Democratic Republic of Congo

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1. Introduction

This succinct note describes how the input-output table of the Democratic Republic of Congo was transform into a GTAP format. Mainly three operations were done on the original input-output table in order to arrive to the GTAP submission: (1) complete missing data; (2) isolate of the extraction of energy sector (3) mapping. But before discussing detail we present the data sources.

2. Data Sources

The original dataset comes from the National Institutes of Statistics of the Democratic Republic of the Congo as constructed for the year 1987. The original input-output table comprises 37 sectors. Table 1 below gives the list of these sectors.

3. Data Manipulation

The original table separates domestics from imports data and gives detail on final demands for both. For a number of sectors, however, details on intermediate consumptions were missing and only the combined total for these sectors were available. In addition to the missing data, the Extraction of coal, minerals, Crude petroleum, and natural gas was reported as one sector putting together extraction of energy with that of other minerals together making the table incompatible with the GTAP requirements. These two issues are addressed as follows:

Intermediate Demand

For both table intermediate consumption from sector 1 through 19 were missing in the original data set. But having the total of the intermediate consumption for all these 19 sectors, it was possible to reasonably approximate the intermediate consumptions for each of these sectors using data for the national account for the same year (1987). Of course this leaves room for improvement.

Isolating Extraction of Energy Sector

The original input-output isolate the sector of oil refinery from other sector but extraction of energy is reported together with other minerals making the table incompatible with the GTAP. Here again we use a very simple approach to isolate the energy extraction sector using the weight of the extraction sector in the overall economy. In doing so we added to the original table one more sector bring the number of sectors to 38.

Table 1. The Congo Input-Output Original Sectors

N0	Full name of the original sector	Short name of the original sector
1	Agriculture- Silviculture Fishery	AGR
2	Extraction of coal, minerals, Crude petroleum, and natural gas	Crude_NatGas
3	Edible vegetable and animal oils and fats	Oils_Fats
4	Bakery – Confisserie and small business services	OthFoodProds
5	Sugar Industry	Sugar
6	Other food processing products	OFoodPProds
7	Beverage industry	BevInd
8	Tobacco and cigarettes	Tobacco_Cigs
9	Textiles (spinning,weaving and finishing of textiles)	TextilesEtc
10	Wearing apparel(except footwear)	Clothing
11	Footwear,leather	Footwear
12	Sawmilling and wood planing products	SawmillProds
13	Products of wood,straw and plaiting materials	WoodStrawPrd
14	Paper and paperboard products	PaperProds
15	painting products	PaintProds
16	Pharmaceutical products	Pharmaceutcl
17	Costimetic product	CosmetPrdos
18	Other chemical materials and products	OthChemPrd
19	Distribution of liquid gas and oil products	DistGas_Oil
20	Rubber industry	Rbb Industry
21	plastic products	PlstcPrd
22	Glass and glasswares	GlassProds
23	Production contruction material	ConstMatProds
24	Basic products of steel and iron and hardware	BasIronSteel
25	Metal products used in construction and manufacturing	MetlForIndCn
26	Industrial machinery	IndustMchnry
27	Manufacture of devices and supplies electriques	MAnElec
28	Other metal and	OthMetal
29	Motor vehicles,motorbike and bicycles	MotorVhicles
30	Other manufacturing products	OthManPrd
31	electricity, water and natural gas	ElecWater
32	Infranstructures and residential buildings	ResBuildings
33	Trade (wholesale and retail trade)	TradeWholRtl
34	transport(road,railway,air, water) and communication	FreightTransRoadP_AirTrn
35	Financial institutions,banking and insurance services	FinanclInst
36	Other business services	BusinessSvc
37	Non-business services	Non-BusinessSvc

4. Mapping

The mapping consisted of going from the OSEC (38 Original I-O Sectors) to SEC (28 sectors) and from the SEC to GSEC (57 GTAP sectors). The mapping is summarized in Table 2 below.

Table 2. Mapping

OSEC: Original IO Sectors		SEC	GSEC: GTAP sectors
AGR	1	OtherAg	pdr wht gro v_f c_b pfb ocr ctl oap rmk wol frs fsh
ExMin	2	omn	omn
Crude_NatGas	3	oil	coa oil gas
Oils_Fats	4	vol	vol
Sugar	5	sgr	sgr
OFoodPProds	6	ofd	cmt omt mil pcr ofd
Tobacco_Cigs BevInd	7	b_t	b_t
TextilesEtc	8	tex	tex
Clothing	9	wap	wap
Footwear	10	lea	lea
SawmillProds WoodStrawPrd	11	lum	lum
PaperProds	12	ppp	ppp
PaintProds Pharmaceutcl CosmetPrdos Rbb Industry PlstcPrd OthChemPrd	13	crp	crp
DistGas_Oil	14	p_c	p_c
GlassProds, ConstMaProds	15	nmm	nmm
BasIronSteel	16	i_s	i_s
MetlForIndCn	17	fmp	Fmp
IndustMchnry, MElectricity	18	ome	Ome
OthMetal	19	otn	Otn
MotorVhicles	20	mvh	Mvh
OthManPrd	21	efe	nfm ele omf
ElecWater	22	ely	ely gdt wtr
ResBuildings	23	cns	Cns
TradeWholRtl	24	trd	Trd
TransCom	25	otp	otp atp cmn wtp
FinanclInst	26	ofi	ofi isr
BusinessSvc	27	obs	obs dwe
NonBusSvc	28	osg	osg ros

Appendix: Methodological Dossier

This report aims at presenting the Input-Output (I-O) table for the Democratic Republic of Congo in 1987. The main objectives when constructing the I-O for the Democratic Republic of Congo were:

1. To assemble data on goods and services and present them in a coherence way in a table of uses and resources
2. Provide a clear picture of the structure of the Congolese economy in 1987 in order to lie down future economic plans

This report comprises two parts. The first part presents a detailed description of matrices in the I-O and their relationship. The second part presents different sources of data and discuses the methodology used.

I. General Structure of the Congolese I-O

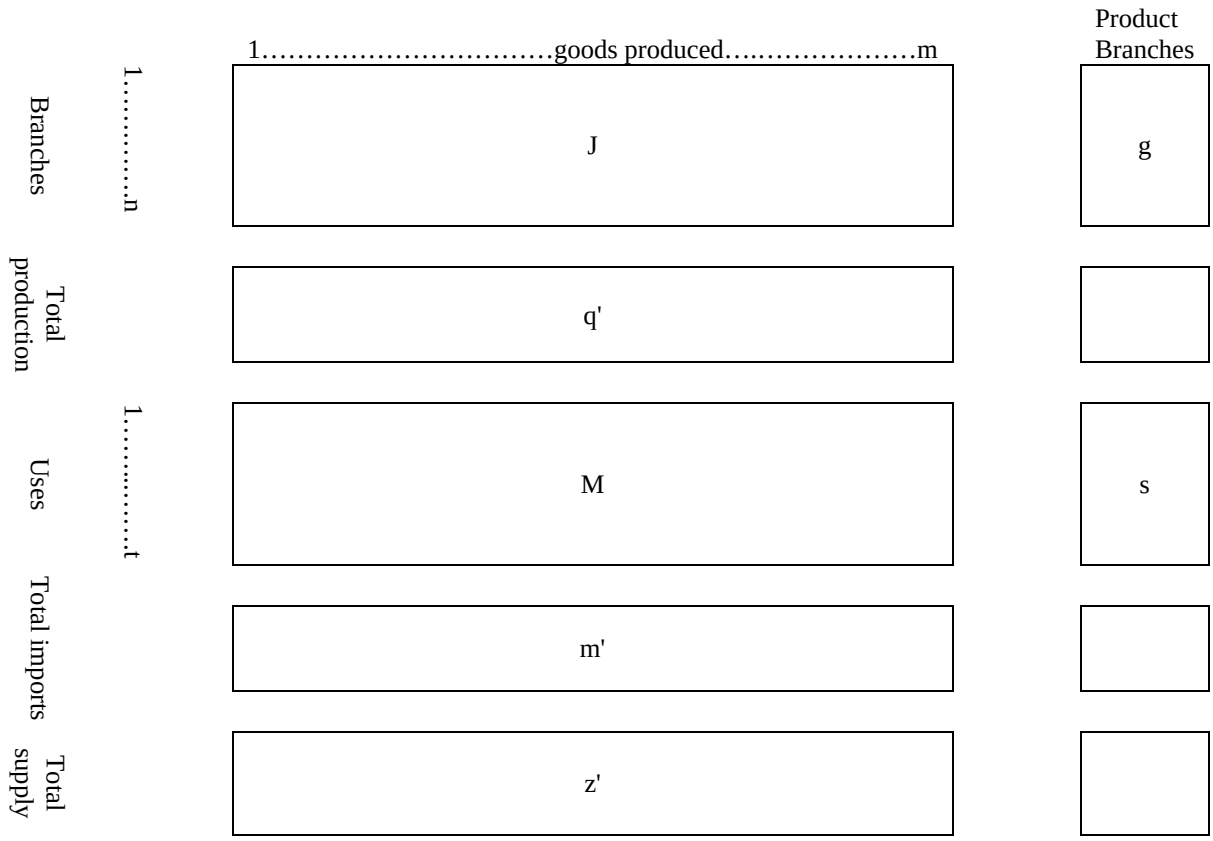
This I-O constitutes the detailed accounting of the Congolese economy. It helps recording the values of goods produced or imported and utilized in a national economy. It also reports the cost of producing or importing these goods.

To use efficiently the I-O one needs to understand the accounting rules that underlay its structure. For this reason we start by presenting the Congolese I-O schematically. The matrices are symbolized by capital letter and vectors by lower case letters.

Production and Supply

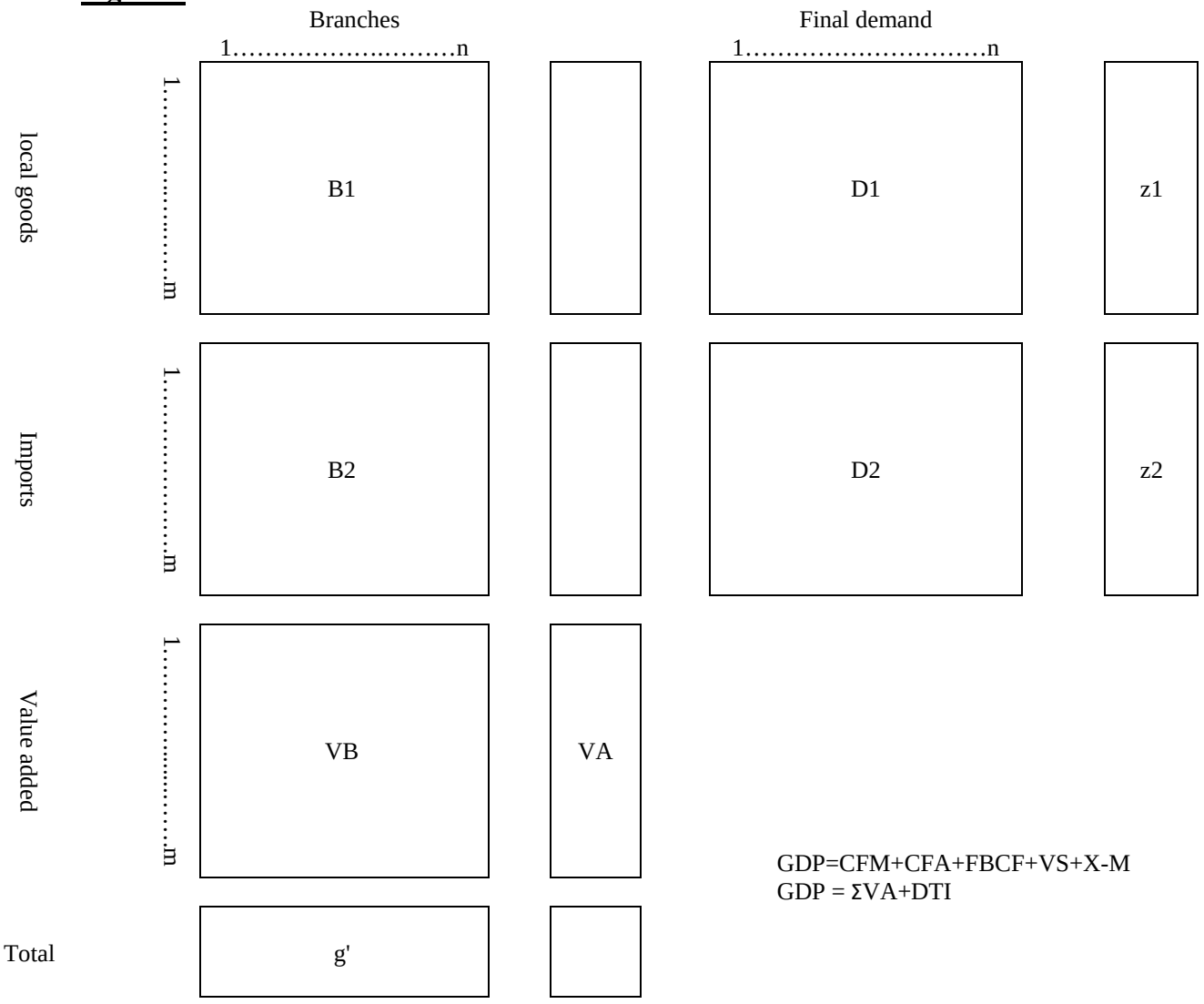
The most important elements for here are the J and M matrices (see Figure 1). All other variables, such as interior production q, production by sector g, total imports m, total supply z are defined in accordance matrices J and M. The Matrices J and M record total supply of goods and services produced locally or imported. The J matrix records production of goods and services of each sector. The values recorded represent the costs of production (sales taxes and excises taxes excluded). The matrix M records the imports by types of uses (final demand, intermediate consumptions, and equipment).

Figure 1.



The vectors q’ and g report the interior production and the production by sector. Each sector represents the value of production for the n businesses in the sector. The variable m’ represents the total imports. Values in m’ represent, each, the import of a particular good of the m products. The vector z’=q’+m’ represent the total supply for each of the m products. Finally s is column vector total import by type of uses**.**

Figure 2



Input-Demand

The key elements here are the matrices of flows B, D and VB (see Figure 2).

The matrices B1, B2, D1 and D2 record the uses of goods and services by different economic agents. The m×n matrices B1 and B2 represent the inputs of the m products into the n sectors. The total supply of each of the m products is given by the matrices J and M. The m×p matrices D1 and D2 represent the demand for each type of final use (households' consumption, government consumption, investment, Changes in Inventory STOCKS, and exports). The matrices indexed 1 represent local products; those indexed 2 represent imported products. The vector z represents the total final demand (consumption and final demand).

The k×n matrix VB corresponds to the k primary input for each of the n sectors. The primary inputs are represented by category of factor's revenue, net indirect taxes, and so on. The vector VA reports the total for the n branches. The line-vector g'represent the production of branches.

II. Sources and Methods

After we've described the principles underlying the construction the Input-Output tables, we present the methods used to prepare the table. In general to construct an Input-Output table the following steps are followed (assuming all other statistical and conceptual problems are solved):

1. Estimation of input and output for each sector
2. Estimation of intermediate and primary expenditures
3. Balance check for all final uses expenditure

But before going into detail of these steps here are a number of problems faced when classifying sectors. In the national accounting system, the production account is divided into four groups of agents or institutional sectors. These sectors are: production businesses, administration, households and the non-residents. The production businesses include agents producing goods and services in order to sell them at prices that allow covering the cost and eventually making benefits. The households comprise all transactions of final users. The administration, capture government's agencies transaction (taxes collection and government expenditures). These three sector do transactions among themselves and with the forth sector, the non-resident, that plays the role of balancing the accounts.

In the Input-Output, the production businesses sector is divided in branches that are defined according to International Standard Industrial Classification (ISIC). A branch comprises businesses that have the same main activity. In the administrations, establishments are classifying according to their functions. Government businesses are classified in the businesses sector in the appropriate branch.

The households are the finals users by definition. They don't produce any goods or services. But when people or families are involved in production process, the value of these productions and inputs are transferred to convenient branch in businesses sector; in some cases, those persons and families are considered as individuals businesses.

For the non-residents, there is a clear difference between establish residents (interiors) and non-establish residents (aliens), and between resident persons and non-residents.

Although Congolese interior productions come, mostly, from businesses established within the Congo, the GDP is equal to the income that come from primary production factor employed by the Congolese businesses whatever their country of residency. Exports are sales of goods and services to the non residents (aliens businesses and person non residents) to non-resident. And imports are whatever Congolese buy from the non-resident.

At an aggregate level, the system counts 38 (37 initially) sectors and 5 final demand categories. It counts, in addition, 4 primary inputs. The choice of sectors was done as follow:

a) Sectors that significantly contributes to the country's income were isolated
b) details are given to reflect the intersectorial structure
c) Sectors chosen to be relatively large.

ESTIMATION OF THE PRODUCTION

Primary sector

The data for the Agriculture sector are collected by the Service of Studies and Agricultural Planning (SEP). These data are analyzed and compare to the results of the 1985 household survey. The SEP provided gross quantities of agricultural productions. These are further manipulated to obtain the agricultural productions net of losses. The agricultural prices are considered in the form of farm-gate or producer prices. The prices are obtained from the National Institute of Statistics for a number of products including maize, beans, meats, fishery product, wood product, and so on. For products for which none of these prices is available, prices are estimated from the INS 1985 household survey.

Non-food agricultural products are evaluated at their export prices or as declared by the businesses. Noticed that transformed agricultural products such as Sawmilling and wood planning products, palm oil, and maize powder are not included in the primary sector. They are part of productions businesses.

Data for the extraction of minerals are collected and adjusted by the National Institution of Statistics (INS). The adjustment operated by the INS consisted of transferring an amount of 2152 millions Zaire intermediate consumption to labor. This amount represents transfer in nature to workers in the production of copper industry. Other adjustment consists of computing the value fob for copper. The volume of gold production is provided by the Gold Feelds Mineral Service London. Their export prices were provided by the IMF balance of payment. The volume and prices of diamonds extracted and exported are those published by the national company of diamond as well as other authorized exporter agencies of diamond in the countries.

The Secondary Sector

The main source of data for manufactures is the INS. They collected data them from the National Council for Business Accounting (CPCZ) and organized. These then are compared to other sources and adjusted when necessary.

The production of fat included production of the oils and tourteaux of the modern sector and the production of palm oil of the traditional sector. The first as well as the second, are evaluated by volume price equation.

Data for the sector of the flours of wheat and corn product are also provided by the SOBEMAP and CPCZ-INS. The bread production is calculated from intermediate consumptions of flour evaluate at 205,000 tons of flours. On this basis, the technical coefficient in volume implies a production of 246,000 tons of bread to the price of 33 Zaire a kilogram (8118 millions of Zaire's of production of bread).

As for the productions of beers, soft drinks and tobacco, they are evaluated by the volume price equation. Beers include alcoholics both from modern manufacturer and traditional production. The main source of estimation of the first type of product is the file CPCZ_INS, while the second is evaluated by extrapolation from the household survey.

The production of the industries of sawed wood is estimated from the results of the industrial survey (United Nations Industrial Development Organization) ONUDI. The results of these investigations indicate that the production of barks in 1987 is equals to 418.000m3 of which 306,000 are transformed on the spot. Their commercial value, by equivalent wood sawed, is equal to 3140 millions of Zaire. It supposes that the losses rate in volume applied to the barks is 40% and that the average price of the production of wood sawed is value at a margin rates of 30%.

The productions of the other manufacturing industries including chemical materials, paper, and rubber, buildings' construction materials, water, and of electricity in the modern sector are estimated by CPCZ-INS. The traditional sector data come from informal sector surveys.

The evaluation of the production of Infrastructure and Residential Building rests on the calculation of the intermediate consumptions of construction material carried out overall, and some other material such as cement, paint, wood and corrugated sheets. In fact, the structure of the technical coefficients of the branch of Infrastructure and Residential Building allows extrapolating the production from the value of the consumption in construction materials, according to the following formula:

Production =Intermediate consumption / technical coefficient

The technical coefficient for the Infrastructure and Residential Building has been determined by an INS survey in 1981. Results show that the intermediate consumption in Infrastructure and Residential Building constitutes 54% of the total production.

The Tertiary Sector

This sector is divided into 5 sub-sectors: commerce, transportation, financial service, and other business services non-business services.

The production of in commerce sector is equal to the commercial margins gain from the distribution of the products. This is regarded as a margin on distribution of goods transported, as well as on the transportation itself. In fact, the method of calculation used consist of determining the value of the global margins which are the divided into between transportation and trade margins.

The calculation of these rates of margin based on the differences in consumers' prices and producers' prices observed in the nine major cities of the country. The national rates of margins of each product are the weighted average of the cities margins. The margins in the rural area are extrapolated based on the mean level of the prices in rural areas weighted by the volume of rural consumption. Data from transportation activities are collected by SOBMAP and the central bank. An estimated rate of 11% of the total margins is affected to the distribution of goods.

Data for financial are collected, mainly, by the central bank and other financial institution such as the insurance national enterprise (SONAS). The production of the other merchant services is calculated by comparison of various sources. The total production is the sum of following services:

- Production of the services in informal sector as determined by the INS informal sector survey.
- Consumption of the real estate services determined by the household. In rural areas the consumption of real estate services is assumed to be proportional to the estimated cost of consumption. This is estimated be 1/6 of the consumption in the urban area.
- The production of hotel, restaurant and other services as collected by the CPCZ in 1986 and extrapolate in 1987;
- Production of the non-factors services exported obtained from the IMF.

The sector of the non-business services comprises services provided by the administrations and the domestic services to the households.