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# THE PLACE OF THE AGRICULTURAL SECTOR AMONG THE PRIMARY SECTORS OF TURKISH ECONOMY

## -WITH İNPUT-OUTPUT APPROACH-

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**─Abstract ─**

*Primary sectors play important role in the economic development. The determination of primary sectors in the overall economy, are important for the interaction and exchanges with other sectors. These sectors provide inputs to other sectors and require inputs of other sectors. Therefore they have stimulating and invigorating effect on the economy .. This kind of sectors are called key sectors or primary sectors for investment.*

*In this study, we will determine the key sectors in the Turkish economy, using the 2002 input-output tables , which are published by Turkey statistical agency. The place of the agricultural sector in these aggregated sectors will be investigated. Then, the sub-sectors of the agricultural sector will be examined, and also the place and position in the agricultural sector and in the overall economy will be determined.. The study used input-output analysis.*

*Key Words : Primary sectors, input-output analysis*

JEL Codes: C67, C60

Topic Area: Economic Development (Economics: In General)

## 1. INTRODUCTION

The agricultural sector has an important place in the economies of countries. People fulfill most of their basic needs from agriculture.

One of the most important components of a developing economy is the agricultural sector. It is possible to put forward an idea about a country's level of development by looking at the share of the agricultural sector in that countries GDP. For example, the agricultural sector in Turkey has a very large potential and contributes to the country's development in various ways. It is of great importance in providing basic foodstuff, providing raw materials to the providing industrial sector, creating demand for industrial products, and contributing to national income and exports. (Yalçınkaya vd.,2006. 98).

## 2.APPLICATION

### 2.1 The Aim of The Study

The aim of the study is to analysis the position of the agricultural sector in Turkey's economy. For this purpose, the place of agriculture in the economy was explored through an input-output analysis. Later the place of the sub-sectors that form the main agriculture sectors was determined by using the same method.

### 2.2 The Method of the Study

Input output tables show production sectors, goods and services flows. While columns show necessary inputs and expenses made to value added elements for each sector, rows show, for the production of each sector, which production sectors and final demand components spend how much. (Yıldırım vd., 2009: 103).

In the study, the input output table prepared by the Turkish statistical institute (TUİK) for the year 2002 was used. First, input coefficient matrix was obtained, and later, linkage coefficients were found by obtaining Leontief inverse matrix.

$$X_{iJ} = X_{iJ} + a_{ij} X_j \qquad (1)$$

It is defined as indicating that it is a linear function of its own production level.

When we assumed that the value that shows the inputs that the sector j in the economy obtained from the other sectors independent of its own production is zero, we find that

$$X_{iJ} = a_{ij} X_j \qquad (2)$$

Therefore, indirect intermediate input coefficient is obtained.

$$a_{iJ} = \frac{X_{ij}}{X_j} \qquad \text{i, j =1,2,….n} \qquad (3)$$

These coefficients are at the same time called as ‘technological coefficients’. These coefficients indicate indirect effect in all sectors based on one unit change in the output of the related sector. The matrix that is formed by all sectors’ unit input coefficients is called ‘technological coefficients matrix‘ and is illustrated by A. With this information on mind, from the definition of the Leontief matrix (I – A), which is the differences between unit matrix and technological coefficients matrix, we obtain a matrix called

$$(I - A)^{-1} \qquad (4)$$

Matrix ‘Leontief inverse matrix.’ Or ‘total necessity matrix’. From this point, depending on each sector’s output level, unit intermediate inputs, and the amount of the demand

$$(I - A)^{-1} Y \qquad (5)$$

Is obtained.(Temurshoev, 2004: 3-4)

Total linkage Effects: Direct linkage effect only reflect direct trade-offs between sectors. However, in production indirect input trade-offs exist between sectors. Inter-industry total linkage effects constitute better indicators when both direct and indirect input trade-offs are taken into account. Total input requirements caused by unit increase in final demand give the elements of the Leontief inverse matrix. Total production increase, caused by one unit final demand increase in a certain sector can be defined as that sector's backward linkage effect, and increase in a certain sector's production caused by one unit final demand increase in all sectors can be called as the sector' forward linkage effect (Aydoğuş, 1999: 95).

$$TLF\hat{I} = \sum_j r_{ij}$$

$$TLBJ = \sum_i r_{ij}$$

## 2.3.Findings

In the study; the place of the agricultural sector among other sectors by using the 2002 input output table. For this purpose, the input output table consisting of 59 sectors was aggregated into 6 sectors. Which sectors were aggregated shown in table 1. When the table 1 is analyzed it can be seen that the agricultural sector takes place between 1-3 sectors.

**Tablo 1: Aggregation key**

| Sector No | Name of Sector | Aggregation key |
|---|---|---|
| 1 | Agriculture | 1 - 3 |
| 2 | Mining | 4 - 8 |

| | | |
|---|---|---|
| 3 | Manufacturing industry | 9 - 31 |
| 4 | Energy | 32 - 33 |
| 5 | Construction | 34 |
| 6 | Service industry | 35 - 59 |

To determine the position of the agricultural sector in six sectors, total forward and backward linkage effects were found.

**Tablo 2: Linkage Effects of the Aggregated Sectors**

| Sectors | Total Forward Connection Effect | Total Backward Connection Effect |
|---|---|---|
| 1 Agriculture | 1,558931371* | 1,65911886* |
| 2 Mining | 1,461092683 | 1,433929688 |
| 3Manufacturing industry | 3,464892852 | 2,60693894 |
| 4 Energy | 1,833018804 | 2,306210599 |
| 5 Construction | 1,046389936 | 2,269977642 |
| 6 Service industry | 2,682516253 | 1,770666171 |

Calculated by using the 2002 input-output table prepared by the Turkish statistical institute (TUİK)

When table 2 analyzed, the agricultural sector in terms of total backward linkage effect, comes fifth, and in terms of total forward linkage effect, it comes fourth in the economy. That the manufacturing industry has highest backward and forward linkage effect shows that it is a key sector in the economy.

The sectors with high total backward linkage effect demand more input than other sectors. Other sectors will increase their production to fulfill this demand. This, in turn, will have a reviving effect in the economy. The agricultural sector comes fifth in terms of total backward linkage effect. As a result it can be argued that it does not have a high effect.

The sectors with high forward linkage effect, supply more input than other sectors. That there is a demand for supplied inputs will cause revival in the economy. The agricultural sector comes fourth in the aggregated sectors.

In this part of the study, the position of each sector in the whole economy was determined. In table 3, prepared for this purpose, the total backward and forward linkage effects of the 59 sectors in the input output table are shown.

Tablo 3: The total backward and forward linkage effects of the sectors.

| | | Total Forward Connection Effect | Total Backward Connection Effect |
|---|---|---|---|
| 1 | Products of agriculture, hunting and related services | 3,088505* | 1,66376* |
| 2 | Products of forestry, logging and related services | 1,368534* | 1,28251* |
| 3 | Fish and other fishing products; services incidental of fishing | 1,037183* | 1,48716* |
| 4 | Coal and lignite; peat | 1,353327 | 1,764536 |
| 5 | Crude petroleum and natural gas; services incidental to oil and gas extraction excluding surveying | 3,58127 | 1,564154 |
| 6 | Uranium and thorium ores | 1 | 1 |
| 7 | Metal ores | 1,314742 | 2,164526 |
| 8 | Other mining and quarrying products | 1,964251 | 1,959898 |
| 9 | Food products and beverages | 2,148785 | 2,450414 |
| 10 | Tobacco products | 1,072535 | 2,398504 |
| 11 | Textiles | 3,29619 | 2,782299 |
| 12 | Wearing apparel; furs | 1,253488 | 2,842524 |
| 13 | Leather and leather products | 1,50078 | 2,828507 |
| 14 | Wood and products of wood and cork (except furniture); articles of straw and plaiting materials | 1,53554 | 2,61474 |
| 15 | Pulp, paper and paper products | 3,546489 | 2,687982 |
| 16 | Printed matter and recorded media | 1,553677 | 2,437609 |
| 17 | Coke, refined petroleum products and nuclear fuels | 2,685525 | 2,415232 |
| 18 | Chemicals, chemical products and man-made fibres | 6,312399 | 2,567182 |
| 19 | Rubber and plastic products | 2,592576 | 2,73821 |
| 20 | Other non-metallic mineral products | 2,306446 | 2,359119 |
| 21 | Basic metals | 7,320686 | 2,959696 |
| 22 | Fabricated metal products, except machinery and equipment | 2,144196 | 2,794285 |
| 23 | Machinery and equipment n.e.c. | 2,320985 | 2,5691 |
| 24 | Office machinery and computers | 1,227408 | 2,336487 |
| 25 | Electrical machinery and apparatus n.e.c. | 2,002621 | 2,771772 |
| 26 | Radio, television and communication equipment and apparatus | 2,539985 | 3,141814 |
| 27 | Medical, precision and optical instruments, watches and clocks | 1,308377 | 2,755355 |
| 28 | Motor vehicles, trailers and semi-trailers | 1,925856 | 2,994197 |
| 29 | Other transport equipment | 1,279988 | 2,294533 |
| 30 | Furniture; other manufactured goods n.e.c. | 1,202025 | 2,929952 |
| 31 | Secondary raw materials | 1,027153 | 2,946035 |
| 32 | Electrical energy, gas, steam and hot water | 5,184007 | 2,557807 |
| 33 | Collected and purified water, distribution services of water | 1,267022 | 1,453114 |

| | | | |
|---|---|---|---|
| 34 | Construction work | 1,348938 | 2,29481 |
| 35 | Trade, maintenance and repair services of motor vehicles and motorcycles; retail sale of automotive fuel | 2,500872 | 1,934419 |
| 36 | Wholesale trade and commission trade services, except of motor vehicles and motorcycles | 4,441557 | 1,836072 |
| 37 | Retail trade services, except of motor vehicles and motorcycles; repair services of personal and household goods | 3,150692 | 1,633109 |
| 38 | Hotel and restaurant services | 1,533004 | 2,107027 |
| 39 | Land transport; transport via pipeline services | 4,71964 | 1,846543 |
| 40 | Water transport services | 1,900123 | 1,799368 |
| 41 | Air transport services | 1,277103 | 2,269698 |
| 42 | Supporting and auxiliary transport services; travel agency services | 3,009367 | 2,028107 |
| 43 | Post and telecommunication services | 1,948795 | 1,92819 |
| 44 | Financial intermediation services, except insurance and pension funding services | 3,96788 | 1,65408 |
| 45 | Insurance and pension funding services, except compulsory social security services | 1,225111 | 1,668398 |
| 46 | Services auxiliary to financial intermediation | 1,316706 | 2,074175 |
| 47 | Real estate services | 2,113551 | 1,461355 |
| 48 | Renting services of machinery and equipment without operator and of personal and household goods | 1,176149 | 1,920049 |
| 49 | Computer and related services | 1,219103 | 1,732121 |
| 50 | Research and development services | 1,537015 | 2,557444 |
| 51 | Other business services | 4,056583 | 1,813508 |
| 52 | Public administration and defence services; compulsory social security services | 1,014138 | 1,840313 |
| 53 | Education services | 1,109344 | 1,447816 |
| 54 | Health and social work services | 1,089672 | 2,008556 |
| 55 | Sewage and refuse disposal services, sanitation and similar services | 1,241337 | 2,06005 |
| 56 | Membership organisation services n.e.c. | 1,315179 | 1,863028 |
| 57 | Recreational, cultural and sporting services | 1,586205 | 1,912517 |
| 58 | Other services | 1,063577 | 1,920424 |
| 59 | Private households with employed persons | 1 | 1 |

Calculated by using the 2002 input-output table prepared by the Turkish statistical institute (TUİK)

When table 3 is analyzed, it is seen that the sector with the highest backward linkage effect is the radio, television and communication equipment and apparatus sector, which is the sub-sector of the manufacturing sector. It is also observed

that the sector with the highest forward linkage effect is another sub-sector of manufacturing, which is basic metals sector. It is possible to say that the manufacturing industry is the key sector in the economy.

The main agricultural sector consists of three sub-sectors including products of agriculture, hunting and related services, products of forestry, logging and related services and fish and other fishing products; services incidental of fishing.

The forward linkage effect (3,088505) of the subsector of products of agriculture, hunting and related services sector rank twelfth among all sub-sectors in whole economy. In terms of total backward linkage effect (1,66376), it is forty ninth out of fifty nine sectors. Products of agriculture, hunting and related services sector has a high value in terms of forward linkage effect. That the backward linkage effect of the products of agriculture, hunting and related services sub-sector is low and forward linkage effect is high, shows that this sector does not demand high amounts of input but it largely demands its own output.

In terms of total forward linkage effect (1,368534) the sub-sector, products of forestry, logging and related services sector comes thirty fourth and in terms of total backward linkage effect (1,28251) it ranks fifty seventh . This sector, in terms of forward linkage effect is in the middle row and in terms of backward linkage effect, in the back row.

Fish and other fishing products; services incidental of fishing sub-sector, in terms of forward linkage effect (1,037183) ranks fifty fifth and in terms of backward linkage effect(1,48716) it ranks fifty third.

When these results are analyzed, the agricultural subsectors, in terms of linkage effect do not have high value.

## 3.CONCLUSİON

The agricultural sector, in terms of total backward linkage effect, ranks fifth, and total forward linkage effect, it comes forth. From this, we can conclude that agriculture, in terms of linkage effect, does not have high values. The fact that the total forward linkage effect of the agricultural sector in the whole economy is

relatively high means that the demand for he output of the agricultural sector comes forth in general economy.

The main agricultural sector consists of three subsectors: products of agriculture, hunting and related services, products of forestry, logging and related services and fish and other fishing products; services incidental of fishing. The first sub-sector, products of agriculture, hunting and related services sector, has a high value in terms of total forward linkage effect. This result shows that the output of the mentioned sector is highly demanded by other sectors. The linkage effect of the other two sub-sectors do not have high values.

Since the demand for the output of the products of agriculture, hunting and related services sector is high, investments in this sector will revive other related sectors.

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