived from the input-output table of Thailand with size of 33x33 sectors in 1971 and in 1975, respectively by means of using a simple location quotient. However, the only drawback was that 14 sectors were not enough to identify the production or the industrial sectors that were worth the investment in order to push the economic system forward. Furthermore, Sukawat S. (2002) [6] studied the selection of major production and industrial sectors by means of input-output table analysis. The input-output tables of 1990 and 1995 made by Office of the National Economic and Social Development Board [1] were used to find the forward linkage and the backward linkage, as well as the total linkages in order to remove the problem of selecting only one linkage either from the forward linkage or the backward linkage. The results revealed that the agricultural or the industrial sectors which showed high levels of linkages and were worth investing in were as follows: 1) crops for textile, 2) sorghum and other cereals, 3) logging, 4) forest products and hunting, 5) animal oils, animal fats, and vegetable oils, 6) animal feed, 7) swine farming, 8) paper and the printing industry, 9) corn grinding, and 10) agriculture services.

Thereafter, Cai J, Leung, PS (2002) [7] studied "The Linkages of Agriculture to

Hawaii's Economy" to analyze linkage effects and linkage index of agricultural sectors toward Hawaii's economy by using the data derived from the input-output table in 1992 comprising 118 sectors. The linkage indices of 28 agricultural sectors and 90 non-agricultural sectors were analyzed. It was found that most of Hawaii's agricultural products appeared to have low levels of both forward linkage and backward linkage. There were 16 production key sectors that showed high levels of linkage; 38 sectors that showed high backward linkage, but low forward linkage; 30 sectors showing high forward linkage, but low backward linkage; and lastly, 34 sectors that showed low linkage. The government should pay more attention to increase the levels of linkage to enhance added value of agricultural products in Hawaii.

In 2004, Kemanuchet C.[8] examined the analysis of linkage index of industrial sectors by using the input-output table made in 2000 by The Office of the National Economic and Social development Board. [1] The following information was found: 1) the industrial sectors like food manufacturing and animal food that had both forward and backward linkages should be supported, 2) the food industries showed highest levels of forward linkage, and 3) the gem industries should be supported because these could expand Thailand's economy more than 13 other industries.

Moreover, Polpiroon P. (2009) [9] investigated the agriculture linkage toward Thailand's economy. The objectives were to analyze the linkage effects and linkage index of agricultural sectors toward Thai economy by exploiting Thailand's input-output table including 180 sectors. Then, the linkage index of 29 agricultural sectors was analyzed. It revealed that most of the agriculture products appeared to have low levels of linkage, so the government should support enhancing the level of the linkage. In addition, by constructing the input-output productivity model of the 3 provinces, including 17 sectors, based on Thailand's 2005 model, and by means of the Cross-Industry Location Quotient.

Boonkier A. (2012) [10] was able to study the prioritization of economic sectors by analyzing the linkage in terms of production projects, income, and employment in the area of the 3 southern provinces. It was found that there were 5 economic sectors in which the government should promote investment. These were prioritized as follows: other manufacturing, crop farming, livestock, forestry, textile industry, trade, motor vehicle repair, personal and household items, and the forest industry, respectively.

Methodology

The data analysis was conducted through quantitative method using the following steps;

Step 1: Making the input-output table of Kalasin comprising 45 production sectors

1) Preparing the input-output productivity model of Thailand in 2005 which is the latest model.

2) Adapting the model's structure with the size of 180 production sectors in response to Kalasin's economic structure as follows:

2.1) removing 71 production sectors being not found

2.2) grouping Thailand's input-output productivity model into 45 production sectors, and matching the number of production sectors found in Kalasin Province by the following steps.

2.2.1) grouping the production sectors

(1) totaling the products

$$Q^* = GQ$$

Q = vector of the old total products from the 109 production sectors

G = matrix with the size of 45x109 sectors used in the total production

(2) minimizing sale matrix of each the production sectors of Thailand from the size of 109 x 109 sectors to 45 x45 sectors

$$Z^* = GZG'$$

Z = Matrix which is going to be grouped, showing the flow

of intermediate inputs with the size of 109x109 sectors

G = Matrix showing activity for grouping valuing 0 and 1

G' = transpose of matrix G

Step 2 : Analyzing the co-efficient value of the input-output table of Kalasin in 2012

1) Making a comparison between the ratio of production sectors in Kalasin and the ratio of production sectors in Thailand by means of the simple location quotient (SLQ), using Thailand's GDP and Kalasin's GPP in 2012.

$$SLQ = \frac{V_i^r / V^r}{V_i^n / V^n}$$

where r = Superscript representing provincial variable

n = Superscript representing national variable

V = added value

2) Calculating to find CIQ and using SLQ to calculate in each of the production sector

$$CIQ = \frac{V_j^r / V_i^n}{V_j^r / V_j^n} = \frac{SLQ_i}{SLQ_j}$$

3) Calculating to find out the direct production co-efficient value of the input-output productivity model in Kalasin because the province needs to bring in production materials from other regions.

Equation $a_{ij} = r_{ij} + m_{ij}$ it will be $r_{ij} = a_{ij} - m$

where r_{ij} = the direct production co-efficient value of Kalasin's input-output productivity model

m_{ij} = the direct co-efficient value of the national input-output productivity model and if the intermediate inputs in Kalasin were enough, or $m_{ij}= 0$

where a_{ij} = rij or $a_{ij} \geq r_{ij}$ which is rewritten as a new equation as follows:

$r_{ij} = k_{ij} \times a_{ij}$ by $0 < kij \leq 1$

where $k_{ij} = CIQ_i$ so $r_{ij} = CIQ_{ij} \times a_{ij}$ (1)

According to the co-efficient value (CIQ) derived from 2), the direct coefficient value from the nation's input-output table was adapted into Kalasin's by replacing CIQ in the equation (1) when $0 < CIQ \leq 1$

4) Estimating the direct co-efficient value of the input-output productivity model in which already included a particular sector

$$A^* = Z^*/Q^* = \begin{bmatrix} Z_{11}/q_1 & (Z_{12} + Z_{13})/(q_2 + q_3) \\ (Z_{21} + Z_{31})/q_1 & (Z_{22} + Z_{32} + Z_{23} + Z_{33})/(q_2 + q_3) \end{bmatrix}$$

where A^* = the matrix of the direct co-efficient value of the products

Z_* = the matrix showing the flow of the grouped intermediate inputs

Q_* = the matrix of the grouped production values

5) Estimating the direct and indirect coefficient values for Leontief Inverse Matrix

$$(I - A^*)^{-1} = \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix}$$

Thereafter, use Leontief Inverse Matrix to analyze the linkage of the production sectors in economic system as follows:

(1) Forward Linkage $\beta_i = \dfrac{\sum_i b_{ij}}{\frac{1}{n}\sum_i \sum_j b_{ij}}$ where i = 1, 2, 3, ...n

(2) Backward Linkage $\alpha_j = \dfrac{\sum_j b_{ij}}{\frac{1}{n}\sum_i \sum_j b_{ij}}$ where j = 1, 2, 3, ...n

According to the calculation of Forward Linkage Index (FL) and Backward Linkage Index (BL) of the 45 sectors can be grouped into four categories:

1) Key Sectors: FL > 1 and BL > 1, 2) Strong FL, but Weak BL Sectors: FL > 1 and BL < 1

3) Weak FL, but Strong BL Sectors: FL < 1 and BL > 1, 4) Weak Linkage Sectors:

FL < 1 and BL < 1

         Step 3 : Prioritizing the production sectors of Kalasin by calculating the linkage of overall productivity

$$TP_i = BP_i + FP_i - Z_{ij} \quad (\text{or } b_{ij}^*) \qquad \text{when} \quad i = j$$

         The reason for using this concept. It is a method that is easy to compute the coefficients of the model and the coefficients are efficiency and consistency the most. The method of Cross-Industry Location Quotient estimated of exports and imports between regions than any other method.

Results

         1) Economic Structure of Kalasin Province

         In 2012, Kalasin's GPP was 48,777 million baht, and the economic growth rate was 9.22 percent. The average income per person per year was 52,202 baht giving Kalasin a ranking of 16th in the Northeast and 72nd in the country, respectively. The economic structure of the province was from the agricultural sectors valuing 12,451 million baht or 25.5 percent. The major crops having highest value were rice, sugarcane, cassava, and rubber. Meanwhile, industry sectors took second place valued at 9,456 million baht or 19.4 percent. There were 473 industrial factories which mostly were agricultural industries, namely, rice mills, agricultural processing industries, cassava factories, sugarcane factories, and so on. Thirdly, education sectors invested by the government were worth 8,976 million baht or 18.4 percent. (Office of the National Economic and Social Development Board [Internet]. 2014 [2] [updated 2014 March 20]. Available from: http://www.nesdb.go.th/Default. aspx?tabid=96).

         2) The linkage analysis of Kalasin's production sectors

         Tables 1 and Figure 1 show the distribution of the 45 sectors according to above categorization thereof, it was found that the non-agricultural sectors showed the highest level of both forward and backward linkages (key sector), comprised of 4 non-agricultural sectors (100 %), namely the food manufacturing, other services, non-metallic products, and rubber products and plastic product, there were 8 sectors from agricultural sectors of 3 sectors (37.50%) that were found to have high forward linkage, but low backward linkage (Strong FL). These were agricultural services, rubber, paddy, and another 5 non-agricultural sectors (62.50%) from trade and services. The production sectors which were found to have low forward linkage, but high backward linkage (Strong BL) include 16 sectors from agriculture sectors of 5 sectors (31.25%) and non-agriculture sectors of 11 sectors (68.75%)

         Most importantly thing is that the production sectors found in Kalasin either from agricultural or non-agricultural sectors appears to have low linkage level (weak linkage), and 9 of 17 (52.94%) are from

agricultural sectors and 8 (47.06%) are from non-agricultural sectors.

3) The prioritization of Kalasin's production sectors

According to Table 2, it has been found that the agricultural sectors have the highest level of linkage index, and the agricultural services affect both forward linkage and backwards linkage of 17 agricultural sectors, especially the production of economic crops in Kalasin like rice, sugarcane, cassava, and rubber all of which resort to agricultural services in terms of laborers and agricultural machinery services, such as preparing top soil for planting, planting, caring for plants, pest control and prevention, and harvest. Furthermore, they link forwards to beans and nuts, Fruits, oil palm, other root crops, poultry and other livestock, livestock (cattle, buffalo and pigs), and the Saw Mills and Wood Products, etc. The production sectors thereof rely on agricultural services for their production. Meanwhile, the agricultural services link backwards to trade sectors, such as the automotive retail activity for use in agriculture (tractors, excavators, rice combine harvesters), wholesale and retail sale of fertilizers and pesticides, the maintenance and repair of motor vehicles used in agriculture, and the retail sales of agricultural equipment used in the production of agricultural services.

According to the non-agricultural production sectors having linkage indices or forward linkage and backwards, it has been found that the sectors having high linkage

index are the food manufacturing sectors since they are an essential part of human life. Generally, the cost of food consumption is about half all the expenses. Meanwhile, the number of population, as well as the need for food, is likely to increase, and thereby expanding industrial growth of food. Food manufacturing are linked to agricultural sectors, such as farming, poultry and other livestock, livestock, and fishery. In addition, other supporting industrial sectors are getting involved. Moreover, Kalasin has potential in terms of geography and topography that can support rice farming, cassava and sugarcane, so there are a number of raw materials that can be be processed by the food industries. Subsequently, there are industrial food factories located in the certain areas that can support agricultural productivity by farmers as follows: a) 63 main rice mills with total capacity of 153,348 tons per year to support farmers harvesting rice in-season and off-season, b) 8 cassava plants with the total capacity of 425,200 per year, and c) 2 sugarcane factories with total capacity of 153,345 tons per year

The food manufacturing sectors are linked forwards the following production sectors: 1) the restaurant and drinking place sectors using the raw materials to make food for customers, 2) the livestock sectors use products from rice mills to feed pigs, 3) poultry and other livestock use products from rice mills like broken-milled rice and bran for feeding chickens, 4) fishery sectors use products from rice mills, such as broken-milled rice and bran for feeding fish,

and, 5) hotel and lodging place and other accommodations using products for making food for customers, etc. For the backward linkage, the food industrial sectors support some sectors. Firstly, in paddy, rice is used as a raw material for processing by means of primary technology for production. After being milled, there are some leftovers from rice and sticky rice, such as the husks, bran, and the broken-milled rice. Secondly, in the livestock sectors and poultry , cattle, pigs, ducks, and chickens are used as the raw materials in the slaughterhouse to make beef, pork, duck, and chicken etc.

Conclusion and Discussion

Referring to the analysis of linkage index; namely forward linkage, backward linkage, and total linkage; it has been revealed that although the agricultural production sectors have been the main manufacturing activities for a long time, most of the linkage level of the agricultural products still remains low compared to the non-agricultural production sectors, especially the industrial production sectors, trading, and services in which high level of the linkage were found. Furthermore, the number of laborers in the agricultural sectors has declined. Meanwhile, the main laborers are turning into aging society (approximately 58 years old), and many of them are unskilled and informal laborers who are not properly protected by social welfare. . As a result, performance and production technique in low levels. Agricultural production sectors   as   raw materials

for the industrial and service sectors, which has been linkage to low levels. Therefore, the guideline for developing Kalasin province should focus more on enhancing the linkage level of the agricultural manufacturing sectors since they have been found to have a more backward linkage than forward linkage. Moreover, it suggests the exploitation of more agricultural products in terms of developing the quality of agricultural production in response to meeting the needs of industrial sectors and creating added value for agriculture products from the beginning of the production stage down through to the attractive packaging of the product before it is distributed to the customers.

Kalasin's economic development plan for promoting investment is considered from the total linkage index's coefficient value in agricultural production sectors. Additionally, in accordance with the development plan, 5 production sectors which should be supported have been prioritized as follows : 1) agricultural services, 2) livestock (cattle, buffalo, and pigs), 3) poultry and other livestock, 4) fishery, 5) forestry

However, before supporting the expansion of agricultural services, it is necessary to promote the agricultural production first within the sectors and then link to other production sectors as intermediate production factors. 5 The non-agricultural production sectors are prioritized as follows : 1) food manufacturing, 2) trade, 3) chemical products, 4) saw mills and wood products0,

5) leather products

Since these sectors as much as possible stimulate the use of intermediate inputs of other involving production sectors, there should be projects that support both the agricultural and the non-agricultural production sectors. Accomplishing this would, thereby, increase productivity at the provincial level. Increasing outputs can help to expand Gross Provincial Products (GPP) of Kalasin, and in response to unbalanced growth theory, can increase the population's income.

Recommendations

As mentioned earlier, Moreover, according to the economic development plan of Kalasin, besides the investment both from government sectors and private sectors in selecting production sectors having high impact level, schemes or projects in Kalasin's development plan should be interconnected. For example, a plan to promote investment in agricultural services in order to increase productivity should be attractive for farmers. Expanding agricultural market can, for instance, keep the price of agricultural commodities in a good state.

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Table 1 Linkage distribution of Kalasin's economic sectors (2012)

Key Sectors							
Agriculture Sectors				Non-Agriculture Sectors			
No.	Sectors	FL Index	BL Index	No.	Sectors	FL Index	BL Index
				1	**Food Manufacturing**	**1.40**	**1.22**
				2	Other Services	1.29	1.03
				3	Non-metallic Products	1.25	1.09
				4	Rubber Products and Plastic Products	1.05	1.33
Key Sectors Statistics							
Total:	**4**						
Agriculture	**0**						
Non-Agriculture	**4**	**(100.00%)**					
Sector with Strong FL and Weak BL							
Agriculture Sectors				Non-Agriculture Sectors			
No.	Sectors	FL Index	BL Index	No.	Sectors	FL Index	BL Index
1	**Agricultural**	**1.32**	**0.78**	**1**	**Trade**	**2.48**	**0.88**
2	Rubber	1.17	0.83	2	Banking and Insurance	1.84	0.93
3	Paddy	1.13	0.85	3	Electricity	1.79	0.90
				4	Post and Telecommunication	1.45	0.99
				5	Transportation	1.08	0.97

Table 1 Linkage distribution of Kalasin's economic sectors (2012) (Cont.)

Sector with Strong FL and Weak BL							
Strong FL Sectors Statistics							
Total :	8						
Agriculture	3	(37.50%)					
Non-Agriculture	5	(62.50%)					

Sector with Weak Linkages							
Agriculture Sectors				**Non-Agriculture Sectors**			
No.	Sectors	FL	BL	No.	Sectors	FL	BL
		Index	Index			Index	Index
1	Other Root Crops	0.96	0.86	1	Real estate	0.87	0.84
2	**Forestry**	**0.95**	**0.84**	2	Stone Quarrying	0.86	0.94
3	Sugarcane	0.88	0.89	3	Textile Products	0.84	0.95
4	**Fishery**	**0.86**	**0.94**	4	Building Construction	0.83	0.92
5	Vegetables	0.84	0.97	5	Hospital	0.78	0.88
6	Fruits	0.83	0.99	6	Tobacco Processing	0.78	0.82
7	Kenaf and Jute	0.81	0.93		and Products		
8	Crops for Textile	0.79	0.91	7	Education	0.78	0.80
	and Matting			8	Public Administration	0.78	0.78
9	Coconut	0.78	0.87				
Weak Linkage Sectors Statistics							
Total :	17						
Agriculture	9	(52.94%)					
Non-Agriculture	8	(40.06%)					

Sector with Weak FL and Strong BL							
Agriculture Sectors				**Non-Agriculture Sectors**			
No.	Sectors	FL	BL	No.	Sectors	FL	BL
		Index	Index			Index	Index
1	Cassava	0.98	1.00	**1**	**Chemical Products**	**0.98**	**1.25**
2	Beans and Nuts	0.95	1.02	2	Fabricated Metal Products	0.87	1.22
3	**Livestock**	**0.93**	**1.08**	3	**Saw Mills and Wood Products**	0.85	1.17
4	**Poultry and Other**	**0.83**	**1.10**	4	Restaurant and Drinking Place	0.83	1.32
5	Oil Palm	0.78	1.27	5	Water Supply system	0.82	1.03
				6	Hotel and Lodging Place	0.80	1.28
				7	Printing and Publishing	0.79	1.02

Table 1 Linkage distribution of economic sectors (2012) (Cont.)

					Sector with Weak FL and Strong			

Strong BL Sectors Statistics

				8	Other Transportation	0.79	1.08
Total :	16			9	Industrial Machinery	0.78	1.02
Agriculture	5	(31.25%)		10	Motor Vehicles and Repairing	0.78	1.14
Non-Agriculture	11	(68.75%)		11	**Leather Products**	**0.78**	**1.10**
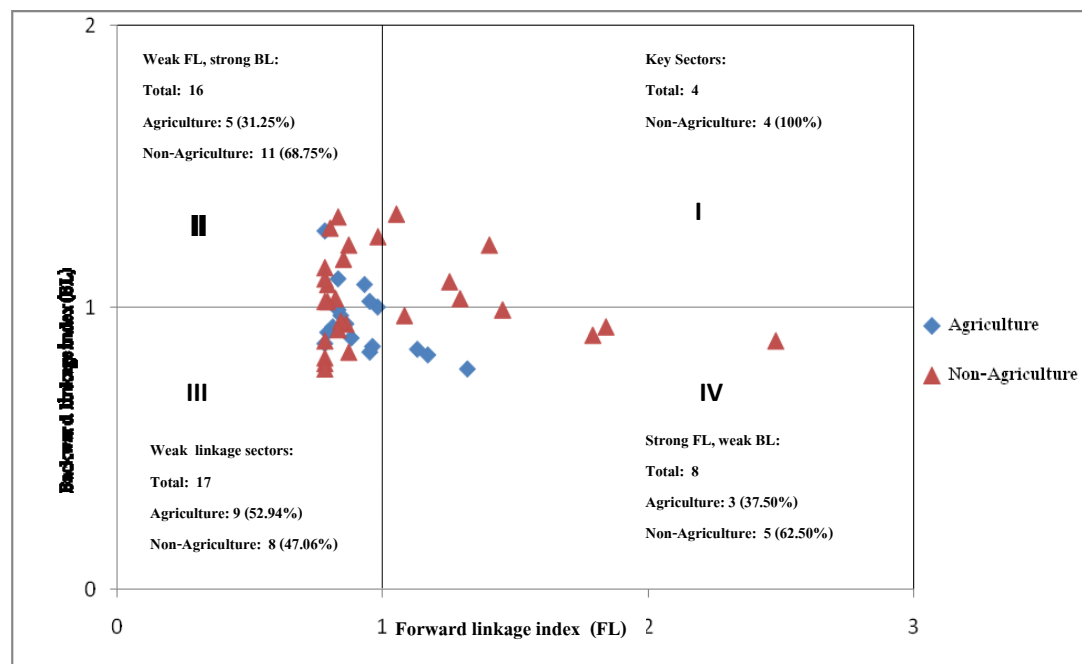
Figure 1 Linkages of Kalasin's 45 Sectors

Table 2 Total Linkages Index of Kalasin 's production sectors, 5 sectors

No.	Sectors	Total Linkages Index	Sectors	Total Linkages Index
	Agriculture		Non-Agriculture	
1	Agricultural Services	2.0824	Food Manufacturing	2.6142
2	Livestock	2.0025	Trade	2.3562
3	Poultry and Other Livestock	1.9342	Chemical Products	2.2340
4	Fishery	1.7925	Saw Mills and Wood Products	2.0120
5	Forestry	1.7874	Leather Products	1.8754