



arts & culture

Department:
Arts and Culture
REPUBLIC OF SOUTH AFRICA



south african
cultural observatory



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for tomorrow

**An inout-output model for
the cultural and creative
industries in South Africa and
possible extension.**

Submitted to the Department of Arts and Culture

MEASURING & VALUING SOUTH AFRICA'S CULTURAL & CREATIVE ECONOMY



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Summary

All government interventions have got a purpose and a goal. Interventions require resources which are scarce. It is therefore important for government to know which interventions are going to realise the best impact. In many cases, it is easy to estimate what the output is going to be. However, it is more difficult to estimate what the impact is going to be. As the old cliché goes “if you can’t measure it you can’t manage it”.

Although there is a good deal of data in South Africa, it is not always relevant to particular sectors. This is the case for the cultural and creative industries. The arts and culture sector is a particular challenge because it includes both intrinsic and extrinsic value. From a macroeconomic point of view extrinsic value includes economic growth, employment, poverty alleviation and equity as the most important measures to consider. The intrinsic value is very difficult to estimate. Estimating the extrinsic value, on the other hand, is hampered by the availability of data. Therefore, the data has to be estimated. This is best done using reliable available data. Using a model or economic system can facilitate this.

As part of the System of National Accounts, input output tables derived from supply and use tables are essential to ensure that the national estimates are correct. The input output tables are also useful to derive estimates of the expected socio-economic benefits that are to be derived from any government intervention.

This paper briefly discusses the history of input output tables, the System of National Accounts, the data that is available, and the methodology used to adapt the South African 2014 input output table into a South African cultural and creative industries input output table. It also includes the input output table in the appendix.

Estimating the anticipated impact of interventions is important to allocate scarce resources.

To estimate the impact, data and appropriate methods are necessary. There is a problem with comprehensive and accurate CCI data in South Africa.

The suitable model that can be used to estimate the anticipated impact is input output analysis. This measures both the forward and backward linkages in a systematic fashion.

There is no CCI input output table for South Africa. The table has therefore been constructed using the South African 2014 input output table and other available data sources. The constructed CCI input output table it is not aligned to the UNESCO classifications of CCIs (or any other CCI classification systems). This table can however be used to estimate the impact of various policies and interventions.

Key Findings

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- Estimating the anticipated impact of interventions is important to allocate scarce resources.
- To estimate the impact, data and appropriate methods are necessary. There is a problem with comprehensive and accurate CCI data in South Africa.
- The suitable model that can be used to estimate the anticipated impact is input output analysis. This measures both the forward and backward linkages in a systematic fashion.
- There is no CCI input output table for South Africa. The table has therefore been constructed using the South African 2014 input output table and other available data sources.
- The constructed CCI input output table it is not aligned to the UNESCO classifications of CCIs (or any other CCI classification systems).
- This table can however be used to estimate the impact of various policies and interventions.

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Table of Abbreviations

AFS	Annual Financial Statistics
CCI	Cultural and creative industries
CGE	Computable General Equilibrium
FTE	Full Time Equivalent
GDP	Gross domestic product
GTAP	Global Trade Analysis Project
GVA	Gross value added
IIOA	International Input-Output Association
IO	Input-output
ISIC	International Standard Industrial Classification
IT	Information technology
SAM	Social Accounting Matrices
SIC	Standard Industrial Classification
SNA	System of National Accounts
SUT	Supply and use tables
UN	United Nations

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1 Introduction

As the old cliché goes “if you can’t measure it you can’t manage it”. However, as Mohr et al. (2016, 2) put it “[d]ifferent people use different criteria to judge the performance of the economy. The criteria that are selected usually depend on the primary interest of the individual making the selection.” To ensure that there is “value for money”, the impact of policies must be measured. In the CCI environment in general and the arts in particular, both intrinsic and extrinsic value must be estimated to ensure the best “value for money”.

While intrinsic value is difficult to measure, extrinsic value has many components. From a macroeconomic point of view, extrinsic value includes economic growth, employment, poverty alleviation and equity as the most important measures to consider. Other elements such as trade are often included as well.

Besides the absolute values, relative values or indicators are also important. These indicators could include market share or growth rates. It may be important to see how a sector or area performs over time or how it compares to other regions. The relative geographic measure could include areas within a country or how a country performs relative to another country. Systems must, therefore, be developed that are relatively standard to enable comparison. The United Nations (UN) has developed a System of National Accounts (SNA) that is to all intents and purposes is used universally.

IO tables serve a similar function for national accounts as the “double-entry” system of bookkeeping does for enterprises. Double-entry accounting is the fundamental concept underlying present-day accounting because it ensures there is a balance and accuracy for business. **IO** tables ensure that national accounts are consistent¹. Like the **IO** table itself, national accounts are part of a double-entry accounting system for the economy. In the same way that firms use accounts to develop a consolidated income statement for the company, the economist uses income and product accounts to measure the performance of the economy and to compare the behaviour of parts of the economy against other standards. It can also be used in analysing the economic impact of cultural and creative industries in South Africa.

2 National Accounts

The SNA is used as an accounting system to measure many macroeconomic dimensions and is, used widely by governments’ statistics offices, central banks and treasuries. Unfortunately, much of the SNA has been developed for the analysis of traditional sectors. The sectors that have traditionally been incorporated in national accounts do not, for example, include tourism, information and communication technologies or the cultural and creative industries. This makes it harder to measure progress, develop appropriate policy or to measure its outcomes. However, in the past two decades, there has been considerable innovation and also a change of focus.

IO analysis has been around for over 80 years. It has been incorporated into the SNA. Researchers continued using these tools despite a waxing and waning of its popularity over this period. With improved availability and quality of national **IO** tables and Information technology (IT) capabilities, there is an increasing use of **IO** analysis in empirical studies. **IO** analysis is therefore both a useful description of the economy and a representation of a country’s national accounts.

The SNA has several familiar concepts. The gross domestic product (GDP) is perhaps the most popular economic indicator reported.

¹ This is discussed later.

2.1 Calculating the GDP

The GDP is the central concept in the national accounts. Simply put it is the monetary measure of the market value of all final goods and services produced in a country for a given period. The OECD (2017) defines it as “an aggregate measure of production equal to the sum of the gross value added of all residents and institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs).” However, there are three methods that are used to calculate the GDP:

1. The **production method** (this focuses on value-added during each manufacturing process);
 - o $\text{GDP} = \text{Output (at basic prices)} - \text{Intermediate consumption} + \text{Taxes less subsidies on products}$;
2. The **income method** (this focuses on the income and from the factors of production including rent, interest, wages and profit);
 - o $\text{GDP} = \text{Compensation of employees} + \text{gross operating surplus} + \text{other taxes less subsidies on production} + \text{taxes less subsidies on products}$; and
3. The **expenditure method** (this is the sum of final goods and services consumed an economy);
 - o $\text{GDP} = \text{Final consumption} + \text{Gross capital formation} + \text{Exports} - \text{Imports}$.

These three methods should all arrive at the same figure for the GDP and are discussed below.

2.2 Compiling Input-Output Tables

IO tables are compiled using supply and use tables (SUT). SUTs describe the whole economy by both industry and products. It shows links between components of gross value added (GVA), industry inputs and outputs, and product supply and use. It connects different institutional sectors of the economy together with imports, exports, final consumption expenditure (households, government, and non-profit institutions) and capital formation. It is however beyond the scope of this paper to describe how SUTs are compiled or how **IO** tables are derived from them.

For the transformation of SUTs into **IO** tables, various assumptions must be made based on Industry by Industry or Product by Product assumptions. Product by Product **IO** tables can be compiled using either the product technology assumption. It is assumed that each product is produced in its own specific way, irrespective of the industry where it is produced. On the other hand, Industry by Industry **IO** tables can be compiled using either the fixed industry sales structure assumption. Here each industry has its own particular sales structure, irrespective of its product mix. The South African **IO** tables based on the industry by industry assumption. [Sentence missing something].

2.3 Data Collected

As described above, the SUTs consist of both products and services. For practical reasons, not all products and services can be included individually, but rather grouped. Industries, for example, are grouped broadly into the primary, secondary, and tertiary sectors. These sectors are again subdivided into broad industry classifications. To ensure that there are consistent time series, these classifications did not change often. Indeed, they are based on historical factors, and the focus is on more traditional production. Therefore, even though data on the components of the CCIs are collected, they are generally aggregated with other more traditional sectors or industries.

The data collected is generally allocated to an industry using the Standard Industrial Classification (SIC). It was first used in the United States in 1937 and has subsequently been adapted and adopted internationally. The International Standard Industrial Classification (ISIC) is maintained by the UN and updated from time to time. South Africa has its own SIC based on the ISIC. The seventh edition of StatsSA's SIC of all Economic Activities is included in Appendix A. It

will notice that some industries contain distinct elements of CCIs. However, in other cases, it is harder to identify if there are any CCIs included in the industry.

2.4 IOs and the SNA

IO analysis is a powerful analytic tool. Many countries, including South Africa, use **IO** analysis to examine their national economies. **IO** analysis is generally not well-known outside the economics profession. Policymakers need to understand the structure of the economy to make sound policy decisions.

Most developed countries have very detailed **IO**s. They find it easier to identify creative sectors – but not comprehensively. Nevertheless, many of these (and other) countries are developing CCI satellite accounts of their national accounts to improve their policy-making. Unfortunately, South African **IO**s are generally not as detailed as many of the developed countries. This together with the fact that there are no South African CCI satellite accounts makes policy making difficult.

One solution that will assist policymakers is the *estimation* of an expanded **IO** that includes the CCIs. Even though the CCI **IO** is an estimation, it is based on actual data and well-based assumptions.

The next section discusses the structure of **IO**s, their history, South African **IO**s, the methodology used in estimating a South African CCI **IO**, the assumptions that are made, and the data that is used.

3 The Structure of an Economy and IO Tables

An **IO** is essentially a matrix that represents the national (or regional) economic accounting in a way that shows industries trade with one another and their production (in other words; the flow of goods and services). The **IO** analysis is the standard method for measuring the effects of changes in the final demand for a product of an industry or sector (Surugiu, 2009).

The complex economic structure of each sector of the economy has many dynamic variables, each of which is unique. Each sector has some impact on the economic performance of the CCIs as a whole. This relates to the inputs into CCIs (raw material, labour, technology and capital) and outputs of CCIs (such as inputs into other sectors that they use as intermediary products, trade and export). It is virtually impossible to determine these backward and forward linkages and their subsequent impacts using conventional cost and accounting systems. This is especially true when these are highly aggregated. The mass of data produced by these conventional systems is distilled into aggregated or averaged factors, upon which fundamentally important operational and investment decisions (both by private investors or firms and government) are based.

The way in which these **IO**s are compiled is influenced by history and convention. Frameworks and guidelines agreed to at various international forums, including the OECD and UN, are playing an increasingly important role how **IO**s are compiled. These, together with the history of **IO**s, are discussed below.

3.1 System of National Accounts

Over the years there have been many developments that have contributed to this understanding. Since the late 1940s, the UN has been working on developing a harmonised SNA that helps with the comparison of different economies. It is an internationally agreed set of recommendations on how to compile economic activity in a coherent, consistent and integrated manner to generate a set of national macroeconomic accounts. There are also internationally agreed concepts, classifications and accounting rules. The integration of an **IO** framework into the SNA was developed and published in 1968 by the UN. This framework ensures that all national accounts are balanced and that the three methods used to calculate the GDP are indeed aligned.

3.2 History and Background

3.2.1 The Physiocrats

However, the history of **IO** tables can be traced back to the Physiocrats. They were a group of French Enlightenment thinkers of the 1760s led by François Quesnay.

The origin of Physiocratic doctrine was the *Tableau Économique* (Quesnay, 1759). He diagrammed the relationship between the different economic classes and sectors of society and the flow of payments between them. Essentially the *Tableau Économique* was a descriptive device showing sales and purchase relationships among various producers and consumers in an economy. Through this, he developed the notion of economic equilibrium, a concept frequently used as a point of departure for subsequent economic analysis.

3.2.2 Wassily Leontief

Wassily Leontief developed the **IO** framework as both a theoretical and an applied economic tool. He constructed the first **IO** tables for the United States for the years 1919 and 1929. Leontief received the Nobel Prize for economic science in 1973. An economic model developed using **IO** analysis is generally referred to as a Leontief model. It is also called “interindustry analysis” because it analyses the independence of industries in an economy.

3.2.3 Richard Stone

Richard Stone, who also received a Nobel Prize for economic science in 1984, integrated the **IO** framework into the SNA.

These early **IOs** had only a few sectors. Computing power was limited, and this made analysis and computation very difficult. However, as technology has improved the number of sectors (both industries and products) has increased. Modern **IOs** are limited by the raw data available. This is collected using surveys which are expensive.

3.2.4 The International Input-Output Association

Founded in 1988, the International Input-Output Association (IIOA) grew out of an informal worldwide network of economists and others with interests in **IO** analysis. It is a scientific non-profit membership organisation with the objective of advancing knowledge in the field of input-output analysis, including improvements in basic data, theoretical insights and modelling, and applications, both traditional and novel, of **IO** techniques.

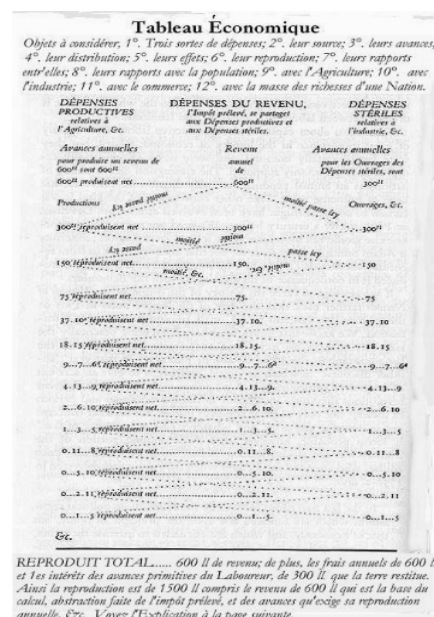
3.2.5 Social Accounting Matrices

Quesnay, Leontief and Stone’s concepts have been developed and refined. Stone played a pivotal role in developing Social Accounting Matrices (SAM). Simple **IOs** have been augmented with additional information (especially on households and employment).

4 A simple input-output framework

An **IO** table focuses on the interrelationship between industries in an economy with respect to the production and uses of their products and the products imported. Generally, the **IO** framework is

Figure 1: *Tableau Économique*



Source: Quesnay²

² <http://www.econlib.org/library/Enc/bios/Quesnay.html>,

represented in a table. In this form, the economy is viewed as each industry listed across the top is a consuming sector and down the side is a supplying sector.

Figure 2: Basic IO Transactions Table

		Producers as Consumers								Final Demand			
		Agric.	Mining	Const.	Manuf	Trade	Transp	Services	Other	Personal Consumption Expenditure	Gross Private Domestic Investment	Govt. Purchases of Goods and Services	Net Export of Goods and Services
Producers	Agriculture												
	Mining												
	Construction												
	Manufacturing												
	Trade												
	Transport												
	Services												
	Other Industry												
Value Added	Employees	Employee Compensation								Gross Domestic Product			
	Business Owners	Profit-type income and capital consumption allowance											
	Government	Indirect business taxes											

Source: Miller and Blair (2009, 3)

Although most industries will provide goods and services for final consumption, they will also provide inputs into the productive process of other industries. Besides buying inputs from other industries, producers need labour and capital to produce the goods and services. In addition, firms may receive subsidies or be required to pay taxes. In an open economy, companies would also import part of their input for production. The “recipe” for the manufacture of an industry’s products or services can be seen down each column.

Similarly, firms will produce products that will be used as inputs for the production in other industries. However, they will supply goods and services (final demand) for consumers, investors and government. They will also provide goods and services to foreign markets.

The **IO** table, as discussed above, therefore shows how the GDP for a country is calculated using the production method, the expenditure method and the income method. The table shown above includes only a few industries. Many **IO** tables have considerably more industries listed. However, the greater number of industries the more complex and complicated it becomes to “balance” the table, bearing in mind that the three methods used to calculate the GDP must arrive at the same value.

Although the table makes it easier to grasp the economic concepts behind the analysis, and **IO** model primarily consists of a system of linear equations. Each equation describes the distribution of an industry’s product throughout the economy.

Leontief introduced the assumption of fixed-coefficient linear production functions relating to input used by an industry. These matrices, including the F-matrix, is shown in figure 3.

Figure 3: a highly simplified IO accounting framework

	Industries	Net final demand	Total output
Industries	F	Y	X
Value added (Primary inputs)	V		
Total input	X		

Source: United Nations (1999, 4)

If we assume that there are only three industries present in an economy, Industry 1 would require inputs from Industry 2 and Industry 3 as well as from its own industry. Although the **IO** table which shows the actual amount used, it is more useful to assume how much of the other industries are required to make one unit. This is demonstrated by an example in the table below.

Table 1: IO flow table and accounts

	Industry 1	Industry 2	Industry 3	Final demand	Total output
Industry 1	0	20	45	35	100
Industry 2	30	0	30	140	200
Industry 3	0	80	0	70	150
Value added	70	100	75		
Total input	100	200	150		

Source: United Nations (1999)

The value-added row corresponds to the “V” matrix in the figure above. The shaded area refers to the “F” matrix above. The total input row is equal to the total output row and corresponds to matrix “X”.

Table 2: IO interindustry flows and value added

	Industry 1	Industry 2	Industry 3
Industry 1	0	20	45
Industry 2	30	0	30
Industry 3	0	80	0
Value added	70	100	75

When Leontief introduced the assumption that there are fixed-coefficient linear production functions relating to each industry, **IO** analysis became an economic tool. These fixed-coefficient linear functions relate the inputs used by an industry along each column to its output flow. In other words, for every one unit of an industries output, the fixed amount of input from other industries is required.

This is shown in the table below:

Table 3: IO coefficient table: inputs per unit of output

	Industry 1	Industry 2	Industry 3
Industry 1	0,00	0,10	0,30
Industry 2	0,30	0,00	0,20
Industry 3	0,00	0,80	0,00
Value added	0,70	0,50	0,50

This table can also be written in more general terms.

Table 4: IO coefficient table: inputs per unit of output

	Industry 1	Industry 2	Industry 3	Net final demand
Industry 1	a_{11}	a_{12}	a_{13}	Y_1
Industry 2	a_{21}	a_{22}	a_{23}	Y_2
Industry 3	a_{31}	a_{32}	a_{33}	Y_3
Value-added	V_1	V_2	V_3	

These relationships can be written as follows:

$$a_{11}X_1 + a_{12}X_2 + a_{13}X_3 + Y_1 = X_1$$

$$a_{21}X_1 + a_{22}X_2 + a_{23}X_3 + Y_2 = X_2$$

$$a_{31}X_1 + a_{32}X_2 + a_{33}X_3 + Y_3 = X_3$$

Equation 1

In matrix form these equations can be written as:

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \times \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} + \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix} = \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix}$$

Equation 2

However, in any economy, they are considerably more than three industries and the more general way of denoting these is as follows:

$$a_{11}X_1 + a_{12}X_2 + \dots + a_{1n}X_n + Y_1 = X_1$$

$$a_{21}X_1 + a_{22}X_2 + \dots + a_{2n}X_n + Y_2 = X_2$$

$$\cdot + \cdot + \dots + \cdot + \cdot = \cdot$$

$$a_{n1}X_1 + a_{n2}X_2 + \dots + a_{nn}X_n + Y_n = X_n$$

Equation 3

In matrix form, this is denoted as:

$$\begin{bmatrix} a_{11} & \dots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \dots & a_{nn} \end{bmatrix} \times \begin{bmatrix} X_1 \\ \vdots \\ X_n \end{bmatrix} + \begin{bmatrix} Y_1 \\ \vdots \\ Y_n \end{bmatrix} = \begin{bmatrix} X_1 \\ \vdots \\ X_n \end{bmatrix}$$

Equation 4

Table 5: Technical coefficients of an IO table (Matrix A)

		Buying sector				
		1	...	j	...	n
Selling sector	1	a_{11}	...	a_{1j}	...	a_{1n}
	:	:		:		:
	i	a_{i1}	...	a_{ij}	...	a_{in}
	:	:		:		:
	n	a_{n1}	...	a_{nj}	...	a_{nn}

Using matrix notation, it is usually written as:

$$AX + Y = X$$

Equation 5

This relationship is the basic **IO** system of equations, where:

- Matrix A is the **IO** coefficient matrix;
- Matrix X is the output vector; and
- Matrix Y is the net final demand vector.

The solution of an **IO** model is described in discussed below.

Final demand (Y) consists of the household, government and rest of the world sectors. Value-added (V) to the producing sector consists of the returns to factors of production (capital and labour) that receive interest and wages.

An **IO** table and associated model is generally constructed from observed data for a particular area. Most often this area refers to a nation. It could however also refer to subnational areas. The data are also collected for a given period of time, usually a year. Although theoretically, the **IO** table applies to units of production, this is impractical, and it is generally presented in monetary terms.

The discussion above referred to a closed economy and therefore did not include international trade (imports and exports). This is necessary because very few industries produce goods or services without using some imported components.

5 The Use of IO Tables

Equation 5 is very useful in that it is used to calculate the impact on an economy of particular shock. In other words, **IO** analysis can use to calculate the economic effects of exogenous changes in y (the net final demand vector). For example, the economic impact (in terms of industrial output, employment, and income) of a new sound stage for the production of motion pictures, in both the short- and long-term, on a particular (national or regional) economy.

Using equation 5, the impact of an exogenous shock is given by equations 6, 7 and 8. The model begins with a formula that states output is equal to final demand plus industry inputs:

$$x = y + F$$

Equation 6

Where

- x = output;
- y = final uses; and

- F = industry inputs.

To simplify the formula and enable algebraic manipulation, industry inputs are expressed in terms of portions of industry output by dividing industry inputs by industry output:

5.1 First Round Effects

The technical coefficients matrix(A) is derived by dividing interindustry transactions by output,

$$A = \frac{F}{x} \quad \text{Equation 7}$$

Where A is the coefficient matrix, and where each element is calculated as follows:

$$a_{ij} = \frac{f_{ij}}{x_j} \quad \text{Equation 8}$$

This formula is usually referred to as the direct coefficients or the direct requirements matrix.

Matrix A describes the direct, first round impact of any change in final demand. It shows how much input from sector *i* is used to produce the output of sector *j*.

5.2 Leontief Inverse Matrix

Rearranging the coefficient formula in terms of F gives:

$$Ax = F \quad \text{Equation 9}$$

Substituting for F in the equation 6 expresses the equation in similar terms:

$$x = Ax + y \quad \text{Equation 10}$$

The formula is rearranged to solve for y, in order to show the relationship between output and final uses. The formula is then solved to describe output as a function of final uses:

$$x - Ax = y \quad \text{Equation 11}$$

This formula can be simplified by applying the distributive rule:

$$(I - A)x = y \quad \text{Equation 12}$$

Where:

- I is an identity matrix.

The Leontief Inverse matrix is calculated when this is solved for production as a function of final demand. The model is solved for x in terms of y by dividing (I-A) into both sides of the equation. In matrix algebra, the division is accomplished by inverting the matrix. In **IO** terminology, the inverse—that is, the function that relates final uses to output—is referred to as the total requirements matrix:

$$x = (I - A)^{-1}y \quad \text{Equation 13}$$

For this model to be valid, it is assumed that:

- The structure of the economy does not change. This is particularly relevant for the production functions.
- The economy is well described with linear production functions. This is particularly relevant when considering changes in final demand.

These assumptions are defensible for assessments over short time spans and small changes in final demand, respectively. Another assumption is that the region is large enough to make imports by individuals insignificant.

$$L_{ij} = (I - A)^{-1} \quad \text{Equation 14}$$

Where $(I - A)^{-1}$ and L_{ij} are generally referred to as the Leontief Inverse matrix.

It is often referred to as a Type I inverse matrix and shows how much of each industry's output is needed, in terms of direct and indirect requirements to produce one unit of a given industry's output.

5.3 Leontief Inverse and Further Rounds of Impacts

A Type II inverse matrix that shows the induced requirements (in terms of industry's output) of a production of one unit of a given industry's output can also be calculated. It not only takes the direct and indirect requirements included in the Type I inverse matrix, but also the flows of money in and out of households and the effect this has on each industry.

A similar process is used to derive a Type II inverse matrix as the Type I inverse or Leontief matrix. However, it is necessary to include households in the analysis. These are treated as an additional industry by adding an extra row "compensation of employees" and column final "consumption expenditure by households" to the direct requirements matrix.

This is given by:

$$A = \begin{bmatrix} (A_{II})_{ij} & (A_{IH})_i \\ (A_{HI})_j & \end{bmatrix} \quad \text{Equation 15}$$

Where:

- $(A_{II})_{ij}$ is the Direct Requirements matrix A, or the amount of industry i required per unit of industry j is the amount of industry i required per unit of total household income from all sources;
- $(A_{IH})_i$ is the amount of industry i required per unit of total household income from all sources;
- $(A_{HI})_j$ is the income paid to households per unit of output of industry i (compensation of employees divided by the total output of the industry).

5.4 A brief note on Social Accounting Matrices

A SAM is a comprehensive, economy-wide data framework that contains systemised information about the flow of financial and economic aggregates between the different economic interest groups and institutions in an economy (i.e. business enterprises, households, government, etc.) on a logical basis during a given period of time – usually one calendar year. The SAM, therefore, makes it possible to clearly distinguish between these interest groups and their role in the economy, to research the effects of interaction between groups, and to measure how the economic/financial welfare of each group is affected. The SAMs are converted by economists into user-friendly macroeconomic impact models that can be used to calculate the economic impact of "interventions" of programmes and projects on the economy. (Conningarth, <http://conningarth.co.za/overview/> accessed September 18, 2017).

SAMs (in much the same way that IOs do), simplify the representation of the economy being modelled. SAMs are currently in widespread use, and many statistical bureaus, (particularly in OECD countries and South Africa), create both a national account and this matrix counterpart.

Table 6: Representation of a SAM³

	Firm	Household	Government	Rest of Economy	Net Investment	Total (Received)
Firm		C	G _F	(X-M) _K	I	C+G _F +(X-M) _K +I
Household	W		G _H	(X-M) _C		W+G _H +(X-M) _C
Government	T _F	T _H				T _F +T _H
Rest of Economy	(X-M) _K	(X-M) _C				(X-M) _K +(X-M) _C
Net Investment		S _H	S _G			S _H +S _G
Total (Expended)	W+T _F +(X-M) _K	C+T _H +(X-M) _C +S _H	G _F +G _H +S _G	(X-M) _C +(X-M) _K	I	

Once the SNA flows have been set up, other flows in the economy can be easily extended to include in SAMs simply by adding more columns and rows. Often rows for capital and labour are incorporated, and the economy can be disaggregated into many sectors. Each extra disaggregated source of funds must have an equal and opposite recipient. SAMs form the backbone of Computable General Equilibrium (CGE) Models and various types of empirical multiplier models.

6 South African IO Tables

A few **IO** tables for South Africa are available and have been constructed for different purposes.

6.1 StatsSA

The **IO** tables for South Africa for 2014 compiled and published by Statistics South Africa (Stats SA)⁴ is used to develop a CCI **IO**. The 2014 **IO** table provides an update to the previous **IO** tables for South Africa report. This **IO** table, the latest available, provides a symmetric framework, based on the SUT (SU-tables). This is used to construct direct and indirect coefficients. It presents an overview of the economy focusing on the inter-relations between industries, represented by a symmetric matrix which contains both supply and use data.

1. Table 1: An **IO** table at basic values, which was also known as a transaction or flow table. Table 1 reflected the value of transactions that took place between the various industries in monetary terms.
2. Table 2: The input coefficient or direct requirements table, which was derived from table 1. Table 2 showed all the direct requirements of each industry in relation to the total output of the industry.

³ Abbreviations: Capital letters: Taxes, Wages, iMports, eXports, Savings, Investment, Consumption, Government Transfer Subscripts: Firms, Households, Government, Consumption Goods, K: Capital Goods

⁴ The **IO** tables for South Africa are compiled and published by Stats SA according to a framework that was developed based on best practices from other countries and the statistical office of the European Communities (Eurostat). The **IO** tables were developed to complement the existing SU-tables and to provide a more complete representation of National Accounts data.

3. Table 3: An inverse coefficient or total requirements table, which in turn was derived from table 2. Table 3 showed the total requirements (direct and indirect) per rand of output delivered to final demand. By means of this table it was possible to calculate the impact of a change in final demand in the various industries.

Symmetric IO-tables or SU-tables

In national accounting and economic analysis, two kinds of **IO** tables are referred to Symmetric **IO** tables or SU-tables. The major differences between an **IO** table and SU-tables are:

- An **IO** table is a product by product or industry-by-industry matrix. An **IO** table rearranges both supply and use information in a single table, and either a product or an industry classification is used for both rows and columns.
- The SU-tables framework has two tables. The SU-tables are industry-by-product matrices, and both industry and commodity classifications are used. The SU-tables are often referred to as rectangular **IO** tables.

(Source: Gerhard Bouwer <https://www.iioa.org/conferences/14th/files/Bouwer.doc>)

6.2 Other South African IOs

A few **IO** tables have been constructed in South Africa for different purposes. For example, Quantec has developed a standardised economic dataset compiled by combining a standardised **IO** framework, spanning four decades, with a comprehensive set of industry and national accounts indicators. Conningarth Economists have developed a number of models based on standard **IO** analysis or the SAMs. They have also developed a number of regional IOs that have been used for sub-national socio-economic analysis.

6.3 International IOs

There are several initiatives aimed at compiling large-scale global multi-region **IO** tables. Global Trade Analysis Project (GTAP) has developed a database comprised primarily of **IO** tables. These **IO** tables are contributed by researchers across the world. GTAP is a global network of researchers and policy makers conducting a quantitative analysis of international policy issues. GTAP is coordinated by the Center for Global Trade Analysis in Purdue University's Department of Agricultural Economics. The focus of GTAP is on international trade.

The Eora multi-region **IO** database⁵ provides a time series of high-resolution **IO** tables with matching environmental and social satellite accounts for 187 countries. The focus is on sustainability issues including the environment, energy, water ,ecology, climate technology but also includessocio-economic factors.

The OECD/WTO Trade in Value Added database includes 61 economies covering OECD, EU28, G20, most East and South-east Asian economies and a selection of South American countries. The industry list includes 34 sectors, among which 16 manufacturing and 14 services sectors. The years covered are 1995, 2000, 2005 and 2008 to 2011.

The World **IO** Database⁶ has been developed to analyse the effects of globalisation on trade patterns, environmental pressures and socio-economic development across a broad set of countries. The database covers 27 EU countries and 13 other major countries in the world for the period from 1995 to 2009.

⁵ <http://worldmrio.com>

⁶ <http://www.wiod.org/database/>

7 Adapting the South African IO Table for the Cultural and Creative Industries

This section describes the methodology and data used to compile the South African CCI **IO** table.

7.1 Cultural and Creative Industries

The **IO** tables in South Africa are based on the SIC system. The UN has developed the ISIC that is used in the SNA. South Africa has adopted the SNA framework and is using an adapted version of the ISIC. Although the ISIC has modified over time and for various countries, CCIs are not specifically catered for. Fortunately, the SIC classification system is hierarchical. It is, therefore, possible to identify some CCI components within the broader SIC classifications. Unfortunately, it is not possible to identify all CCIs even at the most disaggregated levels. Therefore, even when a particular SIC classification is disaggregated to its lowest level, estimates have to be made regarding the proportion of CCI products and services that that particular industry produces.

Although the most accurate way to determine the CCI composition of each industry would be to undertake a census of the industry (or even a large sample survey), the cost of such an undertaking would be prohibitive. Estimates, therefore, must be made using available information. Where CCIs are identified within each industry (in other words where a subcategory refers to a CCI) the turnover, the total output, the net final demand or the value-added components could be used to apportion each industry. Where there is no CCI sub-industry classified, the proportion of creative workers (or the share of total salaries paid to creative workers) can be used.

In principle, the F-matrix should be split according to the turnover of CCI sub-industries. The value-added matrix, or the V-matrix, should be divided according to the returns of the factors of production (compensation or GVA). The Y-matrix, representing final demand, can be divided using either the total turnover or output or the proportion of CCI products and services purchased by households, government or exports.

The process of dividing the various industries is discussed in the three sections following a discussion on the sources of the data, below.

7.2 Source of the data

The **IO** table used is the one that is generated by StatsSA. This is done firstly, because it is produced and provided by South Africa's official statistics agency; and secondly, because other data sources provided by StatsSA are more aligned to the official **IO** table.

7.2.1 Annual Financial Statistics (AFS)

The AFS survey collects a range of financial statistics in respect of enterprises in the formal business sector of the South African economy. The purpose of the AFS is to derive a set of measures of industry performance based on information available from the financial accounts of enterprises. The AFS includes incomes items, inventory, expenditure items, profit/loss, tax and dividends, current assets, equity, non-current liabilities and current liabilities. Importantly turnover for each sector is included in the incomes items, net profit and employment costs. It is therefore convenient to use the 2014 AFS so that the data are more aligned to the StatsSA 2014 South African **IO**. (http://www.statssa.gov.za/?page_id=1854&PPN=P0021)

As discussed above, not all industry sectors have subcategories that include CCIs. In such cases, estimates have been based on the number of CCI employees as a percentage of total employees of the sector concerned. These data are based on the Quarterly Labour Force Survey (QLSF) 2014 (Quarter 3) provided by StatsSA.

7.3 Splitting the V-matrix (Input Requirements by Each Industry)

Before estimating each of the CCI technical coefficients, it is necessary to divide each cell in the matrix, F_{ij} , so that it represents the CCI components of those industries. Each cell is split, where applicable, into CCI and non-CCI components.

$$F_{iujv} = F_{ij} \times u \times v \quad \text{Equation 16}$$

where:

- F_{ij} = represents the requirements of industry i of industry j 's products prior to separating the CCI products from the non-CCI products;
- F_{iujv} = represents the new requirements of industry i of industry j 's products after separating the CCI products from the non-CCI products;
- u = The proportion of CCI output in the buying industry; and
- v = The proportion of CCI output in the selling industry.

Calculating the technical coefficients is done the same way as discussed above, i.e.:

$$x_{iujv} = \frac{F_{iujv}}{x_{iu}} \quad \text{Equation 17}$$

To keep it simple, the technical coefficients will be simply referred to as x_{ij} .

7.4 Splitting the Net Final Demand Matrix

A similar procedure to the one described above was followed to derive a new net final demand matrix, or Y-matrix. To keep the figures consistent, turnover figures from the AFS we used where possible, and estimates were made for the other sectors where this was not possible.

$$F_{iujv} = F_{ij} \times u \times v \quad \text{Equation 18}$$

where:

- F_{ij} = represents the requirements of industry i of industry j 's products prior to separating the CCI products from the non-CCI products;
- F_{iujv} = represents the new requirements of industry i of industry j 's products after separating the CCI products from the non-CCI products;
- u = The proportion of CCI output in the buying industry; and
- v = The proportion of CCI output in the selling industry.

7.5 Splitting the Value-Added Matrix

The value-added matrix, V-matrix, was split according to the net profit before providing for company tax and dividends (for the gross operating surplus row) and employee costs (for the compensation row).

$$F_{iujv} = F_{ij} \times u \times v \quad \text{Equation 19}$$

where:

- F_{ij} = represents the requirements of industry i of industry j 's products prior to separating the CCI products from the non-CCI products;
- F_{iujv} = represents the new requirements of industry i of industry j 's products after separating the CCI products from the non-CCI products;
- u = The proportion of CCI output in the buying industry; and
- v = The proportion of CCI output in the selling industry.

7.6 The New South African IO Table

A new South African **IO** table was derived using the methods described above giving an **IO** table comprising of 74 industries. With additional data, it would probably be possible to disaggregate further.

One disadvantage of the new **IO** table is the fact that it does not make provision for the informal sector. Since many CCIs are in the informal sector, this could be a problem if they were substantially different from the CCIs in the formal sector. It would be possible for the current 74 x 74 South African CCI **IO** to be further split into small, medium, and large enterprises⁷ with data from the AFS. Unfortunately, the sectors are not disaggregated enough to do this meaningfully.

8 Scenarios Using the South African CCI IO Table

This section describes the methods that the South Africa CCI **IO** can be used for.

8.1 Multipliers

8.1.1 Output Multiplier

The Type I output multiplier for a particular industry is defined as the total of all outputs from each domestic industry required in order to produce one additional unit of output: that is, the column sums (Σ_i) from the Type I Leontief Inverse matrix (L_{ij}). Similarly, the Type II output multiplier is given from the column sums of industry rows (i.e. exclude compensation of employees) from the Type II Leontief⁸.

Multiplying a change in final demand for an individual industry's output by that industry's Type I output multiplier will generate an estimate of direct + indirect impacts on output throughout the economy.

It is given by:

$$O_j = \sum_i L_{ij} \quad \text{Equation 20}$$

Where:

- O_j is the output multiplier;
- L_{ij} is the Leontief matrix.

Multiplying a change in final demand (direct impact) for an individual industry's output by that industry's Type II output multiplier will generate an estimate of direct + indirect + induced impacts on output throughout the economy.

8.1.2 Income Multiplier

The income multiplier shows the increase in income from employment (compensation) or c – that result from a change of R1 of income from employment in each industry.

$$I_j = \sum_i v_i L_{ij} / v_j \quad \text{Equation 21}$$

Where:

- I_j is the income multiplier;
- L_{ij} is the income multiplier;
- v_i refers to the ratio of income from employment /total output for each industry. (This is the last row in the augmented Direct Requirements matrix);

⁷ According to the National Small Business Amendment Act, 2004.

⁸ This paper only focuses on Type 1 multipliers

- L_{ij} is the Leontief matrix.

The multipliers show the ratio of direct plus indirect (plus induced if Type II multipliers are used) income changes to the direct income change.

8.1.3 Income Effects

Income effects show the impact on income from employment throughout the economy arising from a unit increase in final demand for industry j 's output.

$$IE_j = \sum_i v_i L_{ij} \quad \text{Equation 22}$$

Where:

- IE_j represents the Income effects;
- L_{ij} is the income multiplier;
- v_i refers to the ratio of income from employment /total output for each industry.

8.1.4 Employment

The employment multipliers show the total increases in employment throughout the economy resulting from an increase in final demand which is enough to create one additional Full-Time Equivalent (FTE) employment in that industry. In the formula above, 'w' is equal to FTE per rand of total output for each industry.

$$E_j = \sum_i w_i L_{ij} / w_j \quad \text{Equation 23}$$

Where:

- E_{ij} is the employment multiplier;
- w_i refers to the is equal to FTE per R of total output for each industry;
- L_{ij} is the Leontief matrix.

9 Conclusion

This paper has described the history and the uses of input-output analysis. It is also highlighted the problems, especially the data problems, that exist in compiling an input-output table for the creative and cultural industries. Notwithstanding the problems, and input-output table has been created based on many assumptions discussed above.

The table comprises of 76 industrial sectors. It is reproduced in full in Appendix C with the intermediate inputs, the value added and the final demand⁹. This can now be used to build an econometric model of South Africa's CCIs to estimate the impact of various interventions on the broader South African economy, given the assumptions discussed above.

The CCI Input Output Table does, however, require more information to include information at more granular levels. This information should be collected during various surveys and particularly the CCI Mapping projects.

⁹ It is also available in a Excel ® spreadsheet from SACO on request.

Appendix A: Standard Industrial Classification of all Economic Activities (SIC) Seventh Edition¹⁰

Section A: Agriculture, forestry and fishing

Division 01 Crop and animal production, hunting and related service activities

Division 02 Forestry and logging

Division 03 Fishing and aquaculture

Section B: Mining and quarrying

Division 05 Mining of coal and lignite

Division 06 Extraction of crude petroleum and natural gas

Division 07 Mining of metal ores

Division 08 Other mining and quarrying

Division 09 Mining support service activities

Section C: Manufacturing

Division 10 Manufacture of food products

Division 11 Manufacture of beverages

Division 12 Manufacture of tobacco products

Division 13 Manufacture of textiles

Division 14 Manufacture of wearing apparel

Division 15 Manufacture of leather and related products

Division 16 Manufacture of wood and of products of wood and cork, except furniture;
Manufacture of articles of straw and plaiting materials

Division 17 Manufacture of paper and paper products

Division 18 Printing and reproduction of recorded media

Division 19 Manufacture of coke and refined petroleum products

Division 20 Manufacture of chemicals and chemical products

Division 21 Manufacture of basic pharmaceutical products and pharmaceutical preparations

Division 22 Manufacture of rubber and plastics products

Division 23 Manufacture of other non-metallic mineral products

Division 24 Manufacture of basic metals

Division 25 Manufacture of fabricated metal products, except machinery and equipment

Division 26 Manufacture of computer, electronic and optical products

Division 27 Manufacture of electrical equipment

Division 28 Manufacture of machinery and equipment nec

Division 29 Manufacture of motor vehicles, trailers and semi-trailers

Division 30 Manufacture of other transport equipment

¹⁰ http://www.statssa.gov.za/classifications/codelistlists/Web_SIC7a/SIC_7_Final_Manual_Errata.pdf

Division 31 Manufacture of furniture

Division 32 Other manufacturing

Division 33 Repair and installation of machinery and equipment

Section D: Electricity, gas, steam and air conditioning supply

Division 35 Electricity, gas, steam and air conditioning supply

Section E: Water supply; sewerage, waste management and remediation activities

Division 36 Water collection, treatment and supply

Division 37 Sewerage

Division 38 Waste collection, treatment and disposal activities; materials recovery

Division 39 Remediation activities and other waste management services

Section F: Construction

Division 41 Construction of buildings

Division 42 Civil engineering

Division 43 Specialised construction activities

Section G: Wholesale and retail trade; repair of motor vehicles and motorcycles

Division 45 Wholesale and retail trade and repair of motor vehicles and motorcycles

Division 46 Wholesale trade, except of motor vehicles and motorcycles

Division 47 Retail trade, except for motor vehicles and motorcycles

Section H: Transportation and storage

Division 49: Land transport and transport via pipelines

Division 50: Water transport

Division 51: Air transport

Division 52: Warehousing and support activities for transportation

Division 53: Postal and courier activities

Section I: Accommodation and food service activities

Division 55: Accommodation

Division 56: Food and beverage service activities

Section J: Information and communication

Division 58 Publishing activities

Division 59 Motion picture, video and television programme production, sound recording and music publishing activities

Division 60 Programming and broadcasting activities

Division 61: Telecommunications

Division 62: Computer programming, consultancy and related activities

Division 63: Information service activities

Section K: Financial and insurance activities

Division 64 Financial service activities, except insurance and pension funding

Division 65 Insurance, reinsurance and pension funding, except compulsory social security

Division 66 Activities auxiliary to financial service and insurance activities

Section L: Real estate activities

Division 68 Real estate activities

Section M: Professional, scientific and technical activities

Division 69 Legal and accounting activities

Division 70 Activities of head offices; management consultancy activities

Division 71 Architectural and engineering activities; technical testing and analysis

Division 72 Scientific research and development

Division 73 Advertising and market research

Division 74 Other professional, scientific and technical activities

Division 75 Veterinary activities

Section N: Administrative and support activities

Division 77 Rental and leasing activities

Division 78 Employment activities

Division 79: Travel agency, tour operator, reservation service and related activities

Division 80 Security and investigation activities

Division 81 Services to buildings and landscape activities

Division 82 Office administrative, office support and other business support activities

Section O: Public administration and defence; compulsory social security

Division 84 Public administration and defence; compulsory social security

Section P: Education

Division 85 Education

Section Q: Human health and social work activities

Division 86 Human health activities

Division 87 Residential care activities

Division 88 Social work activities without accommodation

Section R Arts, entertainment and recreation

Division 90 Creative, arts and entertainment activities

Division 91 Libraries, archives, museums and other cultural activities

Division 92 Gambling and betting activities

Division 93 Sports activities and amusement and recreation activities

Section S: Other service activities

Division 94 Activities of membership organisations

Division 95: Repair of computers and personal and household goods

Division 96 Other personal service activities

Section T: Activities of households as employers; undifferentiated goods-and services-producing activities of households for own use

Division 97 Activities of households as employers of domestic personnel

Division 98 Undifferentiated goods-and services-producing activities of private households for own use

Appendix B: List of Dimensions Included in the AFS Survey 2014 Revised Estimates

Income items

- Turnover;
- Dividends;
- Government subsidies and incentives;
- Capital transfers received from government;
- Interest;
- Profit on financial and other assets: disposal of assets, realisation for cash and revaluation of assets;
- Profit on financial and other liabilities: redemption, liquidation and revaluation of liabilities;
- Profit on foreign transactions resulting from changes in foreign exchange rates;
- Provisions;
- Research and development;
- Royalties, franchise fees, copyright, trade names, trademarks and patent rights;
- Other;
- Total income.

Inventories

- Opening value of raw materials;
- Opening value of work in progress;
- Opening value of finished goods;
- Total opening value;
- Closing value of raw materials;
- Closing value of work in progress;
- Closing value of finished goods;
- Total closing value.

Expenditure items

- Purchases;
- Advertising;
- Amortisation;
- Bank charges;
- Bursaries;
- Computer expenses;
- Containers and packaging materials;
- Depreciation;
- Employment cost.

Expenditure items

- Excise and customs duty;
- IT security services;
- Insurance premiums;
- Interest;
- Losses on foreign transactions resulting from changes in foreign exchange rates;
- Losses on financial and other liabilities: redemption, liquidation and revaluation of liabilities;
- Losses on financial and other assets: disposal of assets, realisation for cash and revaluation of assets;
- Mineral rights leased;
- Motor vehicle running expenses;

- Operational leasing and hiring of plant, machinery, equipment and vehicles;
- Paper, printing and stationery;
- Postal and courier services;
- Property tax;
- Provisions;
- Railage and transport-out;
- Rental of land, buildings and other structures including water and electricity;
- Repair and maintenance;
- Research and development;
- Royalties, franchise fees, copyright, trade names, trademarks and patent rights;
- Security services;
- Staff training;
- Subcontractors;
- Telecommunication services;
- Travelling, accommodation and entertainment;
- Other.

Total expenditure

- Profit/loss, tax and dividends;
- Net profit before providing for company tax and dividends;
- Company tax paid or provided for during the financial year;
- Dividends paid or provided for during the financial year;
- Net profit after providing for company tax and dividends.

Non-current assets

- Property, plant and equipment and intangible assets;
- Long-term investments;
- Other non-current assets;
- Total non-current assets.

Current assets

- Trade and other receivables;
- Cash and cash equivalents;
- Inventory;
- Other current assets;
- Total current assets;
- Total assets.

Equity

- Total equity

Non-current liabilities

- Long-term loans;
- Other non-current liabilities;
- Total non-current liabilities.

Current liabilities

- Trade and other payables;
- Bank overdraft;
- Other current liabilities;
- Total current liabilities;
- Total equity and liabilities.

PPE

- Carrying value of property, plant and equipment and intangible assets at the end of the financial year

Appendix C: A South African Input Output Table

		Agriculture, forestry and fishing [1]	Coal mining [21]	Gold and uranium ore mining [23]	Other mining [22/24/25/29]	Food [301-304]	Beverages & tobacco [305-306]	Textiles [311-312]	Textile design	Wearing apparel [313-315]	Clothing design	Leather and leather products [316]	Accessory design	Footwear [317]
		100%	100%	100%	100%	100%	100%	99%	1%	99%	1%	99%	1%	100%
Agric	100%	5286	30	21	15	71679	10877	1037	10	19	0	4	0	73
Coal	100%	16	9	76	2150	684	167	158	2	11	0	30	0	0
Gold	100%	0	0	0	0	0	0	0	0	0	0	0	0	0
Omin	100%	1603	232	188	364	455	5	12	0	1	0	5	0	0
Food	100%	9032	4	3	7	20335	2484	14	0	3	0	1321	13	93
Bevs & tob	100%	0	19	12	6	221	3821	0	0	0	0	0	0	0
Textile	99%	880	48	53	134	219	26	3895	39	5144	52	42	0	215
Tex design	1%	9	0	1	1	2	0	39	0	52	1	0	0	2
Cloth	99%	0	87	73	159	72	42	10	0	5	0	3	0	3
Cloth design	1%	0	1	1	2	1	0	0	0	0	0	0	0	0
Leather	99%	0	19	5	17	6	0	24	0	105	1	343	3	1460
Accessory design	1%	0	0	0	0	0	0	0	0	1	0	3	0	15
Footwear	100%	0	11	17	87	4	0	1	0	0	0	1	0	312
wood products	100%	965	153	2205	680	115	316	19	0	4	0	7	0	27
Paper	100%	674	59	45	186	2180	4008	170	2	45	0	5	0	101
Publishing	12%	1	2	1	5	34	29	2	0	9	0	0	0	2
Newspapers	38%	3	5	4	18	111	95	5	0	30	0	1	0	6
Music	1%	0	0	0	0	2	2	0	0	1	0	0	0	0
Printing	47%	4	7	5	22	137	118	6	0	37	0	1	0	8
Printing services	1%	0	0	0	1	4	3	0	0	1	0	0	0	0
Reproduction	2%	0	0	0	1	6	6	0	0	2	0	0	0	0
Petroleum	100%	6437	776	214	2522	1122	257	135	1	30	0	9	0	15
Basic chemicals	100%	9359	227	580	1361	1026	518	803	8	26	0	237	2	9
O chemicals	100%	1734	1326	947	4043	837	59	1815	18	137	1	168	2	313
Rubber	100%	265	723	177	1165	21	2	25	0	8	0	0	0	27
Plastic	100%	293	203	130	366	3244	1001	368	4	117	1	25	0	219
Glass	100%	14	27	18	47	745	1342	104	1	3	0	1	0	1
Non-refractory ceramic ware	2%	12	9	10	16	2	0	0	0	0	0	0	0	0
Refractory ceramic products	5%	26	19	21	34	4	1	1	0	0	0	0	0	0
Non-refractory ceramic products	11%	60	44	49	80	8	2	1	0	1	0	0	0	0
Cement	32%	177	129	145	235	24	5	4	0	2	0	1	0	1
Articles of concrete	42%	237	173	194	315	32	7	5	0	2	0	1	0	2
Stone products	2%	11	8	9	14	1	0	0	0	0	0	0	0	0
Other non-metallic mineral products	7%	37	27	30	49	5	1	1	0	0	0	0	0	0
Basic ferrous	100%	97	104	221	535	42	8	33	0	6	0	5	0	6

		Agriculture, forestry and fishing [1]	Coal mining [21]	Gold and uranium ore mining [23]	Other mining [22/24/25/29]	Food [301-304]	Beverages & tobacco [305-306]	Textiles [311-312]	Textile design	Wearing apparel [313-315]	Clothing design	Leather and leather products [316]	Accessory design	Footwear [317]
Basic non-ferrous	100%	14	14	53	77	89	3	3	0	4	0	1	0	1
Metal products	100%	988	1081	928	2644	1562	2202	173	2	435	4	31	0	35
Machinery	100%	495	379	241	1068	191	45	57	1	13	0	5	0	5
Electrical machinery	100%	102	407	173	600	8	3	3	0	2	0	0	0	0
Communication equipment	100%	0	7	2	8	0	0	0	0	0	0	0	0	0
Scientific equip	100%	0	9	7	21	0	0	0	0	0	0	0	0	0
Motor vehicles	100%	1144	389	33	858	308	24	38	0	6	0	1	0	3
Other transport	100%	212	38	176	394	0	0	0	0	0	0	0	0	0
Furniture	100%	0	4	4	18	13	1	1	0	0	0	0	0	2
Jewellery	50%	2	8	7	10	21	5	24	0	36	0	8	0	7
Sports goods	2%	0	0	0	0	1	0	1	0	1	0	0	0	0
Games and toys	3%	0	1	0	1	1	0	1	0	2	0	0	0	0
Musical instruments	46%	2	8	6	9	20	5	22	0	33	0	7	0	7
Electricity	100%	2023	1610	4343	7848	2776	692	653	7	138	1	66	1	47
Water	100%	1082	110	320	2095	622	614	180	2	18	0	8	0	5
Construction	100%	829	264	242	891	9	1	2	0	0	0	1	0	0
Trade	100%	13799	3140	1807	8522	27561	9548	3129	32	2872	29	1106	11	1000
Catering and accommodation	100%	16	0	0	0	21	4	4	0	1	0	0	0	0
Logistics	100%	15457	18557	393	86994	7407	1101	537	5	332	3	124	1	142
Communication	100%	29	78	50	437	558	217	148	1	132	1	18	0	31
Finance	100%	3690	514	157	1787	3227	1453	472	5	602	6	71	1	129
Business services	74%	204	1595	1861	4499	11439	5176	1966	20	1517	15	265	3	366
Photographic activities	0%	0	2	3	7	17	8	3	0	2	0	0	0	1
General research	0%	1	5	6	15	38	17	6	0	5	0	1	0	1
Hardware consultancy	0%	1	9	11	26	65	29	11	0	9	0	2	0	2
Advertising	3%	9	73	85	206	524	237	90	1	69	1	12	0	17
Architectural	11%	30	231	270	652	1658	750	285	3	220	2	38	0	53
Software consultancy	11%	32	248	289	700	1779	805	306	3	236	2	41	0	57
Medical	100%	4484	0	0	0	7	0	0	0	0	0	0	0	0
Other community services	70%	299	965	683	3347	3230	1785	461	5	509	5	83	1	99
Dramatic arts, music	0%	2	6	4	21	20	11	3	0	3	0	1	0	1
Other entertainment activities	1%	3	9	6	30	29	16	4	0	5	0	1	0	1
Library archives museum	1%	5	15	10	51	49	27	7	0	8	0	1	0	2
Motion picture projection	2%	7	23	17	81	78	43	11	0	12	0	2	0	2
Motion picture production	2%	10	33	23	114	110	61	16	0	17	0	3	0	3
Radio and television activities	5%	22	71	50	246	237	131	34	0	37	0	6	0	7

[illegible]

	Wood and wood products [321-322]	Paper and paper products [323] publishing of books, brochures, musical books and other publications SIC 3241	Publishing of newspapers, journals and periodicals SIC 3242	Publishing of recorded music; other publishing SIC 3243, 3249	Printing SIC 3251	Service activities related to printing SIC 3252	Reproduction of recorded media SIC 3260	Coke and refined petroleum products [331- 333]	Basic chemicals [334]	Other chemicals and man- made fibers [335-336]	Rubber products [337]	Plastic products [338]	Glass and glass products [341]	
	100%	100%	12%	38%	1%	47%	1%	2%	100%	100%	100%	100%	100%	
Agric	4734	3232	2	7	0	8	0	0	3	96	562	839	81	2
Coal	50	571	1	2	0	2	0	0	5827	165	352	172	14	19
Gold	0	0	0	0	0	0	0	0	68	0	0	0	0	14
Omin	15	764	0	1	0	1	0	0	43647	18880	2162	25	247	1122
Food	5	251	0	1	0	1	0	0	4	289	518	4	19	24
Bevs & tob	0	0	0	0	0	0	0	0	0	3	1	0	0	0
Textile	9	19	5	15	0	19	1	1	19	9	65	370	105	0
Tex design	0	0	0	0	0	0	0	0	0	1	4	1	0	0
Cloth	26	45	48	155	3	191	5	9	8	38	63	4	23	13
Cloth design	0	0	0	2	0	2	0	0	0	0	1	0	0	0
Leather	0	0	0	1	0	1	0	0	0	0	0	47	0	0
Accessory design	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Footwear	0	0	0	0	0	0	0	0	0	0	0	0	0	0
wood products	9120	2293	2	6	0	7	0	0	11	176	71	11	148	54
Paper	604	14158	951	3068	64	3794	103	179	18	57	545	76	299	98
Publishing	1	1	29	95	2	118	3	6	1	3	1	2	3	1
Newspapers	3	4	95	307	6	379	10	18	3	11	3	6	11	2
Music	0	0	2	6	0	8	0	0	0	0	0	0	0	0
Printing	3	5	118	379	8	469	13	22	3	14	4	8	14	2
Printing services	0	0	3	10	0	13	0	1	0	0	0	0	0	0
Reproduction	0	0	6	18	0	22	1	1	0	1	0	1	1	0
Petroleum	140	319	8	27	1	33	1	2	1402	1104	2827	282	169	72
Basic chemicals	433	1818	4	12	0	15	0	1	745	10428	9864	984	607	86
Ochemicals	449	2627	132	425	9	526	14	25	92	704	9855	1588	4824	129
Rubber	4	20	5	15	0	18	0	1	1	0	133	100	3	0
Plastic	84	1077	39	127	3	157	4	7	49	954	3300	85	2178	103
Glass	71	4	0	1	0	2	0	0	12	7	430	57	229	748
Non-refractory ceramic ware	0	0	0	0	0	0	0	0	1	0	1	0	1	0
Refractory ceramic products	0	0	0	0	0	0	0	0	2	1	2	1	2	0
Non-refractory ceramic products	1	1	0	0	0	0	0	0	4	2	4	2	5	0
Cement	2	2	0	1	0	1	0	0	12	6	13	6	15	1
Articles of concrete	3	2	0	1	0	1	0	0	16	8	17	8	20	1
Stone products	0	0	0	0	0	0	0	0	1	0	1	0	1	0
Other non-metallic mineral products	1	0	0	0	0	0	0	0	2	1	3	1	3	0
Basic ferrous	74	13	4	13	0	16	0	1	5	18	48	156	91	2

	Wood and wood products [321-322]	Paper and paper products [323] publishing of books, brochures, musical books and other publications SIC 3241	Publishing of newspapers, journals and periodicals SIC 3242	Publishing of recorded music; other publishing SIC 3243, 3249	Printing SIC 3251	Service activities related to printing SIC 3252	Reproduction of recorded media SIC 3260	Coke and refined petroleum products [331- 333]	Basic chemicals [334]	Other chemicals and man- made fibers [335-336]	Rubber products [337]	Plastic products [338]	Glass and glass products [341]	
Basic non-ferrous	15	101	1	2	0	3	0	0	30	118	169	45	19	2
Metal products	177	51	2	6	0	7	0	0	42	122	1017	207	134	49
Machinery	33	160	18	59	1	73	2	3	73	86	162	41	19	14
Electrical machinery	4	2	0	0	0	0	0	0	1	3	24	0	3	0
Communication equipment	4	0	0	1	0	1	0	0	0	0	0	0	0	0
Scientific equip	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Motor vehicles	7	35	2	7	0	8	0	0	16	35	90	12	12	7
Other transport	0	0	0	0	0	0	0	0	0	0	11	0	0	0
Furniture	3	3	0	0	0	0	0	0	3	0	0	0	12	0
Jewellery	3	159	1	2	0	3	0	0	9	7	15	24	16	2
Sports goods	0	6	0	0	0	0	0	0	0	0	1	1	1	0
Games and toys	0	10	0	0	0	0	0	0	1	0	1	1	1	0
Musical instruments	3	146	1	2	0	3	0	0	9	6	14	22	15	2
Electricity	423	1177	28	91	2	113	3	5	793	1439	2455	558	261	253
Water	45	237	2	5	0	6	0	0	175	149	421	66	12	19
Construction	1	1	1	2	0	3	0	0	0	0	1	0	0	0
Trade	2460	6199	419	1352	28	1672	45	79	2034	3514	8610	1124	1633	419
Catering and accommodation	1	3	0	1	0	1	0	0	3	8	14	4	1	2
Logistics	953	2403	77	249	5	307	8	14	6397	7561	2255	869	434	222
Communication	129	198	45	146	3	181	5	9	33	232	393	65	126	41
Finance	637	994	80	258	5	319	9	15	686	912	944	213	516	123
Business services	1378	3614	334	1078	22	1333	36	63	768	3655	8626	1109	1574	554
Photographic activities	2	5	1	2	0	2	0	0	1	5	13	2	2	1
General research	5	12	1	4	0	4	0	0	3	12	28	4	5	2
Hardware consultancy	8	21	2	6	0	8	0	0	4	21	49	6	9	3
Advertising	63	166	15	49	1	61	2	3	35	167	395	51	72	25
Architectural	200	524	48	156	3	193	5	9	111	530	1250	161	228	80
Software consultancy	214	562	52	168	3	207	6	10	119	568	1341	172	245	86
Medical	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other community services	432	712	61	197	4	244	7	12	238	856	1909	231	352	168
Dramatic arts, music	3	4	0	1	0	2	0	0	1	5	12	1	2	1
Other entertainment activities	4	6	1	2	0	2	0	0	2	8	17	2	3	2
Library archives museum	7	11	1	3	0	4	0	0	4	13	29	4	5	3
Motion picture projection	10	17	1	5	0	6	0	0	6	21	46	6	9	4
Motion pictureproduction	15	24	2	7	0	8	0	0	8	29	65	8	12	6
Radio and television activities	32	52	4	14	0	18	0	1	17	63	140	17	26	12

	Wood and wood products [321-322]	Paper and paper products [323] publishing of books, brochures, musical books and other publications SIC 3241	Publishing of newspapers, journals and periodicals SIC 3242	Publishing of recorded music; other publishing SIC 3243, 3249	Printing SIC 3251	Service activities related to printing SIC 3252	Reproduction of recorded media SIC 3260	Coke and refined petroleum products [331 - 333]	Basic chemicals [334]	Other chemicals and man- made fibers [335-336]	Rubber products [337]	Plastic products [338]	Glass and glass products [341]	
Sporting activities	36	59	5	16	0	20	1	20	71	159	19	29	14	
Other recreational	83	136	12	38	1	47	1	45	164	365	44	67	32	
General government services	0	0	0	0	0	0	0	0	0	0	0	0	0	
Import	3053	10831	559	1803	38	2230	60	105	47535	34215	26239	3477	5962	1906
Intermediate	26273	55873	3233	10426	217	12895	349	608	111112	87642	88129	13359	20976	6547
Compensation of employees	8 176	8 080	1 470	4 741	99	5 865	159	277	4 839	11 062	22 461	2 885	11 182	2 732
Gross operating surplus	8 684	11 561	59	190	4	235	6	11	30 056	6 164	1 719	2 451	466	524
Other taxes on production	202	162	44	143	3	177	5	8	749	318	645	50	42	62
Other subsidies on production	-44	-90	-9	-29	-1	-36	-1	-2	-121	-1 057	-128	-26	-62	-16
Taxes on products	83	136	4	14	0	18	0	1	1 673	961	2 564	257	313	57
Subsidies on products	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Input	43 374	75 722	4 801	15 485	323	19 153	518	903	148 307	105 090	115 390	18 976	32 917	9 906

	Manufacture of non-structural non-refractory ceramic ware SIC 3421	Manufacture of refractory ceramic products SIC 3422	Manufacture of structural non-refractory clay and ceramic products SIC 3423	Manufacture of cement, lime and plaster SIC 3424	Manufacture of articles of concrete, cement and plaster SIC 3425	Cutting, shaping and finishing of stone SIC 3426	Manufacture of other non-metallic mineral products n.e.c. SIC 3429	Basic iron and steel [351]	Basic non-ferrous metals [352]	Metal products excluding machinery [353-355]	Machinery and equipment [356-359]	Electrical machinery and apparatus [361-366]	Television, radio and communication equipment [371-373]	Professional and scientific equipment [374-376]
	2%	5%	11%	32%	42%	2%	7%	100%	100%	100%	100%	100%	100%	100%
Agric	2	3	8	23	31	1	5	39	17	31	39	107	1	33
Coal	5	11	25	73	97	4	15	10762	851	462	107	15	0	0
Gold	0	0	0	0	0	0	0	0	109	0	0	0	0	0
O min	198	423	991	2914	3905	180	601	37428	7730	1268	460	241	4	0
Food	0	0	0	1	2	0	0	12	8	7	5	4	1	17
Bevs & tob	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Textile	0	1	2	5	7	0	1	10	9	28	23	23	0	128
Tex design	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cloth	0	1	2	7	9	0	1	116	17	40	52	17	1	0
Cloth design	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Leather	0	0	0	0	0	0	0	0	0	13	0	0	0	0
Accessory design	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Footwear	0	0	0	0	0	0	0	0	0	1	0	0	0	0
wood products	2	4	10	28	38	2	6	132	77	369	132	294	32	34
Paper	4	9	22	63	85	4	13	80	10	148	93	256	23	90
Publishing	0	0	0	1	1	0	0	2	1	3	5	4	1	0
Newspapers	0	0	1	2	3	0	0	6	2	10	17	13	3	0
Music	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Printing	0	0	1	3	3	0	1	7	2	13	21	17	3	0
Printing services	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Reproduction	0	0	0	0	0	0	0	0	0	1	1	1	0	0
Petroleum	5	10	24	70	94	4	14	879	798	307	471	403	24	42
Basic chemicals	3	7	17	49	66	3	10	364	229	154	75	120	1	20
O chemicals	7	14	33	97	130	6	20	143	82	1036	498	2276	44	115
Rubber	0	0	1	3	3	0	1	2	0	108	515	95	1	0
Plastic	2	5	11	33	44	2	7	113	50	290	266	1822	147	132
Glass	1	3	6	17	23	1	4	11	7	153	56	197	8	14
Non-refractory ceramic ware	1	1	3	10	13	1	2	0	0	2	2	9	0	0
Refractory ceramic products	1	3	7	21	29	1	4	1	1	4	4	19	0	0
Non-refractory ceramic products	3	7	17	50	67	3	10	1	2	9	9	44	0	0
Cement	10	21	50	148	198	9	30	4	4	26	27	129	1	0
Articles of concrete	13	29	67	198	265	12	41	5	6	35	36	173	2	0
Stone products	1	1	3	9	12	1	2	0	0	2	2	8	0	0
Other non-metallic mineral products	2	4	10	30	41	2	6	1	1	5	6	27	0	0
Basic ferrous	10	20	48	140	188	9	29	3882	191	18583	8768	2854	75	78

	Manufacture of non-structural non-refractory ceramic ware SIC 3421	Manufacture of refractory ceramic products SIC 3422 (manufacture of structural non-refractory clay and ceramic products SIC 3423)	Manufacture of cement, lime and plaster SIC 3424	Manufacture of articles of concrete, cement and plaster SIC 3425	Cutting, shaping and finishing of stone SIC 3426	Manufacture of other non-metallic mineral products n.e.c. SIC 3429	Basic iron and steel [351]	Basic non-ferrous metals [352]	Metal products excluding machinery [353-355]	Machinery and equipment [356-359]	Electrical machinery and apparatus [361-366]	Television, radio and communication equipment [371-373]	Professional and scientific equipment [374-376]	
Basic non-ferrous	1	1	3	8	11	0	2	719	3788	2346	878	2634	84	85
Metal products	2	5	12	35	47	2	7	5848	24	3373	3457	683	29	47
Machinery	1	3	7	19	26	1	4	321	66	112	1485	37	3	7
Electrical machinery	0	0	0	1	1	0	0	118	44	234	882	2743	541	286
Communication equipment	0	0	0	0	0	0	0	0	0	1	13	35	456	0
Scientific equip	0	0	0	0	0	0	0	0	0	0	1	9	0	48
Motor vehicles	0	1	2	7	9	0	1	47	9	43	88	33	10	4
Other transport	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Furniture	0	0	0	0	1	0	0	0	0	1	10	7	2	0
Jewellery	0	0	0	1	1	0	0	5	2	31	32	26	2	119
Sports goods	0	0	0	0	0	0	0	0	0	1	1	1	0	4
Games and toys	0	0	0	0	0	0	0	0	0	2	2	2	0	7
Musical instruments	0	0	0	1	1	0	0	5	2	29	30	24	2	110
Electricity	12	27	62	183	245	11	38	4709	4455	1239	737	464	64	77
Water	1	2	6	16	22	1	3	160	30	78	80	26	7	9
Construction	0	0	0	0	0	0	0	0	0	0	3	2	0	0
Trade	29	61	143	420	562	26	87	4641	1162	6885	7542	5424	1440	1281
Catering and accommodation	0	0	0	1	1	0	0	6	2	4	4	5	0	0
Logistics	54	115	270	795	1065	49	164	7571	216	801	896	754	130	143
Communication	2	5	12	35	46	2	7	172	60	450	527	232	52	52
Finance	9	20	47	138	184	8	28	599	233	2013	1636	755	179	147
Business services	31	67	156	460	616	28	95	3277	652	4152	4660	2399	608	487
Photographic activities	0	0	0	1	1	0	0	5	1	6	7	4	1	1
General research	0	0	1	2	2	0	0	11	2	14	15	8	2	2
Hardware consultancy	0	0	1	3	4	0	1	19	4	24	27	14	3	3
Advertising	1	3	7	21	28	1	4	150	30	190	213	110	28	22
Architectural	5	10	23	67	89	4	14	475	95	602	675	348	88	71
Software consultancy	5	10	24	71	96	4	15	510	101	646	725	373	95	76
Medical	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other community services	6	13	31	90	121	6	19	849	157	1160	903	514	197	97
Dramatic arts, music	0	0	0	1	1	0	0	5	1	7	6	3	1	1
Other entertainment activities	0	0	0	1	1	0	0	8	1	10	8	5	2	1
Library archives museum	0	0	0	1	2	0	0	13	2	18	14	8	3	1
Motion picture projection	0	0	1	2	3	0	0	21	4	28	22	12	5	2
Motion pictureproduction	0	0	1	3	4	0	1	29	5	39	31	17	7	3
Radio and television activities	0	1	2	7	9	0	1	62	12	85	66	38	14	7

	Manufacture of non-structural non-refractory ceramic ware SIC 3421	Manufacture of refractory ceramic products SIC 3422	Manufacture of structural non-refractory clay and ceramic products SIC 3423	Manufacture of cement, lime and plaster SIC 3424	Manufacture of articles of concrete, cement and plaster SIC 3425	Cutting, shaping and finishing of stone SIC 3426	Manufacture of other non-metallic mineral products n.e.c. SIC 3429	Basic iron and steel [351]	Basic non-ferrous metals [352]	Metal products excluding machinery [353-355]	Machinery and equipment [356-359]	Electrical machinery and apparatus [361-366]	Television, radio and communication equipment [371-373]	Professional and scientific equipment [374-376]
Sporting activities	1	1	3	8	10	0	2	71	13	97	75	43	16	8
Other recreational	1	3	6	17	23	1	4	162	30	222	172	98	38	18
General government services	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import	246	524	1228	3610	4839	223	745	47615	14704	16347	21040	12636	4814	1543
Intermediate	682	1453	3407	10019	13429	617	2068	132203	36112	64400	58655	39692	9300	5472
Compensation of employees	113	242	567	1 666	2 233	103	344	13 852	4 597	21 793	19 285	6 197	2 723	1 176
Gross operating surplus	168	358	839	2 466	3 306	152	509	382	6 040	987	7 022	256	839	1 339
Other taxes on production	4	8	19	56	76	3	12	569	153	210	599	256	25	83
Other subsidies on production	-1	-3	-7	-22	-29	-1	-5	-170	-75	-130	-556	-61	-10	-12
Taxes on products	4	10	22	66	88	4	14	1 131	771	432	1 589	1 510	498	315
Subsidies on products	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Input	971	2 067	4 847	14 252	19 102	878	2 942	147 968	47 598	87 691	86 593	47 850	13 375	8 373

	Motor vehicles, parts and accessories [381-383]	Other transport equipment [384-387]	Furniture [391]	Manufacture of jewellery and related articles SIC 3921	Manufacture of sports goods SIC 3923	Manufacture of games and toys SIC 3924	Manufacture of musical instruments; other manufacturing n.e.c. SIC 3922, 3929	Electricity, gas and steam [41]	Water supply [42]	Construction [51]	Wholesale and retail trade [61-63]	Catering and accommodation services [64]	Transport and storage [71-74]	Communication [75]
	100%	100%	100%	50%	2%	3%	46%	100%	100%	100%	100%	100%	100%	100%
Agric	554	5	240	41	1	3	38	22	3	13	33	1559	6	1
Coal	23	2	1	2	0	0	2	29963	900	37	2	85	105	7
Gold	0	0	0	1072	38	66	989	0	0	0	0	0	0	0
Omin	1804	76	41	7204	253	441	6645	40	23	14245	2	50	1113	30
Food	15	4	1	4	0	0	4	42	0	29	571	5048	79	1
Bevs & tob	0	0	0	0	0	0	0	0	0	0	0	1660	185	0
Textile	2290	13	441	87	3	5	80	16	5	266	140	65	318	182
Tex design	23	0	4	1	0	0	1	0	0	3	1	1	3	2
Cloth	118	8	3	9	0	1	8	13	1	10	475	23	71	380
Cloth design	1	0	0	0	0	0	0	0	0	0	5	0	1	4
Leather	301	3	232	4	0	0	3	0	0	0	1	0	8	38
Accessory design	3	0	2	0	0	0	0	0	0	0	0	0	0	0
Footwear	0	0	0	0	0	0	0	0	2	213	22	0	2	264
wood products	346	74	5424	263	9	16	243	173	46	7714	1117	196	1232	121
Paper	324	17	258	45	2	3	41	38	41	990	8203	42	1529	410
Publishing	1	1	4	2	0	0	2	3	8	10	1010	19	31	297
Newspapers	3	3	13	5	0	0	5	10	25	32	3259	60	99	958
Music	0	0	0	0	0	0	0	0	1	1	68	1	2	20
Printing	4	3	16	7	0	0	6	12	31	40	4031	74	123	1184
Printing services	0	0	0	0	0	0	0	0	1	1	109	2	3	32
Reproduction	0	0	1	0	0	0	0	1	1	2	190	4	6	56
Petroleum	458	34	49	59	2	4	54	230	70	4374	3999	331	22945	2954
Basic chemicals	147	6	15	36	1	2	33	78	256	9	215	345	144	30
O chemicals	1668	116	406	248	9	15	229	66	207	939	692	314	1008	250
Rubber	1893	20	96	7	0	0	6	3	29	26	3	27	2989	141
Plastic	2329	129	227	381	13	23	351	4	7	2277	4057	1	140	5
Glass	1153	36	73	9	0	1	8	45	19	540	22	92	69	75
Non-refractory ceramic ware	0	0	0	0	0	0	0	1	1	549	39	16	24	1
Refractory ceramic products	0	1	1	0	0	0	0	1	2	1169	83	34	51	3
Non-refractory ceramic products	0	2	2	1	0	0	1	3	4	2741	193	79	120	6
Cement	0	5	6	2	0	0	2	9	13	8059	569	232	352	17
Articles of concrete	0	7	7	3	0	0	3	12	17	10802	763	311	472	23
Stone products	0	0	0	0	0	0	0	1	1	497	35	14	22	1
Other non-metallic mineral products	0	1	1	1	0	0	0	2	3	1664	117	48	73	4
Basic ferrous	7375	1375	707	362	13	22	334	312	75	4570	177	0	895	11

	Motor vehicles, parts and accessories [381-383]	Other transport equipment [384-387]	Furniture [391]	Manufacture of jewellery and related articles SIC 3921	Manufacture of sports goods SIC 3923	Manufacture of games and toys SIC 3924	Manufacture of musical instruments; other manufacturing n.e.c. SIC 3922, 3929	Electricity, gas and steam [41]	Water supply [42]	Construction [51]	Wholesale and retail trade [61-63]	Catering and accommodation services [64]	Transport and storage [71-74]	Communication [75]
Basic non-ferrous	1060	139	63	401	14	25	370	0	16	23	35	0	9	0
Metal products	3064	404	530	98	3	6	90	259	161	9580	1460	198	275	701
Machinery	284	53	10	6	0	0	5	81	65	414	335	7	149	355
Electrical machinery	1899	91	1	7	0	0	7	1427	122	5918	300	78	444	311
Communication equipment	7	7	0	4	0	0	4	0	1	2	18	0	25	1834
Scientific equip	0	10	0	0	0	0	0	2	15	0	0	7	2	20
Motor vehicles	25210	20	5	6	0	0	6	80	11	77	493	0	3733	268
Other transport	0	1477	0	0	0	0	0	1	2	2	6	0	3102	4
Furniture	2	18	63	78	3	5	72	2	10	575	746	48	126	289
Jewellery	2	2	11	89	3	5	82	4	144	3	256	23	534	14
Sports goods	0	0	0	3	0	0	3	0	5	0	9	1	19	1
Games and toys	0	0	1	5	0	0	5	0	9	0	16	1	33	1
Musical instruments	2	2	10	82	3	5	75	4	132	2	236	21	492	13
Electricity	834	176	161	79	3	5	72	5766	1791	794	6164	3278	5425	4220
Water	45	29	16	14	1	1	13	637	18720	353	1388	1154	1519	740
Construction	9	0	0	0	0	0	0	6144	18	68503	14241	374	3797	0
Trade	32000	1481	1430	704	25	43	649	1891	751	12386	42255	6761	29159	21690
Catering and accommodation	0	0	1	0	0	0	0	204	26	0	2934	37	3725	166
Logistics	3240	133	373	103	4	6	95	934	588	2451	32442	548	3964	11336
Communication	359	70	97	57	2	4	53	200	116	1671	24274	408	3919	27693
Finance	1321	381	214	137	5	8	126	3029	818	4036	30564	691	15969	1374
Business services	5670	861	1044	564	20	35	521	689	551	16361	76591	10309	17273	4690
Photographic activities	9	1	2	1	0	0	1	1	1	25	115	15	26	7
General research	19	3	3	2	0	0	2	2	2	54	253	34	57	15
Hardware consultancy	32	5	6	3	0	0	3	4	3	93	436	59	98	27
Advertising	260	39	48	26	1	2	24	32	25	749	3509	472	791	215
Architectural	822	125	151	82	3	5	75	100	80	2371	11102	1494	2504	680
Software consultancy	882	134	162	88	3	5	81	107	86	2544	11911	1603	2686	729
Medical	0	0	0	0	0	0	0	33	1	0	0	0	597	28
Other community services	1069	119	235	130	5	8	120	4	2	598	1099	205	1122	343
Dramatic arts, music	7	1	1	1	0	0	1	0	0	4	7	1	7	2
Other entertainment activities	10	1	2	1	0	0	1	0	0	5	10	2	10	3
Library archives museum	16	2	4	2	0	0	2	0	0	9	17	3	17	5
Motion picture projection	26	3	6	3	0	0	3	0	0	15	27	5	27	8
Motion picture production	36	4	8	4	0	0	4	0	0	20	37	7	38	12
Radio and television activities	79	9	17	10	0	1	9	0	0	44	81	15	82	25

	Motor vehicles, parts and accessories [381-383]	Other transport equipment [384-387]	Furniture [391]	Manufacture of jewellery and related articles SIC 3921	Manufacture of sports goods SIC 3923	Manufacture of games and toys SIC 3924	Manufacture of musical instruments; other manufacturing n.e.c. SIC 3922; 3929	Electricity, gas and steam [41]	Water supply [42]	Construction [51]	Wholesale and retail trade [61-63]	Catering and accommodation services [64]	Transport and storage [71-74]	Communication [75]
Sporting activities	89	10	20	11	0	1	10	0	0	50	92	17	94	29
Other recreational	204	23	45	25	1	2	23	1	0	114	210	39	214	65
General government services	0	0	0	0	0	0	0	13	0	0	0	0	153	0
Import	63071	4252	2378	8787	309	538	8106	4896	1796	42928	21252	3173	36635	26389
Intermediate	162472	12029	15390	21466	754	1314	19801	57648	27860	234600	315124	41821	173070	111810
Compensation of employees	21 582	4 234	4 079	3 752	132	230	3 461	25 173	7 257	55 990	177 290	12 074	69 165	25 512
Gross operating surplus	954	330	53	9 296	327	569	8 575	67 062	17 998	69 263	258 141	15 588	179 708	39 340
Other taxes on production	470	71	83	98	3	6	90	630	134	1 182	7 144	771	3 858	1 005
Other subsidies on production	-396	-17	-28	-31	-1	-2	-29	-466	-321	0	0	0	-544	-70
Taxes on products	3 057	309	127	88	3	5	81	1 638	164	43 012	5 344	28	38 536	3 086
Subsidies on products	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Input	188 140	16 957	19 704	34 669	1 218	2 122	31 979	151 684	53 092	404 047	763 043	70 282	463 793	180 683

	Business services [83-88]	Photographic activities SIC 8894	General research, e.g. CSIR SIC 8711	Hardware consultancy SIC 861	Advertising SIC 8831 Architectural and engineering activities and related technical consultancy SIC 8821	Software consultancy and supply SIC 862	Medical, dental and veterinary services [93]	Other community, social & personal services [94- 98]	Dramatic arts, music and other arts activities SIC 9614	Other entertainment activities n.e.c.; news agency activities SIC 9619; 9620	Library and archives activities; museum activities and preservation of historical	Motion picture projection SIC 9612	Motion picture and video production and distribution SIC 9611	Radio and television activities SIC 9613
	74%	0%	0%	0%	3%	11%	100%	70%	0%	1%	1%	2%	2%	5%
Agric	83	0	0	0	4	12	206	186	1	2	3	5	6	14
Coal	2397	4	8	14	110	347	450	13	0	0	0	0	0	1
Gold	916	1	3	5	42	133	142	0	0	0	0	0	0	0
Omin	641	1	2	4	29	93	100	16	4	6	10	15	22	47
Food	655	1	2	4	30	95	102	417	1	2	3	6	8	17
Bevs & tob	10	0	0	0	0	2	2	5	4	0	0	0	0	0
Textile	37	0	0	0	2	5	6	115	133	1	2	3	5	10
Tex design	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Cloth	269	0	1	2	12	39	42	195	11	0	0	0	0	1
Cloth design	3	0	0	0	0	0	2	0	0	0	0	0	0	0
Leather	6	0	0	0	0	1	2	15	0	0	0	0	1	1
Accessory design	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Footwear	2	0	0	0	0	0	8	27	0	0	0	1	1	2
wood products	648	1	2	4	30	94	101	107	4	5	9	14	20	44
Paper	3662	5	12	21	168	531	570	681	4	6	11	17	24	52
Publishing	708	1	2	4	32	103	110	112	1	1	2	3	4	9
Newspapers	2283	3	8	13	105	331	355	361	2	3	6	9	13	28
Music	48	0	0	0	2	7	7	8	0	0	0	0	0	1
Printing	2823	4	9	16	129	409	439	447	3	4	7	12	16	35
Printing services	76	0	0	0	3	11	12	12	0	0	0	0	0	1
Reproduction	133	0	0	1	6	19	21	21	0	0	0	1	1	2
Petroleum	5342	8	18	30	245	774	831	1847	2	3	6	9	13	28
Basic chemicals	959	1	3	5	44	139	149	589	5	8	13	21	29	64
Ochemicals	3716	6	12	21	170	539	578	5591	5	7	11	18	25	55
Rubber	41	0	0	0	2	6	6	149	4	0	0	0	0	0
Plastic	102	0	0	1	5	15	16	9	0	0	0	0	0	0
Glass	818	1	3	5	37	119	127	16	1	1	2	2	3	7
Non-refractory ceramic ware	48	0	0	0	2	7	7	2	0	0	0	0	0	0
Refractory ceramic products	101	0	0	1	5	15	16	4	0	0	0	0	0	1
Non-refractory ceramic products	238	0	1	1	11	34	37	10	0	0	0	1	1	2
Cement	700	1	2	4	32	101	109	28	1	1	1	2	3	6
Articles of concrete	938	1	3	5	43	136	146	38	1	1	2	3	4	9
Stone products	43	0	0	0	2	6	7	2	0	0	0	0	0	0
Other non-metallic mineral products	144	0	0	1	7	21	22	6	0	0	0	0	1	1
Basic ferrous	65	0	0	0	3	9	10	3	0	0	0	0	1	1

	Business services [83-88]	Photographic activities SIC 8894	General research, e.g. CSIR SIC 8711	Hardware consultancy SIC 861	Advertising SIC 8831 Architectural and engineering activities and related technical consultancy SIC 8821	Software consultancy and supply SIC 862	Medical, dental and veterinary services [93]	Other community, social & personal services [94- 98]	Dramatic arts, music and other arts activities SIC 9614	Other entertainment activities n.e.c.; news agency activities SIC 9619; 9620	Library and archives activities; museum activities and preservation of historical	Motion picture projection SIC 9612	Motion picture and video production and distribution SIC 9611
Basic non-ferrous	5	0	0	0	0	1	1	0	0	0	0	0	0
Metal products	1649	2	5	9	76	239	256	89	128	1	1	2	4
Machinery	419	1	1	2	19	61	65	2	85	1	1	1	3
Electrical machinery	741	1	2	4	34	107	115	127	89	1	1	1	3
Communication equipment	0	0	0	0	0	0	0	162	1	1	2	4	6
Scientific equip	471	1	2	3	22	68	73	395	117	1	1	2	4
Motor vehicles	336	1	1	2	15	49	52	206	952	6	9	15	32
Other transport	26	0	0	0	1	4	4	0	21	0	0	1	1
Furniture	686	1	2	4	31	99	107	231	290	2	3	4	10
Jewellery	1004	2	3	6	46	146	156	255	152	1	1	2	5
Sports goods	35	0	0	0	2	5	5	9	5	0	0	0	0
Games and toys	61	0	0	0	3	9	10	16	9	0	0	0	0
Musical instruments	926	1	3	5	42	134	144	235	140	1	1	2	5
Electricity	4176	6	14	24	191	605	650	1449	1851	12	17	28	63
Water	3828	6	13	22	175	555	595	1230	383	2	3	6	13
Construction	22995	35	76	131	1053	3333	3576	1911	1136	7	10	17	39
Trade	36451	55	120	207	1670	5283	5669	14801	3871	24	35	59	131
Catering and accommodation	5016	8	17	29	230	727	780	881	1588	10	14	24	54
Logistics	18563	28	61	106	850	2691	2887	3783	1716	11	15	26	58
Communication	17482	26	58	99	801	2534	2719	2867	1587	10	14	24	54
Finance	45404	68	150	258	2080	6581	7061	1245	2032	13	18	31	69
Business services	66381	100	219	378	3041	9622	10324	24206	17654	111	159	270	599
Photographic activities	100	0	0	1	5	14	16	36	27	0	0	1	1
General research	219	0	1	1	10	32	34	80	58	0	1	1	2
Hardware consultancy	378	1	1	2	17	55	59	138	100	1	1	2	3
Advertising	3041	5	10	17	139	441	473	1109	809	5	7	12	27
Architectural	9622	14	32	55	441	1395	1496	3509	2559	16	23	39	87
Software consultancy	10324	16	34	59	473	1496	1606	3764	2745	17	25	42	93
Medical	4306	6	14	24	197	624	670	371	1279	8	12	20	43
Other community services	3725	6	12	21	171	540	579	391	2097	13	19	32	71
Dramatic arts, music	23	0	0	0	1	3	4	2	13	0	0	0	0
Other entertainment activities	34	0	0	0	2	5	5	4	19	0	0	0	1
Library archives museum	57	0	0	0	3	8	9	6	32	0	0	0	1
Motion picture projection	90	0	0	1	4	13	14	9	51	0	0	1	2
Motion picture production	126	0	0	1	6	18	20	13	71	0	1	1	2
Radio and television activities	274	0	1	2	13	40	43	29	154	1	1	2	5

	Business services [83-88]	Photographic activities SIC 8894	General research, e.g. CSIR SIC 8711	Hardware consultancy SIC 861	Advertising SIC 8831 Architectural and engineering activities and related technical consultancy SIC 8821	Software consultancy and supply SIC 862	Medical, dental and veterinary services [93]	Other community, social & personal services [94- 98]	Dramatic arts, music and other arts activities SIC 9614	Other entertainment activities n.e.c.; news agency activities SIC 9619; 9620	Literary and artistic activities; museum activities and preservation of historical	Motion picture projection SIC 9612	Motion picture and video production and distribution SIC 9611	
Sporting activities	311	0	1	2	14	45	48	33	175	1	2	3	4	6
Other recreational	712	1	2	4	33	103	111	75	401	3	4	6	10	14
General government services	468	1	2	3	21	68	73	2105	0	0	0	0	0	0
Import	28464	43	94	162	1304	4126	4427	12862	9535	60	86	146	231	324
Intermediate	317586	477	1048	1806	14548	46033	49391	89929	60068	377	542	918	1458	2039
Compensation of employees	118 762	178	392	676	5 440	17 214	18 470	27 458	58 705	368	530	897	1 425	1 993
Gross operating surplus	170 586	256	563	970	7 814	24 726	26 529	40 559	21 347	134	193	326	518	725
Other taxes on production	17 569	26	58	100	805	2 547	2 732	2 399	1 430	9	13	22	35	49
Other subsidies on production	-21	0	0	0	-1	-3	-3	-14	-605	-4	-5	-9	-15	-21
Taxes on products	10 151	15	34	58	465	1 471	1 579	2 196	376	2	3	6	9	13
Subsidies on products	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Input	634 632	953	2 094	3 610	29 072	91 988	98 698	162 527	141 321	886	1 276	2 159	3 429	4 798

	Household consumption - Semi-durable goods	Household consumption - Non-durable goods	Household consumption - Services	General government expenditure	Capital formation - Buildings and construction works	Capital formation - Transport equipment	Capital formation - Machinery and other equipment	Capital formation - Transfer costs	Change in inventories	Residual item	Exports of goods and services	Output
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Agric	0	34085	0	0	0	0	0	0	-2671	1238	53554	188754
Coal	0	361	0	0	0	0	0	0	-1618	724	51808	109648
Gold	0	0	0	0	0	0	0	0	9546	6	63887	77038
O min	0	0	0	0	0	0	0	0	4856	2285	170701	339425
Food	1151	183603	0	0	0	0	0	0	-856	1721	33719	262059
Bevs & tob	0	64710	0	0	0	0	0	0	-1187	562	15717	85912
Textile	7905	0	0	0	0	0	0	0	-849	188	3995	27989
Tex design	80	0	0	0	0	0	0	0	-9	2	40	283
Cloth	16964	0	0	0	0	0	0	0	-159	149	1722	21949
Cloth design	171	0	0	0	0	0	0	0	-2	2	17	222
Leather	884	0	0	0	0	0	0	0	-4	46	3278	6894
Accessory design	9	0	0	0	0	0	0	0	0	0	33	70
Footwear	7478	0	0	0	0	0	0	0	-19	61	425	8947
wood products	0	0	0	0	0	0	1530	0	-321	288	4313	43374
Paper	4953	0	0	0	0	0	0	0	-621	505	17163	75722
Publishing	0	944	0	0	0	0	0	0	-26	32	115	4801
Newspapers	0	3046	0	0	0	0	0	0	-85	104	372	15485
Music	0	63	0	0	0	0	0	0	-2	2	8	323
Printing	0	3767	0	0	0	0	0	0	-106	128	460	19153
Printing services	0	102	0	0	0	0	0	0	-3	3	12	518
Reproduction	0	178	0	0	0	0	0	0	-5	6	22	903
Petroleum	434	46263	0	0	0	0	0	0	450	1004	30393	148307
Basic chemicals	0	1116	0	0	0	0	0	0	-424	706	58805	105090
O chemicals	164	30960	0	0	0	0	0	0	-457	774	20245	115390
Rubber	4696	0	0	0	0	503	0	0	-146	129	4492	18976
Plastic	347	0	0	0	0	0	0	0	-283	221	5389	32917
Glass	197	0	0	0	0	0	0	0	-134	66	1771	9906
Non-refractory ceramic ware	12	0	0	0	27	0	0	0	-1	6	77	971
Refractory ceramic products	25	0	0	0	57	0	0	0	-2	14	164	2067
Non-refractory ceramic products	58	0	0	0	133	0	0	0	-5	32	386	4847
Cement	172	0	0	0	391	0	0	0	-15	94	1134	14252
Articles of concrete	230	0	0	0	525	0	0	0	-20	126	1520	19102
Stone products	11	0	0	0	24	0	0	0	-1	6	70	878
Other non-metallic mineral products	35	0	0	0	81	0	0	0	-3	19	234	2942
Basic ferrous	5	0	0	0	0	0	0	0	1156	976	92886	147968

	Household consumption - Semi-durable goods	Household consumption - Non-durable goods	Household consumption - Services	General government expenditure	Capital formation - Buildings and construction works	Capital formation - Transport equipment	Capital formation - Machinery and other equipment	Capital formation - Transfer costs	Change in inventories	Residual item	Exports of goods and services	Output
Basic non-ferrous	0	0	0	0	0	0	0	0	-273	317	34067	47598
Metal products	805	0	0	0	13020	0	12886	0	-255	564	15368	87691
Machinery	71	50	0	0	0	0	13577	0	-155	602	64367	86593
Electrical machinery	2218	0	0	0	0	0	13846	0	-180	325	10886	47850
Communication equipment	0	0	0	0	0	0	3011	0	12	100	6208	13375
Scientific equip	169	94	0	0	0	0	0	0	-9	60	5766	8373
Motor vehicles	564	0	0	0	0	21160	0	0	-598	1268	97676	188140
Other transport	0	0	0	0	0	1610	0	0	-181	112	7027	16957
Furniture	0	0	0	0	0	0	3870	0	-85	132	3949	19704
Jewellery	1161	3775	0	0	0	0	5418	0	-95	229	18460	34669
Sports goods	41	133	0	0	0	0	190	0	-3	8	649	1218
Games and toys	71	231	0	0	0	0	332	0	-6	14	1130	2122
Musical instruments	1071	3482	0	0	0	0	4998	0	-87	211	17028	31979
Electricity	0	63147	0	0	0	0	0	0	1279	1016	4192	151684
Water	0	11002	0	0	0	0	0	0	750	354	0	53092
Construction	0	0	0	0	264242	0	0	0	1270	2469	279	404047
Trade	52927	184878	0	0	1797	3108	75919	0	-7691	5054	34589	763043
Catering and accommodation	0	0	36265	0	0	0	0	0	-548	473	13646	70282
Logistics	1098	17500	126897	0	109	183	2052	0	2147	3101	42571	463793
Communication	0	0	58930	0	0	0	0	0	788	1207	17045	180683
Finance	0	0	130547	0	0	0	0	0	615	2530	14400	375837
Business services	0	0	164035	0	17513	3464	17333	6266	1016	4195	20931	634632
Photographic activities	0	0	246	0	26	5	26	9	2	6	31	953
General research	0	0	541	0	58	11	57	21	3	14	69	2094
Hardware consultancy	0	0	933	0	100	20	99	36	6	24	119	3610
Advertising	0	0	7514	0	802	159	794	287	47	192	959	29072
Architectural	0	0	23776	0	2538	502	2512	908	147	608	3034	91988
Software consultancy	0	0	25511	0	2724	539	2696	975	158	652	3255	98698
Medical	0	0	116993	0	0	0	0	0	-475	1188	1354	162527
Other community services	0	0	98393	0	0	0	0	0	-338	805	7086	141321
Dramatic arts, music	0	0	617	0	0	0	0	0	-2	5	44	886
Other entertainment activities	0	0	888	0	0	0	0	0	-3	7	64	1276
Library archives museum	0	0	1503	0	0	0	0	0	-5	12	108	2159
Motion picture projection	0	0	2388	0	0	0	0	0	-8	20	172	3429
Motion pictureproduction	0	0	3341	0	0	0	0	0	-11	27	241	4798
Radio and television activities	0	0	7229	0	0	0	0	0	-25	59	521	10383

	Household consumption - Semi-durable goods	Household consumption - Non-durable goods	Household consumption - Services	General government expenditure	Capital formation - Buildings and construction works	Capital formation - Transport equipment	Capital formation - Machinery and other equipment	Capital formation - Transfer costs	Change in inventories	Residual item	Exports of goods and services	Output
Sporting activities	0	0	8205	0	0	0	0	0	-28	67	591	11784
Other recreational	0	0	18800	0	0	0	0	0	-65	154	1354	27002
General government services	0	0	1342	715959	0	0	0	0	0	3810	0	788456
Import	44057	106234	38223	0	5324	40065	158289	84	-64	0	0	1175091
Intermediate	150235	759725	873119	715959	309491	71328	319434	8586	3024	44221	1088162	8151973
Compensation of employees	0	0	0	0	0	0	0	0	0	0	1 610 646	0
Gross operating surplus	0	0	0	0	0	0	0	0	0	0	1 506 067	0
Other taxes on production	0	0	0	0	0	0	0	0	0	0	63 752	0
Other subsidies on production	0	0	0	0	0	0	0	0	0	0	-7 502	0
Taxes on products	100 285	64 429	0	13	32	216	0	-731	0	8 249	373 564	0
Subsidies on products	-2 440	-6 760	0	0	0	-743	0	494	0	-1 639	-12 199	0
Input	857 569	930 788	715 959	309 504	71 360	318 907	8 586	2 787	44 221	1 094 771	11 686 301	0

APPROVALS FOR THE SOUTH AFRICAN CULTURAL OBSERVATORY PUBLICATION REPORT – An input-output model for the cultural and creative industries in South Africa and possible extensions.

	NAME	TITLE	SIGNATURE	DATE
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