

ECONOMIC OUTLOOK REPORT 2



RIO | regional
investment
opportunities

A PROJECT OF
THE MURRAYLANDS REGIONAL DEVELOPMENT BOARD INC

Murraylands Economic Outlook Report 2: RIO Sector Analysis

A report prepared for



Prepared by



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Abbreviations

ABS	Australian Bureau of Statistics
fte	full time equivalent
GRP	Gross Regional Product
PIRSA	Primary Industries and Resources South Australia
RIO	Regional Investment Opportunities

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1. Introduction

EconSearch Pty Ltd was contracted by the Murraylands Regional Development Board Inc to prepare a series of Economic Outlook reports that provide investors, stakeholders and the community with an overview of the status of the Murraylands economy. The Murraylands Economic Outlook Report consists of three key aspects, namely:

- Headline Analysis;
- Regional Investment Opportunities (RIO) Sector Analysis; and
- Standard Economic Analysis.

The aim of the RIO Sector Analysis, the subject of this report, was to provide analysis of a major industry sector. This report provides estimates of regional economic impact of food manufacturing and processing in the Murraylands at its current (2005/06) level and of two alternative growth scenarios, namely:

- the impact of annual growth in food manufacturing and processing of 5 per cent; and
- the impact of annual growth in food manufacturing and processing of 10 per cent.

The analysis presented in this report was undertaken by Lizzie Clark and Julian Morison (EconSearch Pty Ltd).

2. Method

The estimates of economic impact presented in this report were based on a *R/ISE* (Regional Industry Structure and Employment) model for the Murraylands region for 2002/03 prepared by the consultants for the Office of Regional Affairs (EconSearch 2005).

The method employed for estimation of economic impacts was input-output analysis. Input-output analysis provides a comprehensive economic framework that is extremely useful in the resource planning process. Broadly, there are two ways in which the input-output method can be used.

First, the input-output model provides a numerical picture of the size and shape of an economy and its essential features. The input-output transactions table can be used to describe some of the important features of an economy, the interrelationships between sectors and the relative importance of the individual sectors.

Second, input-output analysis provides a standard approach for the estimation of the economic impact of a particular activity. The input-output model is used to calculate industry multipliers that can then be applied to various growth or decline scenarios.

For a technical description of the input-output modelling procedure refer to Appendix 1 and for a glossary of input-output terminology refer to Appendix 2.

Economic impacts in this report have been specified in terms of the following indicators:

- output;
- employment; and
- contribution to gross regional product (GRP).

Output is a measure of the gross revenue of goods and services produced by commercial organisations plus gross expenditure by government agencies. This indicator needs to be used with care as it includes elements of double counting.

Employment is a measure of the number of working proprietors, managers, directors and other employees, in terms of the number of full-time equivalent (fte) jobs.

Contribution to GRP is a measure of the net contribution of an activity to the regional economy. Contribution to GRP is measured as value of output less the cost of goods and services (including imports) used in producing the output. It can also be measured as household income plus other value added (gross operating surplus and all taxes, less subsidies). It represents payments to the primary inputs of production (labour, capital and land). Using contribution to GRP as a measure of economic impact avoids the problem of double counting that may arise from using value of output for this purpose.

Estimates of the economic impact are presented in terms of

- direct impacts;
- flow-on (or indirect) impacts; and
- total impacts.

Direct impacts are the initial round of output, employment and household income generated by an economic activity.

Flow-on (or indirect) impacts are the sum of production-induced effects and consumption-induced effects. Production-induced effects are additional output, employment and household income resulting from re-spending by firms (e.g. transport contractors) that receive payments from the sale of services to firms undertaking, for example, meat processing. Consumption-induced effects are additional output, employment and household income resulting from re-spending by households that receive income from employment in direct and indirect activities.



3. Data and Assumptions

Estimates of the current¹ value of food manufacturing and processing in the Murraylands region were derived from the *Food Scorecard* for the region obtained from PIRSA (Carina Cartwright, pers. comm.). The value of food processing in the Murraylands region for 2005/06 is detailed in Table 3.1.

The estimated regional economic impacts of food manufacturing and processing at its current level were calculated based on the value of processing in the region (Table 3.1).

The gross food revenue generated in the Murraylands region in 2005/06 was \$949.2 million (including wine). Gross food revenue includes the value of farm production, food value adding, processing, packing and distribution, as well as food services and retail sales. The value of food processing in the Murraylands region in 2005/06 was \$586.8 million (Table 3.1).

The two growth scenarios were based on the assumption that annual growth in food manufacturing of five, or ten, per cent would be achieved by processing otherwise unprocessed, raw agricultural exports or increasing in imports of primary goods from outside the region. That is, the increase in food processing is not in response to an increase in local primary production.

The regional economic impact of the current level of food manufacturing and processing and the growth scenarios were estimated using the *RISE* model for the Murraylands region and are presented in the following sections.

¹ The latest year for which data were available was 2005/06.

Table 3.1 Value of food manufacturing and processing in the Murraylands region, 2005/06

Sector	Farm Gate Value (\$m)						Processing Margin	Value of Local Food Processing	Processed Exports	Retail Sales	Food Service	Gross Food Revenue ^b
	Locally Produced	Commodity Imports	Commodity Exports	Locally Processed ^a	Commodity Exports	Processed Exports						
Wine	0.8	0.0	0.8	0.0	0.0	0.0	0.0	4.0	5.8	5.2	11.8	
Field Crops	60.7	0.0	60.7	0.0	3.3	3.4	0.0	0.0	19.5	20.8	101.0	
Livestock	146.6	105.4	29.2	222.8	144.9	367.9	356.7	32.5	5.7	424.1		
Dairy	53.5	76.3	15.2	114.5	28.0	142.5	139.7	11.9	0.3	167.1		
Horticulture	79.9	1.0	39.5	41.4	31.6	73.0	68.1	84.1	22.6	214.5		
Seafood	1.4	0.0	1.0	0.4	0.0	0.0	0.0	2.8	1.4	4.8		
Other ^c	-	-	-	-	-	-	0.0	24.9	1.1	26.0		
Total^d	342.9	182.7	146.5	379.0	207.8	586.8	568.5	181.5	57.1	949.2		

^a The farm gate value of locally processed food includes primary goods that are produced elsewhere and imported into the Murraylands region for processing.

^b Gross food revenue includes commodity sales out of the region (exports), processed sales out of the region (processed exports), retail sales and food services sales.

^c 'Other' includes sales of processed food not elsewhere allocated.

^d Totals may not sum due to rounding.

Source: SA Food Scorecard (Carina Cartwright pers. comm.).

4. Regional Economic Impact of Food Manufacturing and Processing

Estimates of the regional economic impact of food manufacturing and processing in the Murraylands in 2005/06 are provided in Table 4.1.

Table 4.1 Regional economic impact of food manufacturing and processing

Sector	Output	Employment	Contribution to GRP
	\$m	fte	\$m
Food Manufacturing & Processing	586.8	2,226	142.7
Flow-on impacts			
<i>Trade</i>		536	19.1
<i>Transport & Storage</i>		222	16.1
<i>Other Flow-ons</i>		94	29.2
Total flow-on impacts		852	64.4
Total		3,078	207.1
Proportion of regional total		19%	21%

^a To avoid double counting only direct output impacts have been reported.

^b Totals may not sum due to rounding.

Source: EconSearch analysis.

In 2005/06, the value of output in food processing and manufacturing sectors in the Murraylands was almost \$587m.

In 2005/06, food manufacturing and processing was responsible for generating employment of almost 3,080 fte jobs in the Murraylands regional economy. Almost 2,230 of these jobs were generated directly in the food manufacturing and processing and over 850 flow-on jobs were generated in other sectors of the regional economy. The employment impact represented approximately 19 per cent of the regional total in 2005/06.

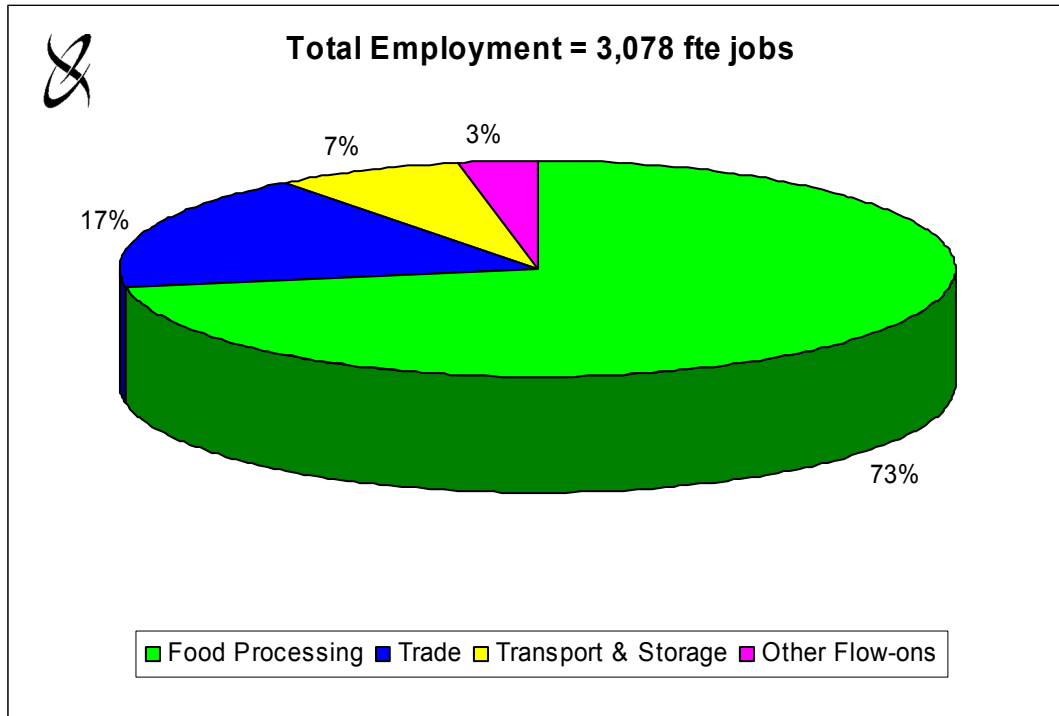
Jobs generated directly in food manufacturing and processing account for approximately 73 per cent of the total employment impact (Figure 4.1). Flow-on jobs account for the balance of the employment impact and were concentrated in trade, transport and other service sectors.

It was estimated that just over \$207m (in 2006 dollars) in GRP was generated in the Murraylands regional economy by food manufacturing and processing. Almost \$143m was generated directly in the food manufacturing and processing sector and approximately \$64m in flow-on GRP in other sectors of the regional economy. The total GRP impact represents 21 per cent of the regional total in 2005/06.

GRP generated directly in the food manufacturing and processing sector accounts for 56 per cent of the total impact, with the balance being attributed to flow-ons in other sectors of the regional economy (Figure 4.2).

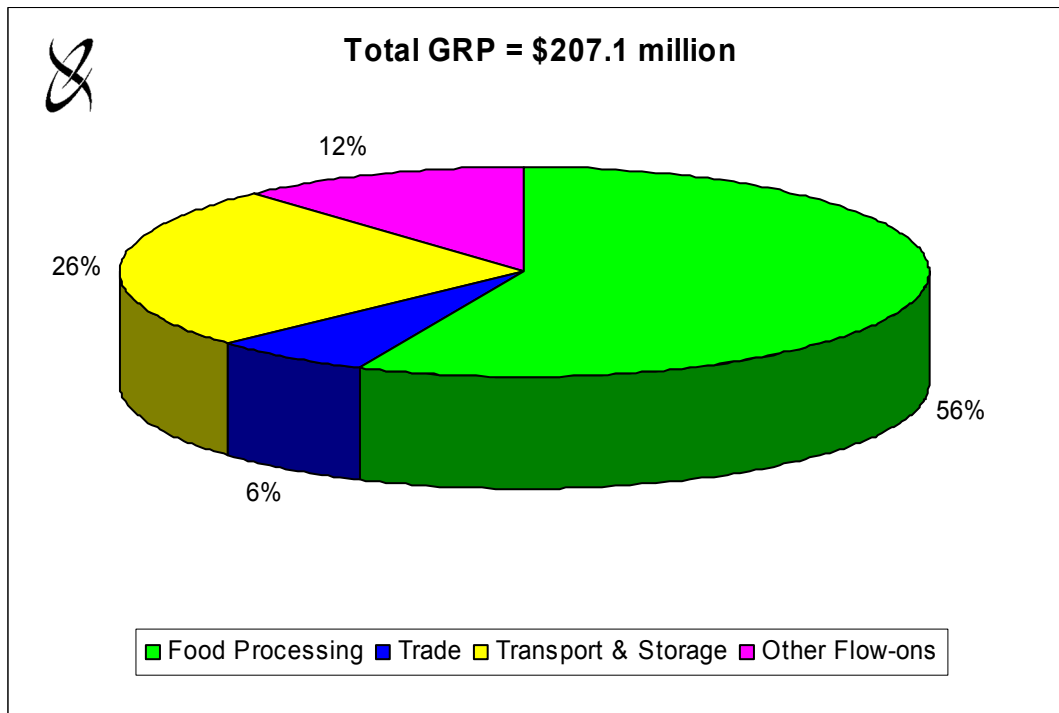


Figure 4.1 Distribution of employment impacts of food manufacturing and processing



Source: EconSearch analysis.

Figure 4.2 Distribution of GRP impacts of food manufacturing and processing



Source: EconSearch analysis.



5. Regional Economic Impact of 5 per cent Annual Growth of Food Manufacturing and Processing

Estimates of the regional economic impact of 5 per cent growth scenario for food manufacturing and processing in the Murraylands in 2005/06 are provided in Table 5.1.

Table 5.1 Regional economic impact of 5 per cent growth in food manufacturing and processing

Sector	Output	Employment	Contribution to GRP
	\$m	fte	\$m
Food Manufacturing & Processing	29.3	111	7.1
Flow-on impacts			
<i>Trade</i>		27	1.0
<i>Transport & Storage</i>		11	0.8
<i>Other Flow-ons</i>		5	1.5
Total flow-on impacts		43	3.2
Total		154	10.4
Proportion of regional total		0.9%	1.1%

^a To avoid double counting only direct output impacts have been reported.

^b Totals may not sum due to rounding.

Source: EconSearch analysis.

A 5 per cent increase in food processing would result in an increase in the value of output of just over \$29m (in 2006 dollars).

It was estimated that over 150 fte new jobs would be generated in the Murraylands region each year in response to 5 per cent annual growth in food manufacturing and processing. Approximately 110 of these jobs (73 per cent) would be generated directly in food manufacturing and processing and 43 flow-on jobs would be generated in other sectors of the regional economy (Table 5.1).

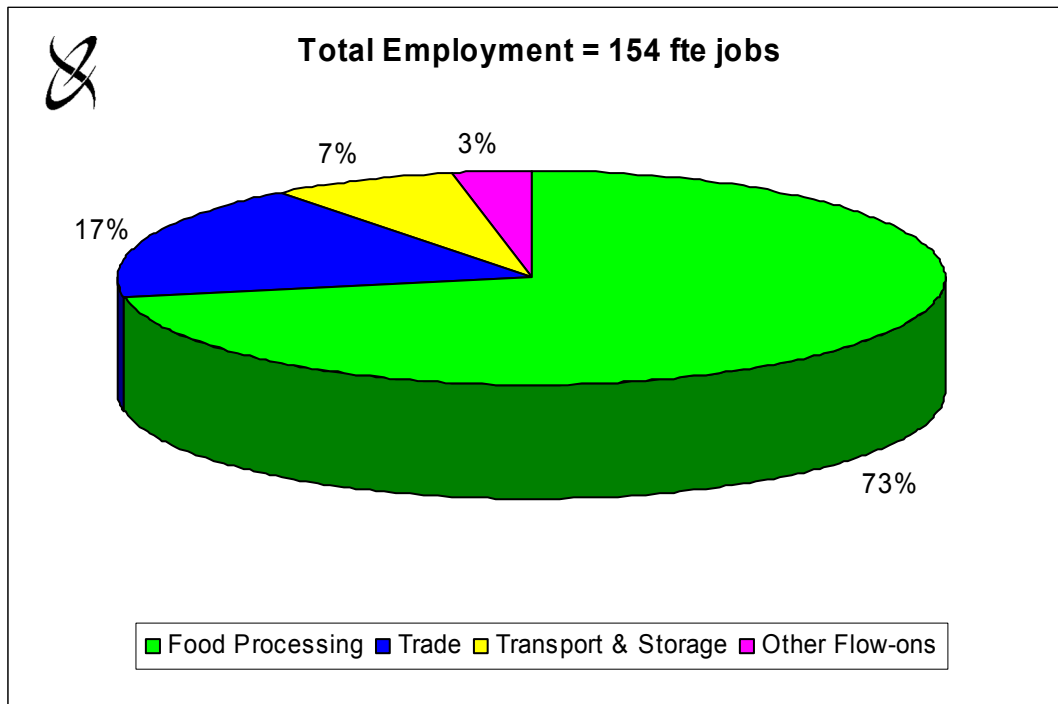
The total annual employment impact represents approximately 0.9 per cent of the regional total in 2005/06. Over a 5 year period, the cumulative impact of this growth would be a 4.6 per cent increase in regional employment above 2005/06 levels.

Jobs generated in the food manufacturing and processing sector account for approximately 73 per cent of the total employment impact (Figure 5.1). Flow-on jobs would account for the balance of the total employment impact and would be concentrated in trade, transport and other service sectors.

It was estimated that over \$10m (in 2006 dollars) in additional GRP would be generated in the Murraylands regional economy each year in response to 5 per cent annual growth in food manufacturing and processing. Approximately \$7m in GRP would be generated directly in food manufacturing and processing and over \$3m in flow-on GRP would be generated in other sectors of the regional economy.



Figure 5.1 Distribution of employment impacts for 5 per cent annual growth in food manufacturing and processing



Source: EconSearch analysis.

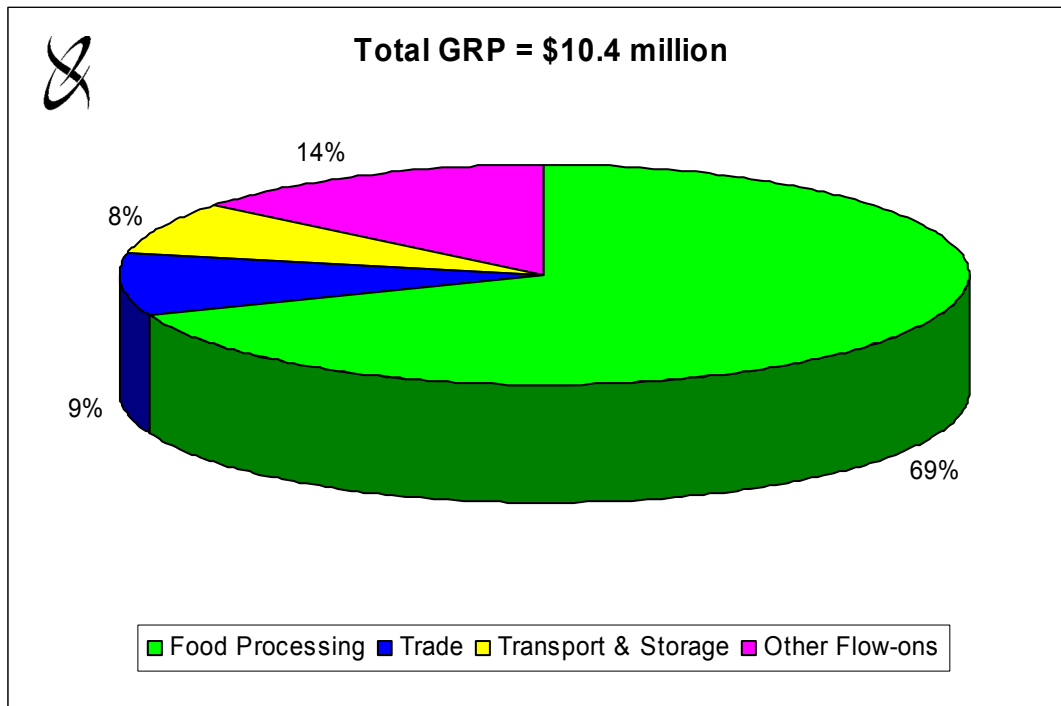
The total GRP impact represents 1.1 per cent of the regional total in 2005/06. Over a 5 year period, the cumulative impact of this growth would be to increase the size of the local economy by 5.3 per cent.

GRP generated in food manufacturing and processing would account for 69 per cent of the total impact, with the balance being attributable to flow-on in other sectors of the regional economy (Figure 5.2).

It should be noted that this analysis assumes that the increase in demand for food manufacturing and processing will have no discernable effect on the costs of goods and services used in the manufacturing process or the cost of labour. In a relatively open economy which has reasonable capacity to increase output in most of the key supply industries, this is a valid assumption. However, if local supply conditions are tight (for either material inputs, or labour), costs may increase as a result of higher demand for food products, inputs and even labour may be sourced from outside the region and the impact on the Murraylands economy may not be as large as Table 5.1 suggests.



Figure 5.2 Distribution of GRP impacts for 5 per cent annual growth in food manufacturing and processing



Source: EconSearch analysis.



6. Regional Economic Impact of 10 per cent Annual Growth of Food Manufacturing and Processing Industries

Estimates of the regional economic impact of 10 per cent annual growth in food manufacturing and processing in the Murraylands in 2005/06 are provided in Table 6.1. The distribution of the employment impacts and GRP impacts for 10 per cent annual growth scenario are similar to that for 5 per cent annual growth scenario (Figures 5.1 and 5.2).

Table 6.1 Regional economic impact of 10 per cent growth in food manufacturing and processing

Sector	Output	Employment	Contribution to GRP
	\$m	fte	\$m
Food Manufacturing & Processing	58.7	223	14.3
Flow-on impacts			
<i>Trade</i>		54	1.9
<i>Transport & Storage</i>		22	1.6
<i>Other Flow-ons</i>		9	2.9
Total flow-on impacts		85	6.4
Total		308	20.7
Proportion of regional total		1.9%	2.1%

^a To avoid double counting only direct output impacts have been reported.

^b Totals may not sum due to rounding.

Source: EconSearch analysis.

A 10 per cent increase in food processing would result in an increase in the value of output of almost \$59m (in 2006 dollars).

It was estimated that almost 310 fte new jobs would be generated in the Murraylands region each year in response to 10 per cent annual growth in food manufacturing and processing. Approximately 220 of these jobs would be generated directly in the food manufacturing and processing sector and 85 flow-on jobs would be generated in other sectors of the regional economy.

The total annual employment impact represents approximately 1.9 per cent of the regional total in 2005/06. Over a 5 year period, the cumulative impact of this growth would be a 9.3 per cent increase in regional employment above 2005/06 levels.

It was estimated that almost \$21m (in 2006 dollars) in additional GRP would be generated in the Murraylands regional economy each year in response to 10 per cent annual growth in food manufacturing and processing. Approximately \$14m in GRP would be generated directly in food manufacturing and processing and over \$6m in flow-on GRP would be generated in other sectors of the regional economy.

The total GRP impact represents 2.1 per cent of the regional total in 2005/06. Over a 5 year period, the cumulative impact of this growth would be to increase the size of the local economy by approximately 10.5 per cent.

The caveat with regard to the size of the regional impact discussed in Section 5 needs to be reiterated here. The analysis assumes the economy has the capacity to meet demands for additional goods, services and labour. The extent to which this is not the case, the estimates provided in Table 6.1 will be overstate the impact of a growing food manufacturing industry on the Murraylands regional economy.



References

EconSearch 2005, *Regional Development Board Economic Models*, a series of RISE impact models prepared for the Office of Regional Affairs, Department of Trade and Economic Development.

Jensen, R.C. and West, G.R. 1986, *Input-Output for Practitioners, Vol.1, Theory and Applications*, Office of Local Government, Department of Local Government and Administrative Services, AGPS, Canberra.

Disclaimer

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Appendix 1 Input-Output Methodology

Overview of Input-Output Analysis

Input-output analysis provides a comprehensive economic framework that is extremely useful in the resource planning process. Broadly, there are two ways in which the input-output method can be used.

First, the input-output model provides a numerical picture of the size and shape of an economy and its essential features. The input-output transactions model can be used to describe some of the important features of an economy, the interrelationships between sectors and the relative importance of the individual sectors.

Second, input-output analysis provides a standard approach for the estimation of the economic impact of a particular activity. The input-output model is used to calculate industry multipliers that can then be applied to various development scenarios.

Linkages between sectors

The standard approach for the estimation of the regional economic impact of a particular activity, such as pig production, is to employ *input-output analysis*. The input-output model conceives the economy of the region as being divided up into a number of sectors, and this allows the analyst to trace expenditure flows.

To illustrate this, consider the example of a piggery that, in the course of its operation, purchases goods and services from other sectors. These goods and services would include feed, power, and, of course, labour. The direct employment created is regarded in the model as an expenditure flow into the household sector, which is one of several non-industrial sectors recognised in the input-output model.

Upon receiving expenditure by the piggery, the other sectors in the regional economy engage in their own expenditures. For example, as a consequence of winning a contract for work with a piggery, a feedstuff producer buys materials from its suppliers and labour from its own employees. Suppliers and employees in turn engage in further expenditure, and so on. These *indirect effects*, as they are called, are part of the impact of the piggery on the regional economy. They must be added to the *direct effects* (which are expenditures made in immediate support of the piggery itself) in order to arrive at a measure of the total impact of the piggery.

It may be thought that these indirect effects go on indefinitely, and that their amount adds up without limit, the presence of *leakages*, however, prevents this from occurring. In the context of the impact on a *regional* economy, an important leakage is expenditure on imports, that is, products or services that originate from *outside the region, state or country* (e.g. machinery).

Thus some of the expenditure on imports to the region is lost to the local economy. Consequently, the indirect effects get smaller and smaller in successive expenditure rounds, due to this and other leakages. Hence the total expenditure created in the local economy is limited in amount, and so (in principle) it can be measured.

The performance of the input-output analysis calculations require a great deal of information. The analyst needs to know the magnitude of various expenditures and where they occur. Also needed is information on how the sectors receiving this expenditure share *their* expenditures among the various sectors from whom they buy, and so on, for the further expenditure rounds.

In applying the input-output model, the standard procedure is to determine the direct or first-round expenditures only. No attempt is made to pursue such inquiries on expenditure in subsequent rounds, not even (for example) to trace the effects in the local economy on household expenditures by piggery employees on food, clothing, entertainment, and so on, as it is impracticable to measure these effects for an individual case, here the piggery.

The input-output model is instead based on a set of assumptions about constant and uniform proportions of expenditure. If households in general in the local economy spend (say) 13.3 per cent of their income on food and non-alcoholic beverages, it is assumed that those working in piggeries do likewise. Indeed, the effects of all expenditure rounds after the first are calculated by using such standard proportions (*multiplier* calculations).

Multipliers

Multipliers are an indication of the strength of the linkages between a particular sector and the rest of the regional economy. As well, they can be used to estimate the impact of a change in that particular sector on the rest of the economy. As noted above, detailed explanations on calculating input-output multipliers (and the underlying assumptions) are provided in any regional economics or input-output analysis textbook (see for example Jensen and West (1986)). Suffice to note that they are calculated through a routine set of mathematical operations based on coefficients derived from the input-output transactions model.

Input-output transactions model

The structure and linkages of a local economy can be described with the aid of input-output analysis. Input-output analysis, as an accounting system of inter-industry transactions, is based on the notion that no industry exists in isolation.

This assumes, within any economy, each firm depends on the existence of other firms to purchase inputs from, or sell products to, for further processing. The firms also depend on final consumers of the product and labour inputs to production. An input-output transactions model is a convenient way to illustrate the purchases and sales of goods and services taking place in an economy at a given time.

Input-output models provide a numerical picture of the size and shape of the economy and its essential features. Products produced in the economy are aggregated into a number of groups of industries and the transactions between them recorded in the transactions model. The rows and columns of the input-output model can be interpreted in the following way:

- The rows of the input-output model illustrate sales for intermediate usage (to other firms) and for final demand (consumers, exports, capital formation).
- The columns show the origin of the inputs and hence the purchases made at that time (labour, capital and intermediate inputs).

- Each item is shown as a purchase by one sector and a sale by another, thus constructing two sides of a double accounting schedule.

In summary, the input-output transactions model can be used to describe some of the important features of a regional economy, the interrelationships between sectors, and the relative importance of the individual sectors. The model is also used for the calculation of sector multipliers and the estimation of economic impacts arising from some change in the local economy.



Appendix 2 Glossary of Input-Output Terminology

Basic value is the price received for a good or service by the producer. It is also known as *producers' price*. It excludes indirect taxes and transport, trade and other margins.

Consumption-induced effects are additional output, employment and income resulting from re-spending by households that receive income from employment in direct and indirect activities. Consumption-induced effects are sometimes referred to as "induced effects".

Contribution to gross state/regional product is calculated as the value of output less the cost of goods and services (including imports) used in producing the output. It represents payments to the primary inputs of production (labour, capital and land). Contribution to GSP/GRP is consistent with standard measures of economic activity, such as gross domestic, State or regional product and it provides an assessment of the net contribution to regional economic growth of a particular enterprise or activity.

Direct effects are the initial round of output, employment and income generated by an economic activity.

Employment is the number of working proprietors, managers, directors and other employees, in terms of the number of full-time equivalent jobs.

Exports refers to the sale of goods and services to final consumers outside the region of interest. In a state input-output model, exports refers to the sale of goods and services interstate and overseas. In a regional input-output model exports refers to the sale of goods and services interstate, overseas and to other regions within the state.

Flow-on effects are the sum of the production-induced effects and the consumption-induced effects.

Household income is wages and salaries, drawings by owner operators and other payments to labour including overtime payments and income tax, but excluding payroll tax.

Input-output analysis is an accounting system of inter-industry transactions based on the notion that no industry exists in isolation.

Input-output model is a transactions model that illustrates and quantifies the purchases and sales of goods and services taking place in an economy at a given point in time. It provides a numerical picture of the size and shape of the economy and its essential features. Each item is shown as a purchase by one sector and a sale by another, thus constructing two sides of a double accounting schedule.

Multiplier is an index (ratio) indicating the overall change in the level of activity that results from an initial change in economic activity. They are an indication of the strength of the linkages between a particular sector and the rest of the regional economy. They can be used to estimate the impact of a change in that particular sector on the rest of the economy.

Other Final Demand includes government expenditure, private and public sector investment (gross fixed capital formation) and change in stocks (inventories).

Other Value Added includes gross operating surplus and all taxes, less subsidies.

Output is gross revenue of goods and services produced by commercial organisations plus gross expenditure by government agencies.

Purchasers' price is the price paid for a good or service paid by the purchaser. It includes indirect taxes and transport, trade and other margins.

Production-induced effects are additional output, employment and income resulting from re-spending by firms that receive income from the sale of goods and services to firms undertaking, for example, agricultural activities. Production-induced effects are sometimes referred to as "indirect effects".

Total impact is the sum of the direct effects and the flow-on effects.

Type I multiplier is calculated as $(\text{direct effects} + \text{production-induced effects}) / \text{direct effects}$.

Type II multiplier is calculated as $(\text{direct effects} + \text{production-induced effects} + \text{consumption-induced effects}) / \text{direct effects}$.

