International Journal of Business, Human and Social Sciences
ISSN: 2517-9411
Vol:12, No:2, 2018

Proposal for a Model of Economic Integration for the Development of Industry in Cabinda, Angola

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Abstract**—**This study aims to present a proposal for an economic integration model for the development of the manufacturing industry in Cabinda, Angola. It seeks to analyze the degree of economic integration of Cabinda and the dynamics of the manufacturing industry. Therefore, in the same way, to gather information to support the decision-making for public financing programs that will aim at the disengagement of the manufacturing industry in Angola and Cabinda in particular. The Cabinda Province is the 18th of Angola, the enclave is located in a privileged area of the African and arable land.

Keywords**—**Economic integration, industrial development, Cabinda industry, Angola.

I. Introduction

THE Cabinda Province is an Angolan enclave located in the north of the Angola´s territory. This Angolan province with an area of 7.283 km² has borders with the Republic of Congo (Brazzaville) in the North and Northeast, with the Democratic Republic of Congo in the South and East and with the Atlantic Ocean in the West. The Cabinda administrative division is constituted by four Municipalities (Cabinda, Cacongo, Buco-Zau and Belize) and 12 Communes. About 60% of Angolan oil production comes from this province; consequently, the effects of the instability of international crude oil prices have a more pronounced effect on its economy [10].

The oil price shock that started in mid-2014 has brought to the forefront the need to address dependence on oil, diversify the economy, and reduce vulnerabilities [1]. In this logic, it is important to agree with [2], on the practice of China's industrial policy processes as a source of inspiration for other developing countries, which are seeking an alternative growth path.

In a post-crisis situation, such statements serve as a model for rethinking development priorities and gradually begin to reformulate economic policies within a national framework more conducive to achieving self-sustaining growth [2].

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The question that arises is how this diversification should be carried out since the industrial sector is totally disintegrated and not competitive in the generality of the country and particularly in Cabinda. There are sectors with great potential such as the agro-industry that have been underexploited. The diversification of the economic activity can only be achieved having on its base, an economic integration plan.

Kamiantako [3] defines economic integration as a process of cooperation that tends to develop as much as possible the exchange between sectors of the economy in order to improve the population standard of living. Regarding the degree of integration, the author states that, in general, in industrialized countries there is an inter-industrial cohesion that favors the progress diffusion between sectors; this justifies the reason for the high level of performance of these economies. On the other hand, in underdeveloped countries the situation is such that each sector is constantly facing isolation, which is the reality in the Province of Cabinda.

The disarticulation of the economic system, from one sector to another or within the same sector, prevents the dynamization of economic progress because it blocks the growth or turns the development impossible [4].

Based on the country's and Cabinda's macroeconomic frameworks, the implementation of a model based on industrial integration is proposed. This model will allow the analysis of the interdependence of all branches of the economy and facilitate the identification of key or priority areas that can guide economic policy for investment and measure the degree of integration between the sectors. The elaboration of this model involves the following step: Collection of data on the economic structure of the country or region [5].

- Group economic activities in sectors;
- Elaborate the input and output table from the data collected on the different sectors;
- Calculate the coefficients and the economy degree of integration.

II. Economic Integration

Economic integration is an adaptation of the neoclassical theory of general equilibrium. This refers to the empirical study of the quantitative interdependence between interrelated economic activities. Commonly known as the "Leontief" model, it was developed using the economic table published by François Quesnay in 1758. This table allowed to analyze the flow of goods and services among the four economic classes that existed at that time: landowners, farmers, merchants and artisans.

The table of inputs and outputs became an instrument of

effective economic analysis in 1930, when Professor Wassily Leontief introduced his theory of inter-industrial analysis. The inter-industrial analysis is an analytical tool, whose fundamental objective is to study the interdependence between the different industries in an economy [5], [6]. In a simplistic way, this model assumes that all products are obtained at the expense of using the production factors, which may come from other industrial or manufacturing units. Registering the entire flow of goods allows to analyze the economic activity of a Region, Province or Country [7]. The table is constituted by four quadrants, as shown in Table I.

TABLE I
STRUCTURE OF THE INTER-INDUSTRIAL TABLE (THE QUADRANTS ARE SHOWN COUNTERCLOCKWISE)

PURCHASE OF \ SALES TO		INTERMEDIATE DEMAND Sectors 1. . . . . .j . . . . . …. N	TOTAL.	FINAL DEMAND INVEST	Dom. Cons.	Public Cons.	Stock variation	EXPORT.	Total	**Total output**
Intermadiate Inputs	1	X_{11} . . . X_1j . . . . …… X_1n	$\sum_{j=1}^{n} X_{1j}$	I_1	C_1	G_1	S_1	E_1	D_1	X_1
	2 Sectors	**2.**	.	.	.	**1.**	.	.	.	.
	i	X_{i1} . . . . X_ij . . . . …… X_in	$\sum_{j=1}^{n} Xij$	I_i	C_i	G_i	S_i	E_i	D_i	X_i
		. . .	.	.	.		.	.	.	.
	n	Xn_1 . . . Xnj . . . . …… Xnn	$\sum_{j=1}^{n} Xnn$	In	Cn	Gn	Sn	En	Dn	Xn
	Intermedi. inputs total	$\sum_{i=1}^{n} Xi_1$ $\sum_{i=1}^{n} Xi_j$ $\sum_{i=1}^{n} Xin$								
	Import.	M_1 . . . ..Mj . . . ……...Mn	M_i	Mi	Mc	Mg	Ms	Me	Md	M
	Capital	L_1 . . . Lj . . …….. Ln	L_i	Li	Lc	Lg	Ls	Le	Ld	L
	Labor	K_1 . . Kj . . …. …….Kn	K_i	Ki	Kc	Kg	Ks	Ke	Kd	K
Primary Inputs		**3.**				**4.**				
	Natural Res.	N_1 . . . Nj . . …. …….Nn	N_i	Ni	Nc	Ng	Ns	Ne	Nd	N
	Land	T_1 . . . Tj . ... ……..... .Tn	T_i	Ti	Tc	Tg	Ts	Te	Td	T
	Total operational value	V_1 . . . Vj . .. …….. Vn	V_i	Vi	Vc	Vg	Vs	Ve	Vd	V
	Primary inputs total	W_1 . . . .Wj . . ……Wn		WI	Wc	Wg	Ws	We	Wd	W
	Total Inputs	X_1 . . . . Xj . . . ……Xn	X	I	C	G	S	E	D	Z

1st Quadrant: Refers to the part of the total production destined for final consumption, the considered variables are: domestic consumers demand (C); public consumers demand (G); external consumption or exports (E); stock level variation (S); fixed capital formation (I), which can be public or private. Thus, the final demand that satisfies the sector is given by:

$$Yi = C_i + G_i + E_i + S_i + I_i. \quad (1)$$

2nd Quadrant: The economy branches are represented by horizontal lines that form the matrix of consumers (i). In this quadrant, the information refers to the total production quotas that each branch sells itself and other branches in the form of intermediate outputs. In the vertical position are the purchases of each branch in the form of intermediate inputs (j), the lines and the columns in this quadrant form a square matrix, denominated by transactions matrix whose elements are Xij.

3rd Quadrant: The main entries are designated by L, K, N and T, which mean salary, capital, natural resources and land, respectively.

4th Quadrant: Contains the primary factors acquired directly by the final demand, that is, without the activities intervention.

A. Considerations

Xj represents the totality of each column and provides information on all inputs used by sector **j**, as well as primary and intermediate inputs.

Xi is the total of each line which represents the set of outputs performed by the production sector.

It can be considered that for any sector, the output total (X_i) is equal to the inputs total (Xj). This equality derives from the nature conservation law applied to an economic context, an economy cannot consume more than the available resources.

B. Applying the Leontief's Model (Inputs and Outputs)

1) The Production Coefficients

The production or technical coefficients express the technical relationship between industries. These coefficients measure the consumption **i** needed to produce a unit of **j** which is defined by:

$$\mathbf{a_{ij}} = \frac{Xij}{Xi} \quad (2)$$

where: $\mathbf{A_{ij}}$**:** production coefficient; $\mathbf{X_{ij}}$**:** the amount of **i** used by **j**; $\mathbf{X_j}$**:** the column **j** total. $\mathbf{A_{ij}}$**:** forms the technical coefficients matrix, which expresses the direct effects of the final variation on the outputs volume. Thereby, with this matrix and the unitary matrix, we obtain the matrix [I-A], the Leontief matrix.

The inverse of the Leontief matrix: $[I - A]^{-1}$**,** expresses the direct and indirect effects of an alteration change on the volume of outputs final demand. Thus, $[I - A]^{-1} = [r_{ij}]$ or $r_{ij} > 1$ se $i = j$; $0 < r_{ij} < 1$ se $i \neq j$.

2) Coefficients or Integration Factors

The integration coefficients give the degree of

interdependence of an industry with its environment by the quotient between the intermediate and total transactions.

The upstream integration coefficient Uj (or j) represents the consumer sector, and shows the degree to which the sector first purchases itself and the other sectors afterwards. Accordingly:

$$X_{\cdot j} = Xj = \sum_{j=1}^{n} Xij \quad (3)$$

The value of sector j intermediate inputs j, (i, j = 1, 2, ..., n) and Xj is the total value of the sector j inputs. Then, the upstream integration coefficient Uj is given by:

$$Uj = \frac{\sum_{j=1}^{n} X.j}{xj} \quad (4)$$

The downstream integration coefficient W_i, where i represents the producer sector, shows the degree to which sector i sells itself and other sectors.

By applying $X_i = \Sigma j X_{ij}$, the downstream intermediate demand w_i, sector i products demand (i, j = 1, 2, ..., n) and X_i = sector i products total, In this case, the integration coefficient downstream W**i** is given by:

$$W_i = \frac{\sum_{i=1}^{n} Xi.}{Xi} \quad (5)$$

The upstream (U) and downstream (W) integration coefficients will provide information on the degree of sectorial interdependence, since it does not define anything about the degree of integration of the entire economy. The average coefficient of integration (W*) is used to know the degree of total integration of the economy. Thus, if

$$X.. = \Sigma_i \Sigma_j X_{ij} \quad (6)$$

However,

$$X.. = \Sigma_i X_{i\bullet} = \Sigma_j \mathbf{X}_{\bullet j} \quad (7)$$

where: $\Sigma X_{i\cdot}$, Represents the total of primary inputs of all sectors.

$$\text{So } U^* W^* = \frac{X..}{\sum X.j} = \frac{X..}{\sum Xj.} \quad (8)$$

When a coefficient U (W) is lower than the mean (U * = W *), this signifies that the sector is weak, otherwise it is the opposite. For a better understanding, the sectors can be grouped into four categories, as shown in Table II.

TABLE II
INDUSTRIAL SECTORS CATEGORIES [3]

a) Highly integrated sectors upstream and downstream $U > U^*$ e $W > W^*$	b) Upstream higly integrated sectors upstream $U > U^*$ e $W < W^*$
b) Highly integrated sectors downstream $U < U^*$ e $W > W^*$	a) Weakly integrated sectors upstream and downstream $U < U^*$ e $W < W^*$

The Dispersion Coefficients

Considering the direct and indirect effects, it is shown how a production increase of a certain sector interacts in other sectors. Putting $r.j = \Sigma_i r_{ij}$, the total of column j of the matrix $[I-A]^{-1}$; and $r = \Sigma_i \Sigma j r_{ij}$, the sum of all elements of the matrix $[I - A]^{-1}$. Then, the dispersion coefficient P_j is given by:

$$P_{\cdot j} = \frac{nr.j}{r..} \quad (9)$$

(i, j = 1, 2, ..., n)

If P_j <1, it represents that sector j only produces low incentives for the economy.

If P_j> 1, it is assumed that the sector already generates higher average repercussions. In this case, sector j is considered as a priority.

III. CABINDA'S ECONOMIC STRUCTURE

Through a systematic process of information gathering, it was possible to identify the main economic activities of the province and classify them into the following six groups.

A. Large Construction Companies

The construction sector is dominated by some of the largest international and national companies, namely Mota Engil, Tecnovia, Emcica, Juang Chu and Meng-Engenharia. Over the last 10 years, these companies achieved a turnover of more than $100 million. Only Emcica and Meng-Engenharia, which are national companies based in Cabinda, made investments with visible impact in the Province. These companies invested not only in the construction sector, but also in other sectors of activity such as: soft drinks, detergents, PVC pipes, cement glue, paints, agro industrial projects, commerce and others.

B. Emerging Industries

Some economic agents with capacity for self-financing started to emerge. They are generally companies that had their origin in the exploitation of wood destined for exporting.

Notwithstanding their success, these companies face high production costs, due to the use of electric generators and the lack of distributors, equipment's and their spare parts.

C. Oil Sector

This group is divided into two subgroups: the group of crude oil producers and the group of refiners. The first subgroup has its base on the Malongo Terminal and is constituted by large multinational enterprises such as Chevron, Gulf Oil, Schlumberger, Haliburton, Weathefort and Elf, among others. There are also many small and medium

enterprises (both domestic and foreign), which provide services for the larger enterprises. The second subgroup is dominated by Sonangol, which is the public company responsible for transporting and distributing refined oil outside the Province. It is important to mention that almost all the crude oil extracted is exported.

Existing constraints in Cabinda demand that each producer is obliged to create his own importation network, in order to be able to obtain the necessary inputs for its production. The companies produce to satisfy the final consumption, not the intermediate one.

D.Importers of Basic Products

This group is dominated by two large companies with foreign capital associated with Angolan entrepreneurs with economic power. They have a long experience in importing food, appliances and other products. They sell their products to wholesalers or retailers at relatively low prices to ensure a larger market share compared to other producers with less financial power. The lack of investment incentives in this sector has conditioned the market conditions.

The diversification of the economy cannot be based on a market dependent on imports. It is essential to develop the productive capacity of the province, based on a strong and well-structured manufacturing industry.

E. Services

This is the most dynamic group. It is leveraged by telecommunications, transportation, catering, hospitality, health and education. Its main gaps lie in education and health. Despite the large government investments in hospital infrastructures, the health care provided still does not meet the population's real needs. The education system also presents some debility. The government should be able to supervise the educational system, in order to safeguard its quality and guarantee that the education and training administered to the students, provides them with the necessary skills to face present-day challenges.

F. Informal Economy

It is a very dynamic sector, because for many families, the informal market is their only source of income [8]. It is rare to find a family where there is not at least one person who has or had a small business.

With the investigation, it was understood that the informal sector in Angola employs 60% of the economically active population. In 2016, the National Institute of Statistics (INE) estimated that 13.6 million inhabitants are aged 15-64 years, and at least 8.2 million are unemployed and are engaged in economic activity in the informal sector.

According to the economist Juliana de Jesus in her interview in the newspaper, Angop (2017/4/19), it is the women who constitute the main labor force of the informal sector. It is estimated that nine out of 10 urban and rural workers are employed in this area. The incidence is particularly on the group of women and young people who have no alternative but informal work to ensure survival [9]. However, workers engaged in street vending activities perform their activities in the worst conditions, exposed to the sun, rainfall and all manner of risk that the situation may entail.

IV. Results and Discussion

A. Construction of the Input-Output Matrix

According to Leontief, to achieve the homogeneity of productive activities, it is necessary that companies operate in a limited number of sectors and there is no possibility of replacing the produced goods or the provided services, nor the manufacturing methods. Taking this into account, the economic activities can be combined in 19 sectors as presented in the following table.

In the table, the authors do not seek to study the sectors of industrial exploitation in Cabinda through the CAE system, but rather, depending on the units operating in the Province.

TABLE III
Cabinda's Economic Activities by Branch or Sector

Types of activity	Nº	Sectors of activities
Food industry; Non-food agriculture Cattle raising and fishing	1	Agriculture, fishing and cattle raising
Exploration of various species of wood	2	Forestry
Exploitation of non-metallic minerals (inert, excluding glue)	3	Mining and quarrying
Bakery & Confectionery; Beverage manufacturing; Yogurt manufacture; Animal food manufacture	4	Food industry
Manufacture of paper; Printing and publishing	5	Paper industry
Sawmill	6	Wood industry
Manufacture of wood and leather furniture	7	Furniture industry
Manufacture of various types of cement	8	Cement industry
Manufacture of refractary ceramics	9	Ceramic industry
Inert treatment	10	Aggregates washing and crushing
Prefabricated concrete elements	11	Prefabricated concrete
Construction, Paving and road construction	12	Deployment and pavement
Manufacture of porcelain and non-refractory products	13	Ceramic industry
Manufacture of foam fabrics, mattresses and furniture	14	Foam Industry
Manufacture of metal structures (Doors, windows, etc.)	15	Metallic framewoks
Distribution of petroleum and its derivatives	16	Crude and its derivatives
Production and distribution of Water and electricity	17	Energy and water
Transportation and communication - maritime, road, air and auxiliary activities, Internet, mobile and advertising	18	Transport and communication
Hotel, catering, hospitals, garages, maintenance	19	Other services:

The basic data for the development of the Cabinda's input-output model were obtained through data from the National Statistics Institute and by complementary information provided by the consulted companies and institutions, such as the reports of the Ministry and Secretary of Industry, 2016.

The primary inputs are obtained through the residual method, under the fundamental relationship of the Leontief model, through the difference between the totals inputs and the intermediate inputs.

TABLE IV
CABINDA'S INDUSTRIES INTERACTIONS (USD MILLION, YEAR 2015)

	SALE FOR / BUY FOR	INPUTS 1	2	3	4	5	6	7	8	9	10	11	12	13
	1	12500	360	35	3780	45								
	2						2820							
	3								220		12000	2000	3000	65
	4				5100									
	5	12	8	5	12	4	6	1	3	0.5				0.1
	6							680						
	7	120												
	8													
INPUTS INTERMÉDIOS	9													
	10										160	6800	18000	
	11													
	12													
	13													
	14													
	15													
	16	800	518	1900	2500	16	1600	900	110	620	350	440	2100	85
	17	160			520	3	12	10	0.1	0.2	4	0.1	50	1.5
	18	210	22	2100	1900	300	78	45	5	12	112	65	800	15
	19	63	12	45	480	33	50	18	22	17	36	25	2800	14
TOTAL INTERMED INPUT		13865	920	4085	14292	401	4566	1654	360.1	649.7	12662	9330	26750	181
PRIMARY INPUT		44855	14315	24500	19990	304	884	276	2060	240	14828	1870	3250	409
TOTAL INPUTS		58720	15235	28585	34282	705	5450	1930	2420.1	889.7	27490	11200	30000	590

	Sale for / Buy for	INPUTS 15	16	17	18	19	Total Intermediate Demand	Final Demand	Total Output
	1		5800				22520	36200	58720
	2						2820	12415	15235
	3					45	17330	11255	28585
	4		7000				12100	22182	34282
	5	0.2	22			6	79.9	625	704,9
	6					210	890	4560	5450
	7						120	1810	1930
	8						0	2420	2420
INPUTS INTERMÉDIOS	9						0	890	890
	10						24960	2530	27490
	11						0	11200	11200
	12						0	30000	30000
	13						0	590	590
	14						0	380	380
	15						0	1900	1900
	16	360	3700	18000	15000	750	49802	35000	84802
	17	54	1500	152	2	22	2492.1	26000	28492.1
	18	450	7000	200	120	350	13929	12600	26529
	19	187	2660	1825	2322	1360	11980	5580	17560
TOTAL INTERMED INPUT		1051	27682	20177	17444	2743	159023	218137	377160
PRIMARY INPUT		849	57120	8315	9085	14737	218057		
TOTAL INPUTS		1900	84802	28492	26529	17480	377080		

TABLE V
TECHNICAL COEFFICIENTS RESULTS

	1	2	3	4	5	6	7	8	9	10
1	0.21280	0.02360	0.00120	0.11020	0.06380	0.00000	0.00000	0.00000	0.00000	0.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.51740	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.09090	0.00000	0.43650
4	0.00000	0.00000	0.00000	0.85130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00020	0.00050	0.00010	0.00030	0.99440	0.00110	0.00050	0.00120	0.00050	0.00000
6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.35230	0.00000	0.00000	0.00000
7	0.00200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.99420
11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
12	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
16	0.01360	0.03400	0.06640	0.07290	0.02260	0.29350	0.46630	0.04540	0.69660	0.01270
17	0.00270	0.00000	0.00000	0.01510	0.00420	0.00220	0.00510	0.00000	0.00020	0.00010
18	0.00350	0.00140	0.07340	0.05540	0.42550	0.01430	0.02330	0.00200	0.01340	0.00400
19	0.00100	0.00070	0.00150	0.01400	0.04680	0.00910	0.00930	0.00900	0.01910	0.00130

	11	12	13	14	15	16	17	18	19
1	0.00000	0.00000	0.00000	0.00000	0.00000	0.06830	0.00000	0.00000	0.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.17850	0.10000	0.11010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00250
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.08250	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00020	0.00010	0.00020	0.00000	0.00000	0.00030
6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.01200
7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
10	0.60710	0.60000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
12	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
16	0.03920	0.07000	0.14400	0.13940	0.18940	0.95640	0.63170	0.56540	0.04290
17	0.00000	0.00160	0.00250	0.00310	0.02840	0.01760	0.99470	0.00000	0.00120
18	0.00580	0.02660	0.02540	0.38150	0.23680	0.08250	0.00700	0.99550	0.02000
19	0.00220	0.09330	0.02370	0.02890	0.09840	0.03130	0.06400	0.00770	0.07780

TABLE VI
LEONTIEF'S MATRIX RESULTS

I	II	II	IV	V	VI	VII	VIII	IX	X
0.78720	-0.02360	-0.00120	-0.11020	-0.06380	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	1.00000	0.00000	0.00000	0.00000	-0.51740	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	-0.09090	0.00000	-0.43650
0.00000	0.00000	0.00000	0.85130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-0.00020	-0.00050	-0.00010	-0.00030	0.99440	-0.00110	-0.00050	-0.00120	-0.00050	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	-0.35230	0.00000	0.00000	0.00000
-0.00200	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.99420
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-0.01360	-0.03400	-0.06640	-0.07290	-0.02260	-0.29350	-0.46630	-0.04540	-0.69660	-0.01270
-0.00270	0.00000	0.00000	-0.01510	-0.00420	-0.00220	-0.00510	0.00000	-0.00020	-0.00010
-0.00350	-0.00140	-0.07340	-0.05540	-0.42550	-0.01430	-0.02330	-0.00200	-0.01340	-0.00400
-0.00100	-0.00070	-0.00150	-0.01400	-0.04680	-0.00910	-0.00930	-0.00900	-0.01910	-0.00130

XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX
0.00000	0.00000	0.00000	0.00000	0.00000	-0.06830	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-0.17850	-0.10000	-0.11010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00250
0.00000	0.00000	0.00000	0.00000	0.00000	-0.08250	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	-0.00020	-0.00010	-0.00020	0.00000	0.00000	-0.00030
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.01200
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-0.60710	-0.60000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000
-0.03920	-0.07000	-0.14400	-0.13940	-0.18940	0.95640	-0.63170	-0.56540	-0.04290
0.00000	-0.00160	-0.00250	-0.00310	-0.02840	-0.01760	0.99470	0.00000	-0.00120
-0.00580	-0.02660	-0.02540	-0.38150	-0.23680	-0.08250	-0.00700	0.99550	-0.02000
-0.00220	-0.09330	-0.02370	-0.02890	-0.09840	-0.03130	-0.06400	-0.00770	0.22200

TABLE VII
TECHNICAL COEFFICIENTS MATRIX RESULTS

	I	II	II	IV	V	VI	VII	VIII	IX	X
I	0.78720	-0.02360	-0.00120	-0.11020	-0.06380	0.00000	0.00000	0.00000	0.00000	0.00000
II	0.00000	1.00000	0.00000	0.00000	0.00000	-0.51740	0.00000	0.00000	0.00000	0.00000
II	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	-0.09090	0.00000	-0.43650
IV	0.00000	0.00000	0.00000	0.85130	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
V	-0.00020	-0.00050	-0.00010	-0.00030	0.99440	-0.00110	-0.00050	-0.00120	-0.00050	0.00000
VI	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	-0.35230	0.00000	0.00000	0.00000
VII	-0.00200	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000
VIII	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000
X	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000
XIX	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.99420
XI	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XII	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XIII	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XIV	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XV	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XVI	-0.01360	-0.03400	-0.06640	-0.07290	-0.02260	-0.29350	-0.46630	-0.04540	-0.69660	-0.01270
XVII	-0.00270	0.00000	0.00000	-0.01510	-0.00420	-0.00220	-0.00510	0.00000	-0.00020	-0.00010
XVIII	-0.00350	-0.00140	-0.07340	-0.05540	-0.42550	-0.01430	-0.02330	-0.00200	-0.01340	-0.00400
XIX	-0.00100	-0.00070	-0.00150	-0.01400	-0.04680	-0.00910	-0.00930	-0.00900	-0.01910	-0.00130

	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX
I	0.00000	0.00000	0.00000	0.00000	0.00000	-0.06830	0.00000	0.00000	0.00000
II	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
II	-0.17850	-0.10000	-0.11010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00250
IV	0.00000	0.00000	0.00000	0.00000	0.00000	-0.08250	0.00000	0.00000	0.00000
V	0.00000	0.00000	0.00000	-0.00020	-0.00010	-0.00020	0.00000	0.00000	-0.00030
VI	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.01200
VII	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
VIII	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
X	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XIX	-0.60710	-0.60000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XI	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XII	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XIII	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XIV	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000
XV	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000
XVI	-0.03920	-0.07000	-0.14400	-0.13940	-0.18940	0.95640	-0.63170	-0.56540	-0.04290
XVII	0.00000	-0.00160	-0.00250	-0.00310	-0.02840	-0.01760	0.99470	0.00000	-0.00120
XVIII	-0.00580	-0.02660	-0.02540	-0.38150	-0.23680	-0.08250	-0.00700	0.99550	-0.02000
XIX	-0.00220	-0.09330	-0.02370	-0.02890	-0.09840	-0.03130	-0.06400	-0.00770	0.22200

TABLE VIII
INTEGRATION AND DISPERSION COEFFICIENTS

Sectors	Upstream integration coefficients (Uj)	Downstream integration coefficients (Wi)	Scattering coefficients (P.j)
1-Agroindustry	0.2361	0.3835	0.6327
2-Forestry	0.0604	0.1858	0.6953
3-Extractive industry	0.1429	0.6063	0.6029
4-Food industry	0.4169	0.3429	0.8319
5-Paper Industry	0.5688	0.1133	1.0636
6-Sawmill	0.8379	0.1633	1.0191
7-Wood transformation	0.8570	0.0622	1.2579
8-Cement Industry	0.1488	0.0000	0.5918
9-Ceramic Industry (tiles)	0.7303	0.0000	1.0917
10-Aggregates wash and crusshing	0.4606	0.9081	0.7576
11- Concrete industry	0.8330	0.0000	1.0869
12- Asphast constrution	0.8917	0.0000	1.3038
13-Ceramic industry (home ware)	0.3068	0.0000	0.7420
14-Mattress industry	0.5532	0.0000	1.0239
15-Metallic frameworks	0.5532	0.0000	1.1256
16-Oil & gas industry	0.3264	0.5873	0.7977
17-Water and electricity	0.7082	0.0875	1.1492
18-Transp. and communication	0.6575	0.5250	0.9498
19 -Other services	0.1569	0.6853	2.4516

The Cabinda's industries interaction is presented in Table IV, it shows how the industries interrelation, in the sense that each one acquires products manufactured by others in order to carry out their own consumption.

To obtain the technical coefficients matrix it was used the data referenced in Table V. The Leontief's matrix results were obtained by using the formula **L= [I - A]** (Table VI). The technical coefficients matrix results are presented in Table VII.

Integration Coefficients Analysis

In the analysis of the matrix of inputs-outputs (Table IV), there are many empty spaces; this shows the lack of intersectoral interdependence of the companies in Cabinda.

When analyzing the lines that represents the sales, it is understood that the production share that each company sells to other sectors is weak; only three sectors have intersectoral sales of over 60%, namely the extractive industry (60.63%), aggregates washing and crushing (90.80%), and other services (68.54%).

The sectors with 0%, means that the totality of their production is destined for final consumption. In the case of the columns that translate purchases or provide information on the cost of production of each sector, this means that sector sales have an important role in the production costs of other sectors. As is the case of the wood industry (83.78%); cement industry (85.70%); tile industry (73.02%); concrete manufacture (83.30%); asphalting (89.17%), and water and energy (70.82%).

After analyzing the sectoral interdependencies, the degree of this interdependence for each sector was measured by calculating the integration coefficients upstream (Uj) and downstream (Wj) and the dispersion coefficients. The results are presented in Table VIII.

V. Conclusion

The obtained results demonstrated that Cabinda still does not have the necessary support for the basic industrial sectors, the few that exist have a precarious structure, for this reason the province is considered a high-risk market for foreign and domestic investments.

The process of diversifying Cabinda's economy should focus on the agro-industry as a stimulus for the basic industries. It is urgent that this sector appears as a priority sector, and that it can be coordinated with upstream and basic economic activities. This articulation would facilitate the creation of downstream activities. If the economic system of the province does not reflect this strategy, the production costs will be a barrier to investment, which could result in the loss of competitiveness in relation to other provinces. The public authorities and the private sector need to focus their attention on the need for industrial integration, to be able to diversify the economy and make it more robust in the face of economic crises caused by the instability of oil prices.

Acknowledgments

This work has been supported by the project Centro-01-0145-FEDER-000017 - EMaDeS - Energy, Materials and Sustainable Development, co-financed by the Portugal 2020 Program (PT 2020), within the Regional Operational Program of the Center (CENTRO 2020) and the European Union through the European Regional Development Fund (ERDF). The authors wish to thank the opportunity and financial support that permitted to carry on this project.

And C-MAST/ *Centre for Mechanical and Aerospace Science and Technologies*. project UID / EMS / 00151/2013 C-MAST, POCI-01-0145-FEDER-007718.

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