The Brazilian Agribusiness, Defining and Measuring: 1994 to 2000[1]

Maria Cristina Ortiz Furtuoso[2]
Joaquim José Martins Guilhoto[3]

Resumo

Utilizando-se de instrumentos de análise de insumo-produto, como índices de ligações para frente e para trás (Hirschman-Rasmussen e Puro), foi possível delinear quais os setores que pertencem ao Agronegócio Brasileiro. Através da definição deste setores e utilizando-se as matrizes de insumo-produto para o Brasil estimou-se que o PIB do agronegócio brasileiro representa por volta de 27% do PIB do Brasil em 2000. O PIB do Agronegócio foi estimado para 2 grandes complexos: a) Produtos Vegetais; e b) Pecuária. Cada um destes complexos foi divido em quatro componentes: a) insumos para a agricultura; b) agricultura; c) indústria de base agrícola; e d) distribuição final.

Palavras-chave: Agronegócio, Insumo-Produto, PIB.

Abstract

Through the use of input-output analysis tools, like backward and forward linkages (Hirschman-Rasmussen and Pure), it was possible to delineate which are the sectors that belong to the Brazilian Agribusiness. From the definition of the sectors and using the Brazilian input-output tables it was possible to measure the GDP of Brazilian Agribusiness which were estimated to be around 27% of the Brazilian GDP in 2000. The GDP of the Agribusiness was also estimated for two major complexes: a) Vegetal Products and b) Animal Products. Each of the Agribusiness complexes was divided into four components: a) inputs to agriculture; b) agriculture; c) agriculture based industry; and d) final distribution.

Key words: Brazilian Agribusiness, Input-Output, GDP.

Área de classificação da ANPEC: Área 05 – Economia Regional e Economia Agrícola

Código da classificação do JEL: Q13 – Agricultural Markets and Markting; Cooperatives; Agribussiness.

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[1] The results presented here are part of a bigger project that is being conduct at the Center for Advanced Studies in Applied Economics at the University of São Paulo (CEPEA-USP) under the financial support of the Brazilian National Confederation of Agriculture (CNA) and which is direct to study the role of the Agribusiness in the Brazilian economy as a whole as well as in its States.

[2] University of São Paulo, Brazil, and , Center for Advanced Studies in Applied Economics (CEPEA),. E-mail: mcofurtu@carpa.ciagri.usp.br

[3] University of São Paulo, Brazil, Center for Advanced Studies in Applied Economics (CEPEA), and Regional Economics Applications Laboratory (REAL) - University of Illinois, USA.. E-mail: guilhoto@usp.br.

THE BRAZILIAN AGRIBUSINESS, DEFINING AND MEASURING: 1994 TO 2000

1. INTRODUCTION

With the post-war worldwide technological revolution of agriculture, the farming activities underwent a large expansion and increasing specialization, decisively influenced by the economical development and growing urbanization. Such process basically imposed a new agricultural order in which the modern farmer is an expert involved with cultivation and animal breeding operations thus transferring the functions of storing, processing and distribution of vegetal/animal products as well as the supply of input and production factors to organizations other than the farm.

Previously focusing on self-sufficiency, agriculture was updated and introduced into the market economy constituting new links or segments to the feeding system. Basically this process resulted in the structuring of a modern industrial park providing capital goods and input for that area, a sector called **the rising tides** of the farm. On the other hand, complex storing, transportation, processing, industrialization and distribution networks were formed – **the ebb tide** sector.

To date the value of the agriculture-related activities performed outside the farms are substantially higher than those of the total operations performed therein. As an example, LIPTON et alii (1998) points the case of the United States, according to 1996 data, whose percentage composition of the agroindustrial complex already represented 29.6%, 7.1% agriculture and 63.3% industry and distribution. In 1996, the American agricultural-feeding system recorded US$ 997.7 billion, that is, 13% total GDP and employed 17% of its work force. Although rural jobs represent only 1% of the total jobs of the country and less than 1% of the GDP, its impact on the national economy is very high due to the multiple interlinks formed with the other industrial, commercial and service segments.

As a result of such phenomenon, the traditional economy concept that classifies the different activities as "primary, secondary and tertiary" sectors as separate sectors and not integrated led to an analysis focusing an interlinked system of production, processing and commercialization of farming-originated products – **the Agribusiness**.

The pioneering academic contribution to quantify such conceptual approach arisen in 1957, when American economists Ray Goldberg and John H. Davis created the term **Agribusiness**. Making use of input-output matrix techniques developed by Wassily Leontief (LEONTIF, 1951), the authors studied the transformations and restructuring of agriculture. By analyzing the problems related to the agricultural sector of the economy they stated that these were much more complex and not limited to an ordinary rural activity. That explains the need of dealing with agricultural problems under a systemic focus (Agribusiness) instead of a static one (agriculture).

Such expansion and specialization process of the agriculture is known to have occurred homogeneously in all regions of the planet, for it depends on the economic and social stage of development of each one of them. Namely, the participation and interaction of the agents – farmers,

input suppliers and production factors, processors and distributors – occurred in different degrees in the various levels of the agricultural-feeding system (Pinazza & Araújo, 1993).

The Brazilian agriculture incorporated this worldwide transformation process. The agriculture and stock raising activities were redirected, updated and integrated into the market. These transformations and restructuring of the rural sector began starting in the 1950s, which, in parallel to the extensive growth of the farming production, undergoes a modernization process of the technical grounds, with an effective performance of the State.

During the post-1950s period, the modernization process begins a more advanced phase, that of the industrialization of the Brazilian agriculture, "... which represents the fundamental qualitative change in the long process of transformation of technical grounds, thus making the modernization process irreversible" (See Kageyama, 1990).

A great deal of these transformations were intensified by the National System of Rural Credit through great availabilities of the subsidized credit, together with the establishment of new replacement groups of imports of production media for agriculture by means of the II National Development Plan (1974/79) (Barros, 1983).

This process culminates in the constitution of the agribusiness, which takes place through the intersectorial integration between the industries that produce for the agriculture, (modern) agriculture so to speak, and the processing industries. The agricultural production then becomes part of a chain and depends on the industry dynamics, that is, there is an increasing integration between agriculture and industry in which the agriculture/industry sectorial cut becomes less important.

In view of these considerations, it is clear that the integration between agriculture and industry implies a real restructuring of the rural sector, establishing deep technological, productive, financial and business relationships with the other economy activities. The systemic view of the input-output is broadened and the agricultural-feeding chains grow in the domestic market and in the world food market.

In Brazil, surveys on Agribusiness are scarce, and the researches available constantly involve problems regarding scope and periodicity. In features regarding the feeding issue the functional approach still prevails, as in the economic literature the analysis of agriculture so to speak also prevails. In turns, the IBGE Foundation, an institution responsible for the estimation of the National Accounts of Brazil, undertakes a methodology separately presenting the three economic sectors – agriculture, industry and services – thus making the intersectorial analysis more difficult.

In order to contribute for the comprehension and study of the Brazilian agriculture, a new scope is developed this paper.

In this way, one expects to provide concrete elements for discussion, by estimating the Agribusiness GDP capable of allowing economic evaluations as subsidies to the sectorial policy planning, to the agribusiness management, as well as to detect fundamental elements of this new agricultural pattern, in order to help redirect the rural producer as an economic agent.

Based on these principles this work aims to measure the Brazilian Agribusiness GDP, decomposing these estimates into two major Subcomplexes – Agricultural Products and Animal products – which form this important economic segment. One also intends to detect the participation of the processing sectors (agriculture-based industry) composing the Brazilian Agribusiness.

2. METHODOLOGY TO MEASURE THE BRAZILIAN AGRIBUSINESS COMPLEX

Besides measuring the Agribusiness as whole for the Brazilian economy, in this paper the Agribusiness was also measured for two major complexes: Vegetal Products and Animal Products.[4]

The total GDP value of the Agribusiness in each complex will also be divided into 4 aggregates: I) inputs; II) the sector itself; III) industrial processing; and IV) distribution and services.

The procedure adopted to estimate the Brazilian Agribusiness GDP is through the scope of the Product, i.e., by estimating the value added at market prices.

The value added at market prices is given by the sum of the value added at basic prices with indirect net taxes less the financial dummy, resulting in:

$$VA_{MP} = VA_{BP} + INT - FDu \quad (1)$$

where:

VA_{MP} = Value added at market prices
VA_{BP} = Value added at basic prices
INT = Indirect net taxes
FDu = Financial dummy

To estimate the GDP of **Aggregate I** (input for vegetal and animal production) one uses the information available in the input-output tables regarding the input values acquired by the Vegetal and Animal sectors. The columns with input values are multiplied by the respective coefficient of value added (CVA_i).

The Coefficients of the Value Added for each sector (CVA_i) are obtained by dividing the Value Added at Market Prices (VA_{MP}) of a given sector by its respective output (X_i), i.e.,

$$CVA_i = \frac{VA_{MP}}{X_i} \quad (2)$$

Thus, the double-counting issue presented by previous Agribusiness GDP estimates in the Brazilian Economy when input values were considered, instead of the value added effectively generated is eliminated. In that sense the GDP of the **Aggregate I** is given by:

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[4] See FURTUOSO (1998), FURTUOSO et al. (1998) and GUILHOTO, FURTUOSO, and BARROS (2000) for further methodological details on the composition of the Brazilian Agribusiness Complex.

$$GDP_{I_k} = \sum_{i=1}^{43} z_{ik} * CVA_i \quad (3)$$

k = 1, 2 vegetal and animal sectors
i = 1, 2, ..., 43 remaining sectors

where:

GDP_{I_k} = GDP of aggregate I (input) for vegetal (k=1) and animal (k=2)

z_{ik} = total input value of sector i for either vegetal or animal

CVA_i = value added coefficient of sector i

For the total Aggregate I we have:

$$GDP_I = GDP_{I_1} + GDP_{I_2} \quad (4)$$

where:

GDP_I = GDP of aggregate I

and the other variables are as previously defined.

The estimates for the **Aggregate II** (the sector itself, vegetal and animal) considers the value added generated by the respective sectors, subtracting the values used as input from the value added of these sectors, thus the double-counting issue found in the previous Agribusiness GDP estimates for the Brazilian economy is again eliminated. Then one has:

$$CDP_{II_k} = VA_{MP_k} - \sum_{i=1}^{43} z_{ik} * CVA_i \quad (5)$$
$$k = 1, 2$$

where:

GDP_{II_k} = GDP of aggregate II for vegetal (k = 1) and animal (k = 2)

and the other variables are as previously defined.

For the total Aggregate II we have:

$$GDP_{II} = GDP_{II_1} + GDP_{II_2} \quad (6)$$

where:

GDP_{II} = GDP of aggregate II

and the other variables are as previously defined.

To define the composition of the **Aggregate III** (agriculture based industries) several indicators were adopted as for instance: a) the main demanding sectors of agricultural products obtained by input-output matrix estimation; b) the participation of agricultural input in the intermediate consumption the agroindustrial sectors; and c) the economic activities carrying out the first, second and third transformation of agricultural raw materials. In this way, the agriculture based industries will consist of the following activities: i) Wood and Wood Products; ii) Pulp, Paper and Printing; iii) Processing of Chemical Elements (Alcohol); iv) Textile; v) Clothing; vi) Footwear, Leather and Skins; vii) Coffee Industry; viii) Vegetal Products Processing; ix) Animal Slaughtering; x) Dairy Industry; xi) Sugar Industry; xii) Vegetal Oil Processing; and xiii) Other Food Products.

Therefore, aggregates II and III express the income (value added) generated by these segments. The input-output matrix data for 1995 shows that out of the total output of vegetal and animal production for intermediary purposes, 21.8% is absorbed by the rural sector, 71.8% is sold to the agriculture based industries and only 6.4% is designated to the remaining sectors.

In the estimation of **Aggregate III** (Agriculture Based Industries) one adopted the summation of the value added generated by the agroindustrial sectors subtracted from the value added of these sectors that have been used as input in the Aggregate II. As previously mentioned, this subtraction is done to eliminate the double-counting found in previous Agribusiness GDP estimates, as so, one has that:

$$CDP_{II_k} = \sum_{qek} \left(VA_{MP_q} - z_{qk} * CVA_q \right) \qquad k = 1, 2 \tag{7}$$

where:

GDP_{III_k} = GDP of aggregate III for vegetal products (k = 1) and animal products (k = 2)

and the other variables are as previously defined.

For the total Aggregate III we have:

$$GDP_{III} = GDP_{III_1} + GDP_{III_2} \tag{8}$$

where:

GDP_{III} = GDP of aggregate III

and the other variables are as previously defined.

In the case of **Aggregate IV**, regarding the Final Distribution, one considers the aggregated value of the Transportation, Commerce and Service sectors. Out of the total value obtained for these sectors only the part corresponding to the share of the agricultural and agroindustrial products is designated to the Agribusiness in the final product demand. The approach adopted in the estimation of the final distribution value of the industrial agribusiness can be represented by:

$$GFD - INT_{FD} - IP_{ED} = DFD \tag{9}$$

$$VAT_{MP} + VAC_{MP} + VAS_{MP} = TM \tag{10}$$

$$GDP_{IV_k} = TM * \frac{FD_k + \sum_{q \in k} FD_q}{DFD} \qquad k = 1,2 \tag{11}$$

where:

GFD = global final demand

INT_{FD} = indirect net taxes paid by the final demand

IP_{FD} = imported products by the final demand

DFD = domestic final demand

VAT_{MP} = value added of the transportation sector at market prices

VAC_{MP} = value added of the commerce sector at market prices

VAS_{MP} = value added of the service sector at market prices

TM = trading margin

FD_k = final demand of vegetal (k=1) and animal (k=2)

FD_q = final demand of the agroindustrial sectors

GDP_{IV_k} = GDP of aggregate IV for vegetal (k=1) and animal (k=2)

For the total Aggregate IV we have:

$$GDP_{IV} = GDP_{IV_1} + GDP_{IV_2} \tag{12}$$

where:

GDP_{IV} = GDP of aggregate IV

and the other variables are as previously defined.

The Agribusiness GDP for each sub-complex is given by the sum of its aggregates as:

$$GDP_{Agribusiness_k} = GDP_{I_k} + GDP_{II_k} + GDP_{III_k} + GDP_{IV_k} \tag{13}$$

where:

$GDP_{Agribusiness_k}$ = GDP of the agribusiness for vegetal products (k =1) and animal products (k =2)

and the other variables are as previously defined.

The total Agribusiness GDP is given by:

$$GDP_{Agribusiness} = GDP_{Agribusiness_1} + GDP_{Agribusiness_2} \tag{14}$$

where:

$GDP_{Agribusiness}$ = Agribusiness GDP

and the other variables are as previously defined.

The methodology described above can be showed as a scheme (Figure 1), which presents the process of obtaining the Agribusiness GDP. The Agribusiness GDP is then observed to be obtainable both by the weighed sum of the aggregates GDP and by the weighed sum of the GDP of Vegetal Products and Animal Products.

To obtain the contribution of each industrial sector to the Agribusiness GDP the following is done: a) the agribusiness value is estimated, should there be no industrial sectors, according to the methodology described above; and b) also according to this methodology, each industrial sector is inserted, one by one, into the agribusiness complex, thus, by subtraction it is possible to estimate the contribution of each processing industry to the total agribusiness.

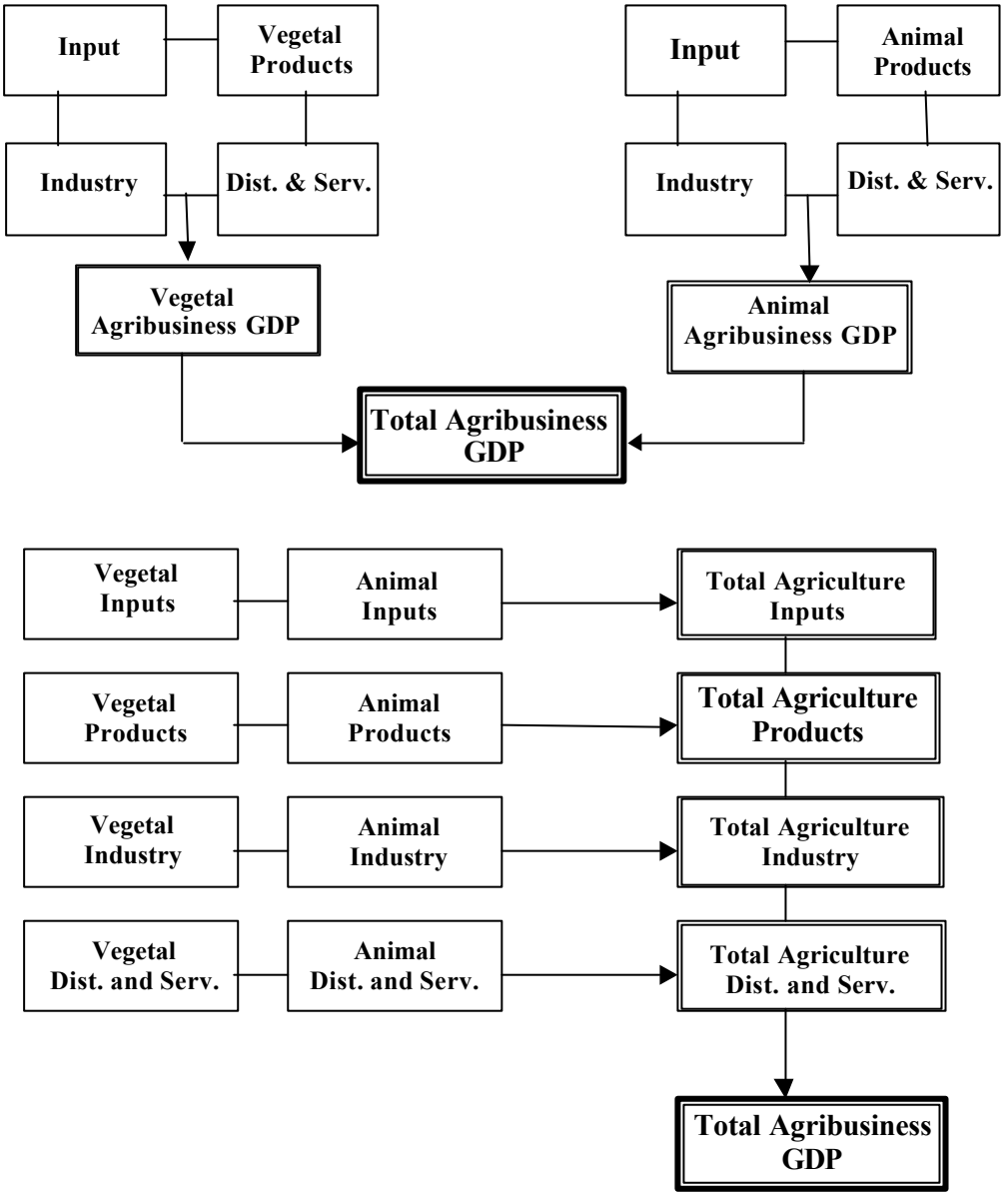


Figure 1. Scheme the Agribusiness GDP

3. THE BRAZILIAN AGRIBUSINESS, 1994 TO 2000

The results of the Brazilian Agribusiness point out the importance that such complex has played in the national economy, accounting for approximately 27% of its GDP in 2000.

Figure 2 presents the shares of the Agribusiness GDP in the Brazilian economy for the 1994-2000 period. The Brazilian Agribusiness GDP accounted for approximately 29% of Brazil's GDP in 1994, having a declining trend until 1997 (26.41%).

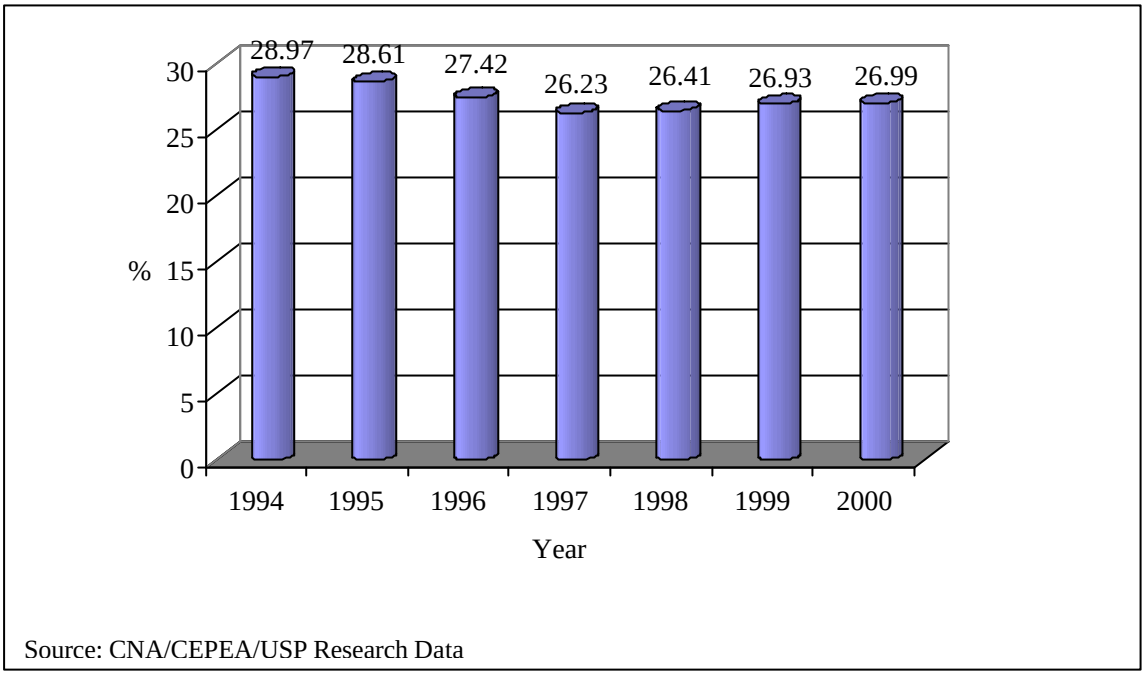


Figure 2. Share of the Total Agribusiness in the Brazilian GDP – 1994 to 2000.

Table 1 presents the shares of the Agribusiness GDP in the Brazilian economy for the 1994-2000 period. The Brazilian Agribusiness GDP accounted for approximately 29% of Brazil's GDP in 1994, having a declining trend until 1997 (26.41%).

The GDP of the Brazilian Agribusiness for 2000 was estimated to be US$167,673,3 millions, with a real growth of 0.098% in relation to 1999 (Table 1). Such growth, in comparison with the 1994-2000 can be seen as a mediocre although positive result of the period. (Figure 3).

Table 1. Agribusiness and Brazilian GDP at Market Prices. 1994-2000 (US$ Thousand of 2000)

Year	Agribusiness GDP	Brazilian GDP	Share of the Agribusiness GDP (%)
1994	162,951,8	535,173,7	30.45
1995	167,707,2	557,758,0	30.07
1996	164,987,8	572,594,4	28.81
1997	163,527,3	591,318,2	27.65
1998	164,472,0	592,619,1	27.75
1999	167,510,0	597,300,8	28.04
2000	167,673,3	621,192,9	26.99

Source: CNA/CEPEA Research Data.

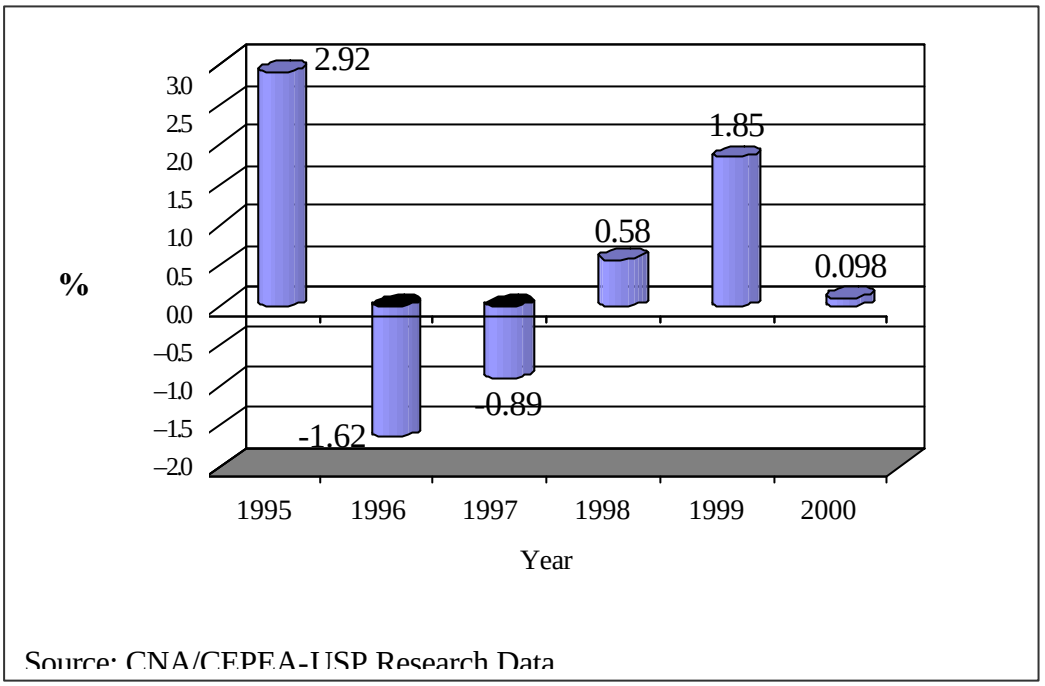


Figure 3. Annual Growth Rates of the total Agribusiness GDP – 1995 to 2000.

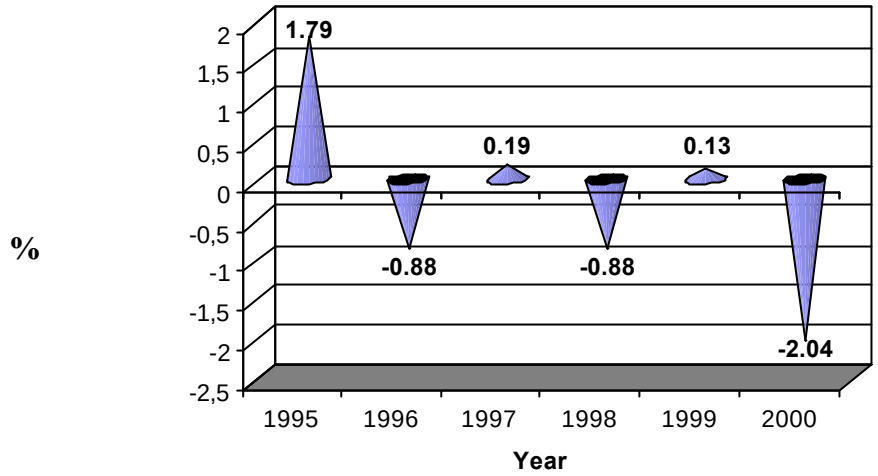
Table 2 shows the evolution of the Brazilian Agribusiness GDP, both in global terms (total) and for the two sub-complexes, with corresponding segments for the 1994-2000 period.

Table 2. Brazilian Agribusiness GDP (US$ Thousand of 2000)

AGRIBUSINESS	Years						
	1994	1995	1996	1997	1998	1999	2000
Agriculture	162,951,8	167,707,2	164,987,8	163,527,3	164,472,0	167,510,0	167,673,3
Input	7,552,5	7,244,6	7,365,8	7,268,5	7,681,3	8,977,0	9,546,9
Total Agriculture	45,990,6	46,819,0	45,327,1	44,682,1	47,467,0	47,415,2	46,989,3
Industry	54,723,3	58,710,9	56,132,3	56,449,6	53,475,0	54,925,7	55,487,3
Distribution	54,685,4	54,932,8	56,162,7	55,127,2	55,848,7	56,192,1	55,649,8
Vegetal	117,547,5	119,653,6	118,595,6	118,815,5	117,773,9	117,922,1	115,522,4
Input	5,099,3	4,835,2	5,016,4	4,998,8	5,246,5	5,961,7	6,154,8
Vegetal	27,012,2	26,842,6	26,861,9	26,806,1	28,211,9	26,764,0	24,854,3
Industry	46,275,3	49,347,7	46,693,6	47,477,1	44,875,7	46,191,6	46,651,4
Distribution	39,160,7	38,628,0	40,023,7	39,533,5	39,439,7	39,004,7	37,861,9
Animal	45,404,3	48,053,7	46,392,2	44,711,9	46,698,2	49,587,9	52,151,0
Input	2,453,2	2,409,4	2,349,4	2,269,6	2,434,8	3,015,3	3,392,1
Animal	18,978,4	19,976,3	18,465,1	17,876,1	19,255,1	20,651,2	22,135,0
Industry	8,448,0	9,363,2	9,438,7	8,972,5	8,599,3	8,734,1	8,835,9
Distribution	15,524,7	16,304,7	16,139,0	15,593,7	16,409,0	17,187,3	17,788,0

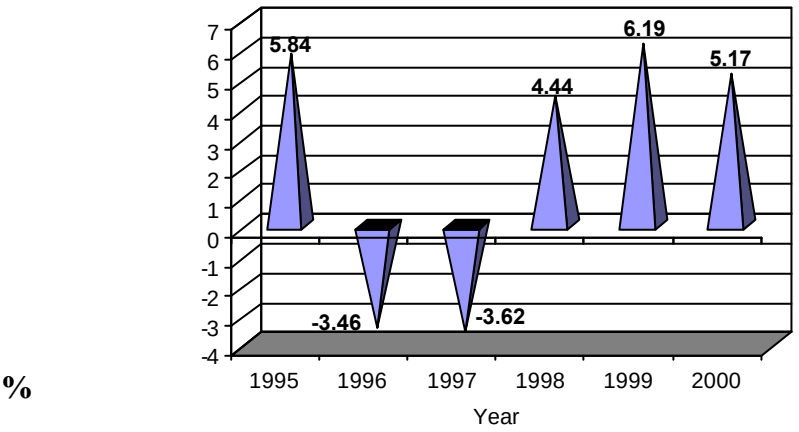
Source: CNA/CEPEA-USP Research Data.

Regarding the annual growth of the sub-complexes one verifies that the Animal segment was the one presenting best results in 1999 and 2000, with real growth rates of 6.19% and 5.17%, respectively, in comparison with those of 0.13% and –2.04% for agriculture (Figures 4 and 5).



Source: CNA/CEPEA-USP Research Data.

Figure 4. Annual Growth Rates of the Vegetal Agribusiness GDP – 1995 to 2000.



Source: CNA/CEPEA-USP Research Data.

Figure 5. Annual Growth Rates of the Animal Agribusiness GDP – 1995 to 2000.

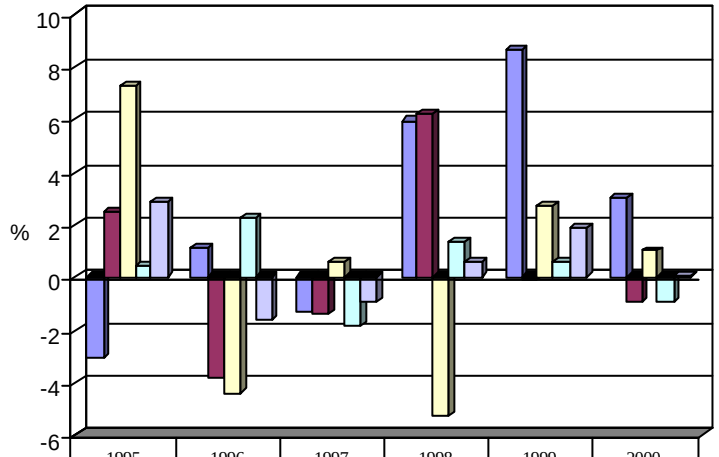
The shares of the components of the Agribusiness GDP (obtained from Table 2) show that the input contribution has a growing trend for the total complex in the period. Although vegetal and animal have shown declining results from 1994 through 1997, an inverse trend was recorded in 1998-1999 e 2000. With regards to the Agriculture Based Industries and Distribution segments, they had a share of respectively 33.09% and 33.19% in 2000, for the total Complex.

The evolution of the Brazilian Agribusiness composition also shows the high shares of the Agriculture Based Industries and the Distribution segment, showing values always above 30%.

In terms of values and shares, Table 3 shows the structure of the two major sub-complexes of the Brazilian Agribusiness – Vegetal and Animal. In 2000 the Vegetal Agribusiness GDP (US$ 115,522,4 millions) represented around 19% of Brazil's GDP, while the Animal Agribusiness GDP corresponded to approximately 8% (US$52,151,0 millions) of Brazil's GDP. In the case of the agriculture, the higher GDP share is justified by the diversity of the agricultural sector that has a higher number of processing industries than the animal sector.

Considering that the Agribusiness is a segment with agents from the primary (agriculture), secondary (industry), and tertiary (services) sectors, the changes in the GDP will be a function of the relative variation of its components.

The results show that out of the components considered for the estimation of the Total Agribusiness GDP only that of the Total Agriculture had, in 1999, a negative variation (–0.11%), significantly contrasting with the positive performance (6.23%) reached in 1998. One can also observe that the Inputs, the Agriculture Based Industries, and Distribution had positive variations in 1999, with respectively, real growth rates of 8.66%, 2.71% and 0.61%. In 2000, however, negative results were observed for the total Total Agriculture and Distribution segment, with respectively, variations of –0,90 and –0,96. (Figure 6).



	1995	1996	1997	1998	1999	2000
Input	-3,09	1,08	-1,37	5,95	8,66	3,03
Total Agriculture	2,48	-3,81	-1,42	6,23	-0,11	-0,9
Industry	7,29	-4,39	0,57	-5,27	2,71	1,02
Distribution	0,45	2,24	-1,84	1,31	0,61	-0,96
Total	2,92	-1,62	-0,89	0,58	1,85	0,09

Year

Source: CNA/CEPEA -USP Research Data.

Figure 6. Real Annual Growth Rates of the Total Agribusiness GDP and its Segments - 1995 to 2000

Table 3. Brazilian GDP and Brazilian Agribusiness Complex GDP - 1994 to 2000
(Billions US$ of 2000 and Shares, %, in the Brazilian GDP)

Total	1994		1995		1996		1997		1998		1999		2000	
	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share
Vegetal Complex	117,5	21.96	119,7	21.45	118,6	20.71	118,8	20.09	117,8	19.87	117,9	19.74	115,5	18.60
Animal Complex	45,4	8.48	48,1	8.62	46,4	8.10	44,7	7.56	46,7	7.88	49,6	8.30	52,2	8.40
Agriculture Complex	163,0	30.45	167,7	30.07	165,0	28.81	163,5	27.65	164,5	27.75	167,5	28.04	167,7	26.99
Brazil	535,2	100.00	557,8	100.00	572,6	100.00	591,3	100.00	592,6	100.00	597,3	100.00	621,2	100.00

Source: CNA/CEPEA -USP Research Data.

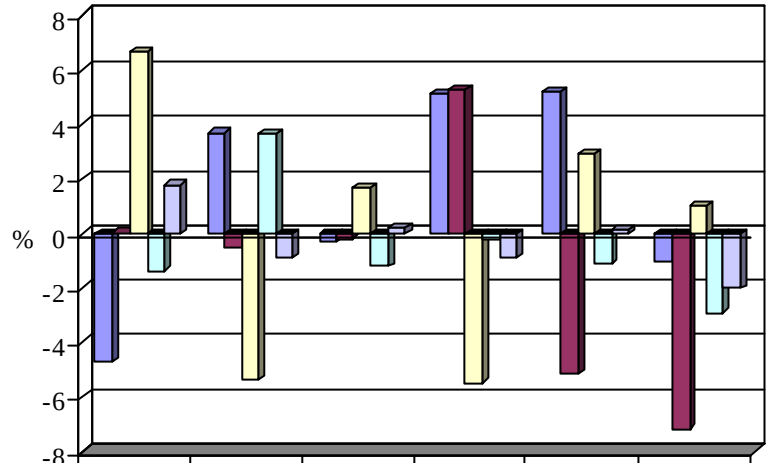
Table 4. Agribusiness and Agriculture GDP by Complexes, Brazil - 1995 to 2000
(Billion US$ of 2000 and Real Growth Rates, %)

Agribusiness	Year											
	1995		1996		1997		1998		1999		2000	
	Value	Growth Rate	Value	Growth Rate	Value	Growth Rate	Value	Growth Rate	Value	Growth Rate	Value	Growth Rate
Agriculture Agribusiness	**167,7**	**2.92**	**165,0**	**–1.62**	**163,5**	**–0.89**	**164,5**	**0.58**	**167,5**	**1.85**	**167,7**	**0,09**
Total Agriculture	46,8	1.80	45,3	–3.19	44,7	–1.42	47,5	6.23	47,4	–0.11	47,0	–0.90
Vegetal Agribusiness	**119,7**	**1.79**	**118,6**	**–0.88**	**118,8**	**0.19**	**117,8**	**–0.88**	**117,9**	**0.13**	**115,5**	**–2.03**
Total Vegetal	26,8	–0.63	26,9	0.07	26,8	–0.21	28,2	5.24	26,8	–5.13	24,9	–7.14
Animal Agribusiness	**48,1**	**5.84**	**46,4**	**–3.46**	**44,7**	**–3.62**	**46,7**	**4.44**	**49,6**	**6.19**	**52,2**	**5.17**
Total Animal	20,0	5.26	18,5	–7.56	17,9	–3.19	19,3	7.71	20,7	7.25	22,1	7.19

Source: CNA/CEPEA -USP Research Data.

Considering the annual growth rates of the components of the Vegetal Agribusiness GDP one notices that only the Input and Industry segments had a positive performance in 1999, with growth rates, respectively, of 5.17% and 2.93%, compensating the negative results of Agriculture (–5.16%) and Distribution (–1.10%). For 2000, only the industry keeps a positive growth rate (0.99%). (Figure 7).

Despite the negative context presented by the farming segment, the Animal Agribusiness Sub-Complex showed a positive performance in the 1998/1999/2000 period. Thus, in that sub-complex the growth rates in 1999 were respectively 15.07%, 7.21%, 1.57% and 4.74% for the input, animal, processing and services segments. For 2000 a high growth level is kept. (Figure 8).



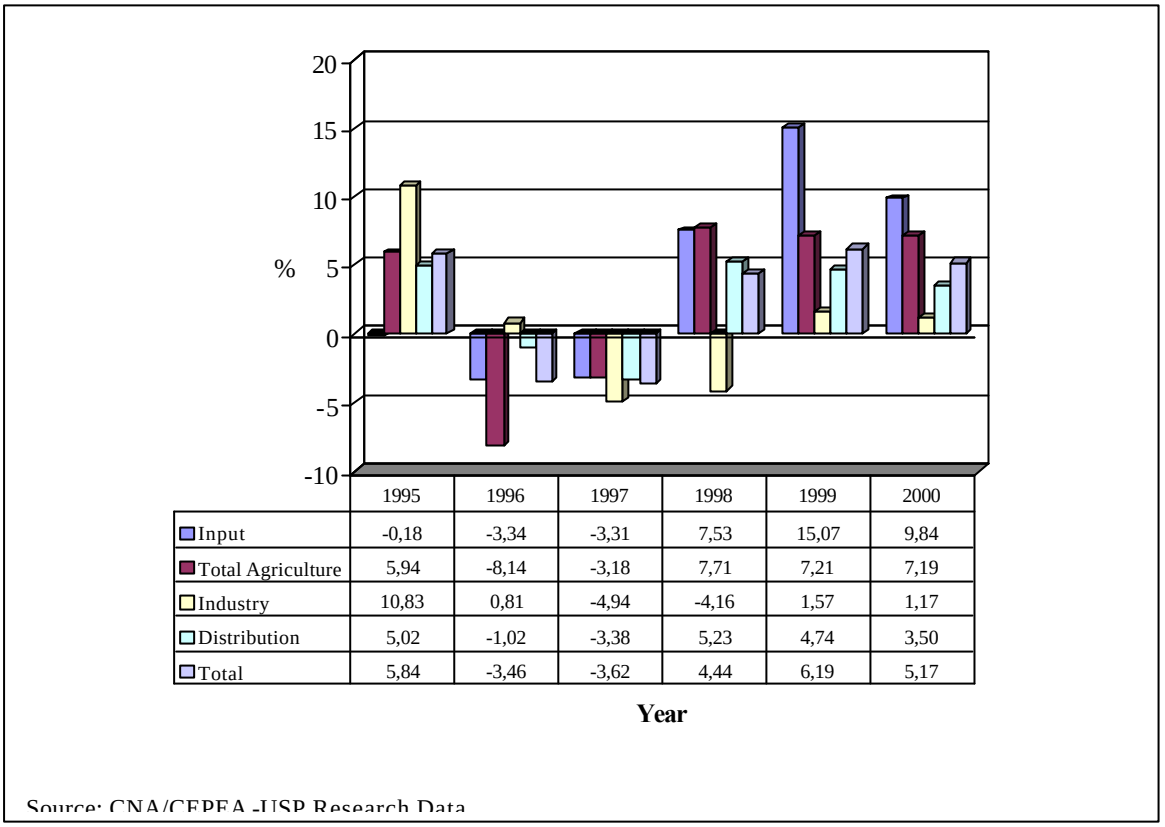
	1995	1996	1997	1998	1999	2000
Input	-4,73	3,69	-0,31	5,10	5,17	-1,03
Total Agriculture	0,03	-0,55	-0,20	5,24	-5,16	-7,14
Industry	6,64	-5,38	1,68	-5,48	2,93	0,99
Distribution	-1,36	3,61	-1,22	-0,24	-1,10	-2,93
Total	1,79	-0,88	0,19	-0,88	0,13	-2,03

Year

Source: CNA/CEPEA -USP Research Data.

Figure 7. Real Annual Growth Rates of the Vegetal Agribusiness GDP and its Segments - 1995 to 2000.

The aggregate value derived from agriculture and animal products are made up by its output destiny, i.e.: a) inputs used in the agriculture; b) inputs used by the industries; c) exported; and d) final consumption by the families and the government. Given the above, one has that the value of the Total Agriculture GDP in 2000 was of US$47,0 billions, a difference of US$8,5 billions in comparison with the US$55,5 billions used as inputs by the industries or used by the components of the final demand, this difference reflects the value of using the vegetal and animal products as inputs in the Agricultural sector. Splitting the Total Agriculture GDP by the sub-complexes one has that in 2000 the total GDP for the Vegetal and Animal production was, respectively, of US$24,9 billions and US$22,1 billions (Table 4).



	1995	1996	1997	1998	1999	2000
Input	-0,18	-3,34	-3,31	7,53	15,07	9,84
Total Agriculture	5,94	-8,14	-3,18	7,71	7,21	7,19
Industry	10,83	0,81	-4,94	-4,16	1,57	1,17
Distribution	5,02	-1,02	-3,38	5,23	4,74	3,50
Total	5,84	-3,46	-3,62	4,44	6,19	5,17

Figure 8. Real Annual Growth Rates of the Animal Agribusiness GDP and its Segments - 1995 to 2000.

When measured by a broader concept, the sectoral GDP data from 1994-2000 allows a more accurate technical evaluation regarding the sectoral performance of the Brazilian Agribusiness. These results are shown in Tables 5 and 6. The activity regarding the vegetal and animal products also includes the value of the inputs used plus the value aggregated with the distribution of the vegetal and animal products; the value for the agriculture based industries also includes the value aggregated with the distribution of the industries production. Using this broader concept, the value of the agricultural sector was responsible, in 2000, for 42.23% of Brazil's Total Agribusiness GDP.

In regards to the vegetal and animal sector, the decrease of the GDP value in 1996 and 1997 can be interpreted as an economic backward movement (US$65,8 billions in 1996 and US$ 64,3 billions in 1997). After this period there was a recovery in 1998, 1999 and 2000, with growth rates of 8.02%, 1.77% and 0,10%, respectively. One should point the highly positive performance of animal in the 1998-1999-2000 period, with growth rates of 9.55%, 8.48% and 7,71%, respectively, which certainly reflected on the positive result of the rural sector in that triennial (8.02%, 1.77% and 0,10%, respectively).

Despite the not so significant growth of the Total Agribusiness GDP (1.85%) in 1999 and 2000 (0,098%), some agroindustrial sectors managed to overcome the drawbacks and present highly satisfactory results. The Pulp, Paper and Printing industry had a GDP growth of 20.81% and 17,94% in 1999 and 2000, respectivamente, going from R$7,5 billions in 1998 to R$9,0 billions in 1999 and us$10,6 in 2000 (Tables 5 and 6, and Figure 9).

Table 5. Sectoral Distribution of the Brazilian Agribusiness GDP, 1995 to 2000.

(Billion US$ of 2000)

Sector	1995	1996	1997	1998	1999	2000
Agriculture (1)	67,8	65,8	64,3	69,5	70,7	70,8
Vegetal (2)	39,1	39,2	38,8	41,6	40,4	38,1
Animal (3)	28,7	26,6	25,5	28,0	30,3	32,7
Wood and Wood Products(4)	8,7	8,5	8,2	7,6	7,6	7,9
Pulp, Paper and Printing(4)	9,0	8,4	8,0	7,5	9,0	10,6
Chemical Elements (Alcohol)(4)	6,2	6,0	7,4	6,3	7,1	7,2
Textile Industry(4)	7,6	6,9	6,3	5,4	5,7	5,6
Clothing Industry(4)	8,4	8,3	7,4	7,1	6,0	5,8
Footwear Industry(4)	4,3	4,3	4,1	3,3	3,1	3,0
Coffee Industry(4)	3,1	3,2	3,1	4,1	4,4	4,3
Vegetal Products Processing(4)	12,7	13,5	14,3	13,1	12,4	11,2
Animal Slaughtering(4)	10,4	10,6	10,3	10,5	11,7	11,8
Dairy Industry(4)	4,6	4,9	4,9	5,0	4,5	4,7
Sugar Industry(4)	2,5	2,5	2,6	2,6	2,5	2,9
Vegetal Oil Processing(4)	4,5	4,5	5,1	4,8	4,6	3,7
Other Food Products(4)	17,8	17,6	17,6	17,8	18,0	18,2
Total	167,7	165,0	163,5	164,5	167,5	167,7

Source: CNA/CEPEA -USP Research Data.

(1) These values refer to the sum of the aggregated value generated by the agriculture sector, the inputs used by the sector and the distribution value of the vegetal and animal products.

(2) These values refer to the sum of the aggregated value generated by the vegetal sector, the inputs used by the sector and the distribution value of the agricultural products.

(3) These values refer to the sum of the aggregated value generated by the animal sector, the inputs used by the sector and the distribution value of the animal products.

(4) These values refer to the sum of the aggregated value generated by the industrial sector plus the distribution value of the processed products.

In the case of the Chemical Elements (Alcohol) industry the GDP increase in 1999 was 12.97%, reaching the mark of US$7,1 billions. In 2000, this segment had a slight growth of 1.18%. The Animal Slaughtering industry recorded a significant variation of 11.67%, increasing its aggregated value from US$10,5 billions in 1998 to US$11,7 billions in 1999. In 2000, the growth was also neglectful (0.84%). In addition to these sectors, which were significantly outstanding in 1999, one should also stress the real positive annual growth of the Coffee and Textile industries, with growth rates of 7.09% and 5.77%, respectively. In 2000, diverging from these results, the segments had negative results of –3.54% and 1.78%, respectively. Among the sectors, the poorest performance was that of the Clothing industry, which recorded a reduction of 14.76%, with its GDP going from US$7,1 billions to US$6,0 billions in 1999. In 2000, the Vegetal Oil Processing Industry sector presented the worst result (–18.94%). (Figure 9).

Table 6. Real Growth Rates (%) of the Sectoral Distribution of the Brazilian Agribusiness GDP, 1995 to 2000

Sector	1995	1996	1997	1998	1999	2000
Agriculture (1)	1.67	–2.99	–2.20	8.02	1.77	0.10
Vegetal (2)	–0.75	0.27	–1.00	7.01	–2.75	–5.61
Animal (3)	5.10	–7.36	–3.97	9.55	8.48	7.71
Wood and Wood Products(4)	4.99	–2.29	–2.73	–8.03	0.41	3.55
Pulp, Paper and Printing(4)	24.85	–6.49	–5.22	–6.14	20.81	17.94
Chemical Elements (Alcohol)(4)	–20.98	–4.02	24.67	–15.28	12.97	1.18
Textile Industry(4)	2.30	–8.49	–9.70	–13.13	5.77	–1.78
Clothing Industry(4)	5.50	–1.43	–9.87	–5.21	–14.76	–4.42
Footwear Industry(4)	–5.11	–1.19	–4.58	–19.01	–6.61	–1.38
Coffee Industry(4)	–15.38	4.10	–3.58	32.11	7.09	–3.54
Vegetal Products Processing(4)	–1.61	6.12	5.94	–7.90	–5.73	–9.88
Animal Slaughtering(4)	6.55	2.25	–3.43	1.96	11.67	0.84
Dairy Industry(4)	22.38	5.80	–1.31	2.57	–9.72	3.76
Sugar Industry(4)	–7.98	–3.57	4.21	–0.13	–1.34	12.91
Vegetal Oil Processing(4)	–5.71	0.89	12.42	–6.50	–3.17	–18.94
Other Food Products(4)	16.25	–1.15	–0.27	1.06	1.51	1.07
Total	**2.92**	**–1.62**	**–0.89**	**0.58**	**1.85**	**0.098**

Source: CNA/CEPEA -USP Research Data.

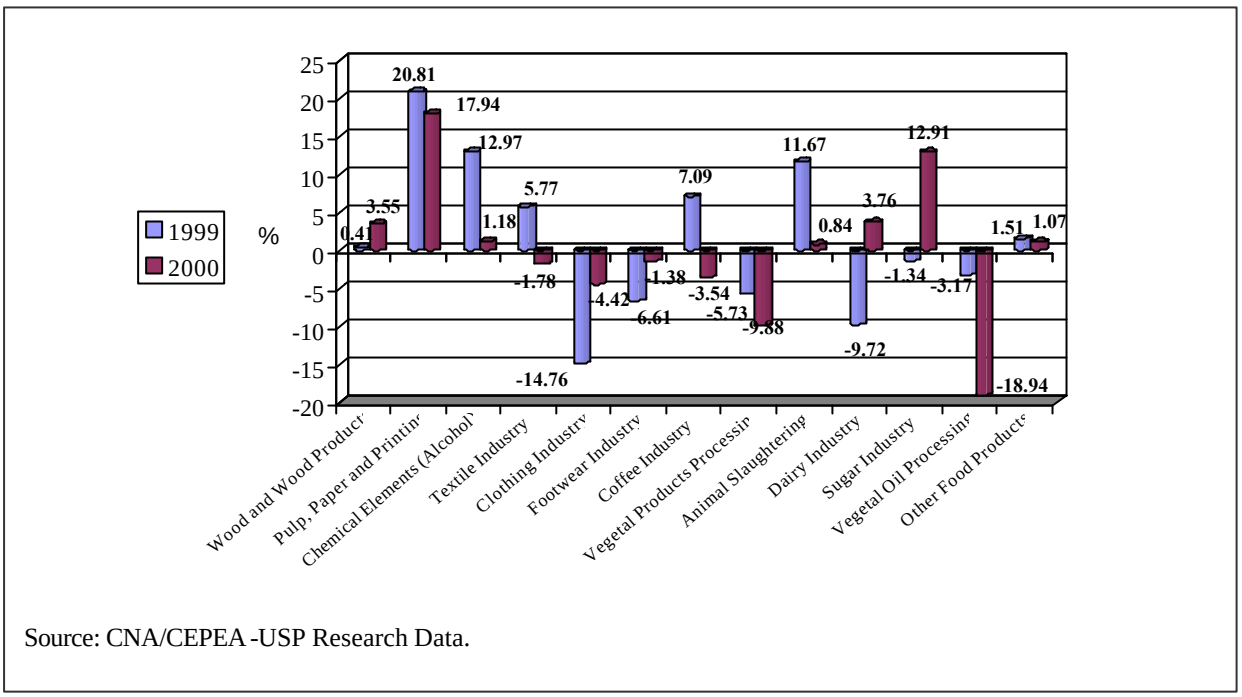
(1) These values refer to the sum of the aggregated value generated by the agriculture sector, the inputs used by the sector and the distribution value of the vegetal and animal products.
(2) These values refer to the sum of the aggregated value generated by the vegetal sector, the inputs used by the sector and the distribution value of the agricultural products.
(3) These values refer to the sum of the aggregated value generated by the animal sector, the inputs used by the sector and the distribution value of the animal products.
(4) These values refer to the sum of the aggregated value generated by the industrial sector plus the distribution value of the processed products.

The results confirm the Agribusiness behavior trend in highly industrialized economies, in which the participation of the agriculture based industries and final distribution, tends to be more and more representative in the value of the output sold by farmers. In that process, the vegetal and animal sector becomes less important in the composition of the Agribusiness output, with a relative sector's income decrease. (Davis e Goldberg, 1957; Lipton et al., 1998; Lauschner, 1993 e Malassis, 1968).

Through the data presented it is possible to see that the Brazilian agriculture is inserted into the current trend of the world's economy by adapting itself to the situation of the consumers, concentrated on the urban regions, with sophisticated consuming structures in which a larger participation of industrialized and diversified products is a constant demand.

In short, the Brazilian Agribusiness adds value on the agricultural raw materials in which the warehousing, processing and final distribution sector tends to be more representative of the total value of the output sold to the consumer, thus dominating the agriculture/industry relationships.

In that sense, it is fundamental to take into account the necessary organization of farming producers into associations, cooperatives or other alternative means to support rural producers, as it allows rural workers to face the challenges of this new agrarian pattern, leading to a relative reduction of the rural sector in relationship with the other Agribusiness components.



Source: CNA/CEPEA-USP Research Data.

Figure 9. Yearly Growth Rates (%) of the Agriculture-Based Industries GDP – 1999 and 2000

5. CONCLUSIONS

By analyzing the results of this research one can infer the complexity of the Brazilian economy, which presents an advanced stage of a productive structure with a high interlinking degree among the national productive sectors.

As to the Agribusiness results, the empirical data show the fundamental role that this segment has performed in the Brazilian economy, responsible for approximately 27% of the GDP in 2000. In regards to the participation structure of the two major sub-complexes of the Brazilian Agribusiness – Vegetal and Animal Products – one observes that the GDP of the Vegetal Product Agribusiness represents, in average, 20% of the Brazilian GDP, while the GDP of the Animal Products Agribusiness corresponds to approximately 8% of the Brazilian GDP. In the case of the Vegetal one the higher GDP participation is justified by the diversity of the agricultural sector, which has a larger number of processing industries than the animal sector. These results point the importance and dependence of the other sectors of the economy regarding the vegetal/animal segment, in that the participation of the primary GDP of the rural sector – 7.56% of the Brazilian GDP in 2000 – is multiplied approximately 3.5 times when the Agribusiness concept is used.

Specifically with regards to the annual growth of the sub-complexes, one verifies that the Animal Product segment was the one presenting best results in the last years of analysis.

As to the participation of the components of the Agribusiness GDP one observes that the input contribution tended to grow for the total complex during the analyzed period, especially in the last three years (1998, 1999, and 2000). Although the Vegetal/Animal product segment presented decreasing results between 1994 and 1997, a recovery is recorded between 1998 and 2000.

The evolution of the Brazilian Agribusiness composition also shows a high participation of the base agriculture Industry and of the Distribution segment as outstanding dynamic poles, with most figures above 30% in the Agribusiness chain.

The results of this research show that the chains of such complex add value to the farming raw materials, so the processing and final distribution sectors are the higher impulse vectors on the total value of the output sold to consumers, consolidated on the strong net connecting agriculture and industry.

One should stress that the basic methodology adopted in this paper is integrated with IBGE´s New System of National Accounts (NSNA), which presents the advantages of having a wider scope and being raised with a higher level of disaggregation perfectly articulated with the Input-Output matrix. The methodological refinement adopted, in turns, prevents the double count problem presented in usual works of Agribusiness GDP calculus. Due to the use of this new methodology one believes that the results achieved provide an accurate picture of what has been happening to the Brazilian Agribusiness, so as to provide the economic agents with subsidies for decision-making, besides decisively contributing to the methodological improvement of this sort of research.

With this new methodological procedure one intends, by carrying on the with these studies, to elaborate and develop regional Agribusiness GDP estimates through productive chains and monthly projections in order to have a deeper analysis of the Brazilian Agribusiness and to broaden its scope viewing the identification of clearer trends likely to be the object of topical action. It intends to create a more and more solid basis for the formulation of really effective agricultural sectorial policies to help conduct rural producers as economic agents.

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