

A sectoral analysis of the Emfuleni economy and identification of the key economic sectors

7.1 Introduction

The underlying theory for an input-output analysis was discussed in Chapter Three (Section 3.3). In this chapter, the input-output model for the Vaal region is discussed, as well as the method used for the updating of the 1993 input-output table to 2000-figures. The potentialities of each economic sector of the Emfuleni economy are described. The tourism and entertainment sector usually forms part of the trade and service sectors, but as Emfuleni has a high potential in the tourism and entertainment field, this sector and its potentialities are discussed as a separate sector.

By considering the sectoral linkages that exist in the Vaal economy, as well as the multipliers of the different economic sectors, the key sectors for stimulating the Emfuleni economy were determined.

7.2 Input-output model of the Vaal

As the economies of Emfuleni and Metsimaholo (together forming the Vaal region) are interwoven, it is not possible, nor desirable, to construct an input-output table for Emfuleni alone. The Emfuleni economy forms 69.3% of the Vaal economy in terms of GGP contribution (Slabbert 1999:9), and the Emfuleni population forms 85% of the Vaal population (Stats SA 2003a).

7.2.1 Updating the input – output table

The updating of the 1993 input-output table was done by the candidate in 2001 (Slabbert & Slabbert 2002a). The updated figures for the 2000 input-output table were the results of a combination of the 1993 input-output model

of the Vaal (VAALMET 1994) and growth rates for each economic sector as estimated through statistical methods. Table 7.1 shows the average annual growth rates of the sectoral GGP for the Vaal over a 10-year period (from 1990 to 2000). Inputs were also weighted under the assumption that in constant returns to scale, the intermediate output increases in the same proportions as the inputs.

The 1993 input-output table did not have a separate tourism and entertainment sector. However, as Emfuleni is considered to have a great potential for economic development in this sector, the tourism and entertainment sector is treated as a separate sector (formed as the result of the sum of 7% and 9% of the trade sector and services sector respectively) in the 2000 input-output table.

Other columns were adjusted on a simple proportionality principle in order to create equality of sums of total inputs and total outputs.

TABLE 7.1 GGP-CONTRIBUTION AND SECTORAL GROWTH RATES, VAAL

ECONOMIC SECTOR	1990 (in Rm)	2000 (in Rm)	Annual growth rate (%)
Agriculture	293	314	0.74
Mining	563	265	-5.62
Manufacturing	7,758	9,857	2.64
Electricity/Gas and Water	1,557	1,085	-3.12
Construction	363	551	4.97
Trade	1,165	1,584	4.44
Transport	416	2,023	30.32
Financing	1,621	2,717	6.40
Services & Other	1,800	4,087	13.35
Tourism & Entertainment	–	523	–

• Source: calculated from statistics by WEFA 1999 (updated).

Table 7.2 represents the updated input-output table of the Vaal economy for the year 2000. From this table, technical and inter-dependence (Leontief inverse) coefficients tables (Table 7.3 & Table 7.4) were derived by Dr.

Hendrik Nel (2001), on the basis whereof he then calculated the sectoral multipliers (Table 7.8).

The main uses of the input-output table, as well as other derived tables, are to evaluate the capability of each sector to create a process that increases the production of other sectors and creates employment opportunities within the region (Miller 1998:42). Sectoral linkages and multiplier effects are studied for this purpose.

Sectoral linkages refer to the interaction between different economic sectors in the economy of the study area. For example: the agricultural sector supplies inputs to the manufacturing sector. The degree of linkages has a direct bearing on multiplier effects and provides an indication of agglomeration advantages that point to existing and potential development opportunities or constraints. Two types of linkages can be distinguished, namely the backward linkage effects and the forward linkage effects (VAALMET 1994:35).

Backward linkage of a sector is the effect of a change in the demand for production of that sector, on its demand for intermediate inputs derived from other sectors. The higher/lower the backward linkage of a sector with other sectors is, the higher/smaller is the impact of change in economic activity within that sector on the economic activity (VAALMET 1994:35). For example: an increase in production by an iron and steel industry will inescapably lead to an increase in the demand by that industry for inputs like coal, labour, electricity and machinery. The increase in demand for coal will have the effect that the coal mines will also have to increase their output. This, in turn, will lead to an increase in demand for inputs in the coal mines (labour, machinery, electricity and the like).

Forward linkages illustrate the extent to which the rest of the sectors in the study area are dependent on the sector concerned for inputs (VAALMET 1994:35). For example: the closure of a basic iron and steel industry will have several effects. The factories using basic iron and steel for inputs, should then get their inputs from other locations at a higher cost because of higher

transport costs. This could lead to the closure or departure of these factories. Many employees (from the basic iron and steel factory, as well as from the factory using iron and steel as input) will lose their jobs, which will lead to a decrease in household income, and this in turn will lead to a decline in trade, taxes, payment of services, and the like.

Input-output models are also constructed with the objective of providing a detailed industry-by-industry breakdown of the predicted effects of changes in demand (VAALMET 1994:36). With the input-output table as basis, sectoral output multipliers, household income multipliers and employment multipliers are constructed. The higher the multiplier, the larger is the impact of an exogenous change on the economy (i.e. a change in exports or an increase in tourists flowing into the region).

The multiplier analysis assesses the effect on an economy of changes in the elements that are exogenous to that economy (VAALMET 1994:36). An increase in final demand (exogenous change, which is consumption of final goods and services, exports, fixed investments in Emfuleni, and/or a change in inventories) leads to an increase in production, followed by an increase in turnover, household income and employment. The higher the multiplier, the larger is the impact of a change on the economy. The effect of such changes is measured most frequently in terms of:

- output gain of the sectors of the economy;
- income gain by households because of an increase in final output;
- employment (in physical terms) that is expected to be created (VAALMET 1994:36).

TABLE 7.2 INPUT-OUTPUT TABLE OF THE VAAL ECONOMY (2000)

												INTERME-	PRIVATE	PUBLIC	FIXED	CHANGE	EXPORT	FINAL	TOTAL
	SECTOR	1	2	3	4	5	6	7	8	9	10	DIATE	CONSUMP-	EXPEN-	INVEST-	IN		DEMAND	OUTPUT
												OUTPUT	TION EXPEN-	DITURE	MENT	INVEST-			
													DITURE			MENT			
1	AGRICULTURE	5.8	0.2	545	0	0	3	0.2	0.2	1.8	0.4	556.6	191.6	6.2	0	5.9	163.7	367.4	924
2	MINING	0.3	0.2	797.7	9.8	27.1	0.2	0.8	1.5	0.6	0	838.2	5.8	0.4	0	-5.8	277.4	277.8	1116
3	MANUFACTURING	64.7	50.5	7940.1	30	561	389.9	60.2	58.8	409.5	69.4	9634.1	1759.3	182	1641.7	55.1	15527	19165.1	28799.2
4	ELEC,GAS,WATER	1.5	9.5	560.4	26.6	1.8	42.9	11.3	17	46.3	7.7	725	108.1	100.2	10	-6.5	301	512.8	1237.8
5	CONSTRUCTION	0.8	0.8	25.1	1.9	319.6	49.2	4.7	18.2	7.8	5.5	433.6	1.3	14.6	2604.8	-13.4	795.3	3402.6	3836.2
6	TRADE	6.2	3.7	154.7	2.5	25.4	153.8	12.2	16	52.9	19.2	446.6	1254	43.5	8.3	-25.6	191.2	1471.4	1918
7	TRANSPORT	5.9	4	115.8	5	38.7	128.7	15.9	31.5	57.2	17	419.7	1414.8	132.4	40.6	9.7	1964.9	3562.4	3982.1
8	FINANCING	0.4	0.4	318.4	0.9	25.1	134.8	3.5	78.5	113.6	21.8	697.4	1108	74.2	142	-26.8	2229.5	3526.9	4224.3
9	SERVICES	2	141.4	468.6	1.3	377.1	68.5	3.3	43.9	514.2	45.3	1665.6	745	34	0	-0.2	242.8	1021.6	2687.2
10	TOURISM & ENTERT.	0.7	11	50.6	0.4	30.9	20.4	1.4	4.9	43.8	0	164.1	180.1	6.9	0.8	-2.5	35.9	221.2	385.3
	TOTAL INTERME-																		
	DIATE INPUTS	88.3	221.7	10976.4	78.4	1406.7	991.4	113.5	270.5	1247.7	186.3	15580.9	6768	594.4	4448.2	-10.1	21728.7	33529.2	49110.1
	REMUNERATION	63.2	26.8	3154.2	376.1	482	603.7	498.6	442.1	576.4	149.5	6372.6	132.4	683.8	217.7	0	896.2	1930.1	8302.7
	GROSS	78.8	86.4	2050	359.1	100.2	247	283.5	474.8	423.3	35.1	4138.2	0	19.2	0	0	0	19.2	4157.4
	NET	11.5	7.9	40.6	15.4	87.4	20.6	93.3	136	263.4	2.9	679	394.8	31.3	173.1	11.1	-44.2	566.1	1245.1
	TOT PRIM. INPUT	153.5	121.1	5244.8	750.6	669.6	871.3	875.4	1052.9	1263.1	187.5	11189.8	527.2	734.3	390.8	11.1	852	2515.4	13705.2
	IMPORTS	682.2	773.2	12578	408.8	1759.9	55.3	2993.2	2900.9	176.4	11.5	22339.4	219.9					219.9	22559.3
	TOTAL INPUT	924	1116	28799.2	1237.8	3836.2	1918	3982.1	4224.3	2687.2	385.3	49110.1	7515.1	1328.7	4839	1	22580.7	36264.5	85374.6

• Source: Vaalmet 1994, adapted & upgraded by the Vaal Reseach Group for 2000.

*Note: The horizontal numbers 1-10 indicate the same 10 economic sectors as listed column 1

TABLE 7.3 TECHNICAL COEFFICIENTS OF THE VAAL ECONOMY (2000)

Sector*	1	2	3	4	5	6	7	8	9	10
1 Agriculture	0.0063	0.0002	0.0189	0.0000	0.0000	0.0016	0.0001	0.0000	0.0007	0.0010
2 Mining	0.0003	0.0002	0.0277	0.0079	0.0071	0.0001	0.0002	0.0004	0.0002	0.0000
3 Manufacturing	0.0700	0.0453	0.2757	0.0242	0.1462	0.2033	0.0151	0.0139	0.1524	0.1801
4 Elect. Gas & Water	0.0016	0.0085	0.0195	0.0215	0.0004	0.0224	0.0028	0.0040	0.0172	0.0200
5 Construction	0.0009	0.0007	0.0009	0.0015	0.0853	0.0257	0.0012	0.0043	0.0029	0.0143
6 Wholesale, Retail	0.0067	0.0033	0.0054	0.0020	0.0066	0.0802	0.0031	0.0038	0.0197	0.0498
7 Transport	0.0064	0.0036	0.0040	0.0040	0.0101	0.0671	0.0040	0.0075	0.0213	0.0441
8 Financing	0.0004	0.0004	0.0110	0.0007	0.0065	0.0703	0.0008	0.0186	0.0422	0.0565
9 Services	0.0022	0.0004	0.0163	0.0011	0.0983	0.0357	0.0008	0.0104	0.1914	0.1176
10 Tourism & Entertainment	0.0008	0.1267	0.0018	0.0003	0.0081	0.0106	0.0004	0.0012	0.0163	0.0000
Labour	0.0683	0.0240	0.1095	0.3038	0.1256	0.3146	0.1252	0.1047	0.2145	0.3867

• Source: Nel 2001.

*Note: The horizontal numbers 1-10 indicate the same 10 economic sectors as listed column 1

TABLE 7.4 LEONTIEF INVERSE MATRIX OF THE VAAL ECONOMY (2000)

	Leontief Inverse	Direct +Indirect+induced										
	SECTOR	1	2	3	4	5	6	7	8	9	10	11
1	Agriculture	1.012	0.005	0.151	0.008	0.002	0.030	0.031	0.023	0.023	0.005	0.113
2	Mining	0.006	1.005	0.151	0.018	0.003	0.029	0.032	0.029	0.178	0.016	0.110
3	Manufacturing	0.035	0.042	1.499	0.037	0.004	0.054	0.057	0.060	0.071	0.011	0.233
4	Elec, Gas, Water	0.015	0.015	0.214	1.036	0.005	0.081	0.091	0.074	0.066	0.013	0.411
5	Construction	0.015	0.019	0.378	0.018	1.094	0.066	0.075	0.067	0.184	0.020	0.275
6	Trade	0.027	0.017	0.577	0.052	0.036	1.199	0.196	0.185	0.148	0.030	0.560
7	Transport	0.006	0.003	0.096	0.009	0.003	0.036	1.040	0.032	0.028	0.006	0.170
8	Financing	0.006	0.003	0.092	0.010	0.006	0.034	0.041	1.047	0.038	0.006	0.153
9	Services	0.021	0.014	0.469	0.043	0.009	0.113	0.123	0.138	1.315	0.034	0.436
10	Tourism & Entertainment	0.029	0.018	0.589	0.052	0.024	0.185	0.191	0.188	0.257	1.023	0.651
11	Households	0.044	0.017	0.556	0.042	0.010	0.246	0.271	0.229	0.194	0.038	1.293
	Total	1.2	1.2	4.8	1.3	1.2	2.1	2.1	2.1	2.5	1.2	4.4

- Source: Nel 2001.

*Note: The horizontal numbers 1-10 indicate the same 10 economic sectors as listed column 1

Output multipliers are expressed in terms of the total change in the economic output of the study area as a result of an increase in output of a specific sector. Household income multipliers are expressed in terms of the total change in household income as a result of a change in a sector's labour expenditure. Employment multipliers are expressed in terms of total change in employment as a result of a change in the final demand for a specific sector (VAALMET 1994:36). The sections hereafter will provide a broader discussion of the sectoral linkages and multiplier effects of the Emfuleni economy.

7.2.2 Potentialities of each sector of the Emfuleni economy

For the purpose of this thesis, the Vaal economy was aggregated into 10 main economic activities which, in turn, were grouped in 3 sectors, namely, the primary sector, secondary sector and the tertiary sector. The activities included in each sector are detailed in Annexure B. As stated earlier, it was only possible to update the input-output table for the Vaal as a whole. All multipliers and linkages therefore could only be calculated for the Vaal as a whole. As the Emfuleni economy is considerably larger than the Metsimaholo economy (more than twice in terms of GGP contribution (Slabbert 1999:9), and because the initial increase or decrease affects Emfuleni's economic sectors, the final effects of an increase or decrease in final demand will mostly affect Emfuleni.

The backward and forward linkages are calculated from the input-output table (Table 7.2) and summarised in Table 7.6 and Table 7.7 respectively. From the Technical Coefficients table (Table 7.3) and Leontief Inverse matrix (Table 7.4) the sectoral multipliers were calculated by Dr Hendrik Nel, an expert in input-output analysis (Nel 2001). These sectoral multipliers are summarised in Table 7.8.

In the paragraphs below, the 10 main economic activities in Emfuleni are discussed. Where possible, data for Emfuleni and not for the Vaal as a whole was given. However, all estimates derived from the input-output table, i.e. linkages and multipliers, are given for the Vaal as a whole.

Primary sector

The primary sector comprises agricultural and mining activities.

Agriculture

Agriculture is responsible for 2,904 employment opportunities or 1.9% of the total formal employment in Emfuleni (Table 4.4). The agricultural land is found mainly in the northern and eastern parts of Emfuleni (VAALMET 1994:36).

There is a steady decline in agricultural activities in the study area as farmers relocate outside Emfuleni and more land gets distributed for new urban residential areas.

Both reasons mentioned above might explain why the sector's GGP-contribution to the region, which is already as small as 1.4% of the total regional GGP, only grew by 3.0% p.a. in average over the decade from 1990 to 2000 (Table 6.1). The relative contribution of this sector to the GGP of Emfuleni declined from 1.6% in 1990 to 1.4% in 2000.

Linkages

The backward linkages of the agricultural sector show weak industrial connections. This implies that the sector depends on local raw materials for only 9.6%. Even when labour is included, the agricultural sector only depends for 16.4% on local inputs. 73.8% of its inputs are imported from either other South African provinces or the rest of the world.

With regard to the forward linkages, 60.2% of the agricultural output is sold to the local economic sectors. Local manufacturing enterprises take up 97.9% of the agriculture intermediate output (calculated from Table 7.2). This shows a high potential for further development and diversification. An effort to improve agricultural output would cause a reduction in imports of agricultural products and stimulate the manufacturing sector, provided problems with climatic conditions could be overcome through improved technological and agricultural practices.

Besides the purchase by the manufacturing enterprises, agricultural production goes largely to private consumption (52.2% of final demand) and to exports (44.6% of final demand) (calculated from Table 7.2).

Multiplier effect

Incentives to expand the agricultural sector may be less effective in boosting income earned by households, employment creation and output. An increase of R1,000,000 in the formal agricultural sector's final demand would increase

- income earned by households by R111,000;
- the contribution to the GGP by R240,000;
- an outflow of capital because of imports by R861,000;
- job opportunities by an additional 8 throughout the Vaal economy.

Based on the above, the formal agricultural sector is not regarded as an economic activity that can contribute substantially to growth in Emfuleni. This sector has, however, the ability to improve household income and to stimulate some growth in the manufacturing sector.

Informal (subsistence) agriculture may provide an outcome to the poor households in Emfuleni, but will not necessarily stimulate the economy to a noticeable extent.

Mining and quarrying

The study area's most important mineral resources are the Vereeniging coalfields. The discovery of coal and its exploitation has significantly influenced the spatial-economic structure in the Vaal. It has played a major role in the decision to establish Vanderbijlpark as a planned industrial city in the earlier PWV Complex. However, local coal reserves are not expected to influence export markets substantially (VAALMET 1994:38).

The mining sector's relative GGP-contribution to that of the Emfuleni economy declined from 0.5% in 1990 to 0.2% in 2000, showing a decline of -3.2% per annum of its contribution to the Emfuleni GGP over the last decade (Table 6.1).

Present employment in the sector is estimated at about 1,230 or 0.8% of the total employment in the Emfuleni economy (Table 4.4).

Linkages

The backward linkages of the mining sector are weak. Of all the inputs needed in this sector, only 22.3% (labour included) is provided by the local economy. It purchases most of its inputs from the manufacturing and services sectors. These sectors are also influenced by the downward trend in the mining activities in the Vaal.

Mining activities have historically developed strong forward linkages with manufacturing activities in the Vaal. Most of the output (75.1%) is taken up by local economic sectors. The most important buyer of mining products remains the manufacturing sector with 95.2% of the total intermediate output (calculated from Table 7.2). But most mining activities in the Vaal are located in Metsimaholo. For this reason, this sector has a relatively small effect on the Emfuleni economy.

Multiplier effects

An increase in the final demand of the mining sector of, for example, R1,000,000 per annum would have the following effects:

- An increase in household income throughout the economy of approximately R108,000;
- A creation of 5 job opportunities, of which most will be in the mining sector itself and in the manufacturing activities. The opposite will apply to a closure of a mine which will undoubtedly result in a loss in the mining sector and in the rest of the economy;
- An increase in GGP-contribution of about R268,000; and
- An outflow of capital out of Emfuleni through imports of R831,000.

A major constraining factor in the mining industry is the high capital cost required to develop new mines and only a few organisations in the country can raise the necessary capital in this respect. Therefore, because there is no anticipation of new large-scale mining development in the medium term, this sector should not be regarded as a major growth stimulus for the future economic development in Emfuleni.

Secondary sector

Secondary economic activities consist of three sub-sectors, namely Manufacturing, Electricity/ Gas/ Water and Construction.

Manufacturing

Manufacturing is the single economic activity which is responsible for most employment opportunities in Emfuleni. The formal employment profile of manufacturing in 2003 is 34,122 or 22.2% of all Emfuleni employment opportunities. In this sector, the basic metals and metal products manufacturing sectors themselves are responsible for almost 66.4% of all the manufacturing employment opportunities (Slabbert & Slabbert 2002b:9). A loss of employment opportunities in the manufacturing sector will also lead to the loss of employment opportunities in other sectors of the Emfuleni economy, especially those activities which are linked with industrial activities.

The relative contribution of Manufacturing towards the GGP of Emfuleni decreased from 50.0% in 1990 to 41.3% in 2000 (Table 6.1). Table 7.5 shows the share of each industrial activity in the manufacturing sector's GGP.

The manufacturing of metal, metal products and machinery dominates the manufacturing in Emfuleni with a 80.6% contribution to the Manufacturing's GGP. There is, therefore, a strong dependence of the Emfuleni economy on the metal, metal products and machinery industries.

TABLE 7.5 INDUSTRIAL ACTIVITIES, EMFULENI (2000)

Activity	Percentage share in Manufacturing's GGP contribution
Food, drink and tobacco	3.5
Textiles, clothing and footwear	1.8
Fuel, petroleum and rubber products	3.1
Other non-metallic mineral products	5.9
Metal, metal products and machinery	80.6
Electrical machinery & electronic appliances	2.8
Transport equipment	1.3
Furniture	1.0

TOTAL	100.0
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- Source: WEFA 1999 (updated).

Linkages

Due to its size in the Vaal economy, the manufacturing sector's backward linkages are significant to the Vaal economy. Of the total inputs (labour included), 49.1% comes from within the Vaal. This implies that a decrease in manufacturing activities would lead to a significant decrease in the demand for the output of other economic activities in the Vaal. These economic activities are, for example:

- Agriculture
- Mining
- Other manufacturing activities
- Electricity/ gas and water
- Services
- Labour

The development of inter-industrial linkages, especially with the above-mentioned activities, has led to agglomeration advantages and high turnover multipliers in the industry. The turnover multiplier in the Vaal as a whole is the highest of all the economic activities (Table 7.8).

There are, however, relatively weaker forward linkages in the region. The industry sells 33.5% of its total output to other economic sectors within the region. Buying sectors of intermediate output are mostly other manufacturing industries (82.4%), construction (5.8%), trade (4.0%) and services (4.2%) sectors (calculated from Table 7.2). However, 53.9% of the total output goes outside the region as exports.

The rather high (72.3% of the total intermediate inputs) inter-industrial linkages (calculated from Table 7.2) experienced by the manufacturing sector are

regarded as an opportunity for further diversification in this sector. This implies a high potential for the development of new industrial sectors linked to existing industries, which are important markets for suppliers of intermediate products. However, a decline in certain manufacturing activities will have a strong negative impact and multiplier effect on industries using intermediate inputs from manufacturing activities that decline.

Multiplier effects

It is estimated that an increase in final demand of an industrial enterprise in Emfuleni of R1,000,000 per annum, would have the following effects on the region as a whole:

- GGP income would increase by R396,000 per annum;
- Household income would increase by about R229,000 per annum;
- Imports would also increase by R813,000; and
- 5.1 employment opportunities would be created in all sectors of the Vaal economy.

Electricity/ gas and water

Emfuleni is an important source of water. This sector is presently responsible for 2,367 employment opportunities or 1.5% of all employment in the Emfuleni economy (Table 4.4).

The relative GGP-contribution of the sector decreased from 4.8% in 1990 to 1.8% in 2000. The sector's contribution to Emfuleni GGP had an annual growth rate of -5.2% over the past years (Table 6.1).

Linkages

A decrease in the consumption of water and electricity in the Vaal will not only lead to a decrease in employment opportunities to provide and maintain these services, but will also lead to a decrease in employment opportunities in all

sectors of the economy. This is because of the other sector's linkages to electricity and water provision.

Backward linkages are weak with only 36.7% of inputs (labour included) purchased from within the Vaal. Contrary to backward linkages, forward linkages show that 75.7% of output is consumed within the region with 45.3% of the total output being used by the manufacturing sector and 24.3% being exported (calculated from Table 7.2).

Multiplier effects

An increase, for example, in the total consumption of water and electricity of R1,000,000 per annum can have the following implications:

- GGP would increase by R785,000;
- About 6.2 new employment opportunities would be created;
- Household income earned throughout the economy would increase by R404,000.

Although Emfuleni exports water, there is only a limited supply. Electricity is only generated in Metsimaholo. There is, therefore, not much scope for development in this sector in Emfuleni.

Construction

The construction sector is responsible for 7,812 jobs or 5.1% of the total Emfuleni employment opportunities (Table 4.4). Most of enterprises in this sector specialise in civil engineering contracts and building.

The relative GGP-contribution of construction activities to that of Emfuleni decreased from 3.0% in 1990 to 2.7% in 2000. The sector's contribution to the GGP grew with 3.5% per annum from R330 million in 1990 to R457 million in 2000 (Table 6.1).

The role of the construction sector in the economy is much the same as that of electricity, gas and water in the sense that its growth is dependent on the performance of other economic activities. Factors that impact on the economic performance of construction are:

- Overall economic growth and stability;
- Demand for capital investment in property and urban development, including transportation infrastructure;
- Household investment in housing; and
- The availability of capital at affordable interest rates (VAALMET 1994:45).

A lack of the above will lead to low or zero capital investment in construction projects, a decrease in the demand for output of the building and construction sector and declining employment.

Linkages

This sector has relatively strong backward linkages as 49.2% of its total inputs (labour included) come from the local economy. Improved building activities will therefore require substantial inputs from other existing sectors in the Vaal. Some of these sectors are:

- Manufacturing of bricks, tiles, roof sheets, pipes, paint, board, etc.;
- Other construction activities (subcontractors);
- Financing and business services (bonds, loans, professional services);
- Households (as labour force) (VAALMET 1994:45).

The forward linkages are much weaker with only 11.3% of the total output being consumed by other local economic sectors. Of the 88.7% of output that constitutes the final demand for construction activities, 76.6% goes to fixed investment, whereas 23.4% of the final demand is contracted outside the study area (calculated from Table 7.2).

Multiplier effects

Construction activities have strong household income and employment multiplier-effects. An increase in final demand of R1,000,000 can generate an additional household income of about R270,000; an increase in GGP of R434,000 and can generate about 7.2 jobs throughout the Vaal economy.

It is worth mentioning that the construction sector has limited potential to form the basis for sustained growth in Emfuleni as it is dependent on productive investment which is influenced by factors exogenous to the building industry (VAALMET 1994:46).

Tertiary sector

Tertiary activities consist of a number of sub-sectors such as Trade, Transport, Financing, Services and Other and Tourism and Entertainment.

Trade

This sector's relative contribution towards the aggregate GGP decreased from 9.3% in 1990 to 8.1% in 2000. The sector's contribution to the GGP of Emfuleni grew with 3.8% per annum (Table 6.1). The sector is responsible for 25,717 employment opportunities or 16.7% of total employment in Emfuleni (Table 4.4).

The trade sector has a relatively well-developed trade structure and finds itself in the midst of growing local consumer markets, but it is constrained by the comparatively low affordability levels of communities that are further enhanced by high unemployment (VAALMET 1994:50).

Linkages

This sector has developed strong linkages, both forward and backward, with other sectors in the Vaal economy. This implies that the sector is dependent on the local economy for 83.2% of its inputs (labour included) and provides 88.7% of its output to other sectors of the economy (households included)(calculated from Table 7.2).

An increase in the output of trade activities will increase the input requirements of the sectors with which they are 'backwardly' linked. These sectors are for example (calculated from Table 7.2):

- Manufacturing (20.3%);
- Other trade activities (8.0%);
- Financing and business services (7.0%);
- Households (31.5%).

Multiplier effects

An injection of R1,000,000 in the final demand of trade business would cause the following effects:

- About R867,000 increase in the GGP of the Vaal;
- About R551,000 increase in income earned by households mostly throughout Emfuleni economy;
- About 14.3 additional employment opportunities;
- About R637,000 flowing outside the Vaal for imports of food, clothing, furniture, motor vehicles, tools, etc.

Transport

The Vaal economy is built upon massive industrial activities for which transport and telecommunication infrastructure is considered to be one of the pillars of the regional economy. For this reason, the need has been expressed to assess the impact of an international cargo airport in Vereeniging (LAAC 2001).

There are two airports in Emfuleni, the Vanderbijlpark Airport and the Vereeniging Airport (Aerovaal). Plans to upgrade the latter into a freight-based international airport are under discussion due its proximity to local industries and also due to the fact that Johannesburg International Airport would not be able to respond to a high demand for especially fresh produce cargo-transport (LAAC 2001) .

The sector's relative GGP-contribution increased from 3.3% in 1990 to 8.8% in 2000, with a growth in GGP contribution of 15.2% per annum (Table 6.1). It is responsible for 7,277 employment opportunities (4.7%) in the Emfuleni economy (Table 4.4).

Linkages

This sector has relative weak backward linkages (15.4% with labour included) - these linkages are mainly with households for labour (12.5%) and manufacturing (1.5%) (calculated from Table 7.2). Forward linkages are also weak with only 10.5% of the total output taken up by the local economic sectors. Of this sector's total output, 35.5% is taken up by households (private transport) (calculated from Table 7.2) and 49.3% is exported (*i.e.* 49.3% of the transport services are used by enterprises and people outside the region, bringing in 'new' money into the region).

Multiplier effects

An injection of R1,000,000 in the final demand of transport services would cause the following effects:

- A small household income multiplier effect of R167,000;
- A GGP multiplier effect of R293,000 which is just above that of agriculture and mining;
- About 2.8 additional job opportunities.

Financing

This sector consists of financial intermediation, insurance, real estate and business services such as computer and related activities, legal, accounting, auditing activities, architectural, advertising, engineering and related technical activities (VAALMET 1994:53). Its current employment capacity is 13,228 jobs (Table 4.4) and its relative GGP-contribution decreased slightly from 12.8% in 1990 to 12.4% in 2000 (Table 6.1). This sector grew over the last decade at an annual growth rate of 4.0%. Most of these services are located within the central business areas of Vereeniging and Vanderbijlpark, while agencies or relative small activities occur in the suburbs or decentralised shopping centres.

Linkages

This sector has comparatively strong inter-industrial forward linkages with especially the manufacturing sector (45.7% of total intermediate output), trade sector (19.3%) and services sector (16.3%) in the Vaal (calculated from Table 7.2), while 52.8% of its total output is exported. Its backward linkages (16.9% of its total input comes from the local economy – labour included) are comparatively small, which implies that the provision of inputs in this sector is only to a limited extent dependent on the other sectors.

Multiplier effects

The employment and household income multipliers are very low compared to sectors such as manufacturing, trade and services.

Services

This sector includes public and personal services, which in turn include regional and local authorities, education and health services (VAALMET 1994:54). The sector experienced an increase in its contribution towards the aggregate GGP of the study area from about 14.7% in 1990 to 20.6% in 2000 (Table 6.1). This sector experienced an annual growth rate of 9.0% (contribution to the GGP). It is responsible for 29,105 employment opportunities (Table 4.4).

Linkages

This sector has strong linkages with almost all other sectors of the Vaal economy, of which manufacturing is the most prominent. About 67.9% of inputs required by this sector (labour included) is provided by local economic activities, whilst more than 91 per cent of this sector's output is taken up by the local economy of the Vaal (calculated from Table 7.2).

Multiplier effects

An increase in final demand of this sector of R1,000,000 can generate the following effects:

- An additional household income of about R428,000 in the region;
- An increase in the Vaal's GGP of about R866,000 per annum;

- Creation of 20 additional employment opportunities throughout the Vaal economy.

Tourism and Entertainment

Traditionally, the tourism and entertainment industry is not interpreted as a separate economic sector, but rather as an economic activity which falls mainly under tertiary activities such as the Trade and Services sectors. It is estimated that the Tourism and Entertainment sector employs 2,176 people (Table 4.4) and contributes 2.7% to the GGP of Emfuleni (Table 6.1).

There are, however, a few issues to be considered as regards this sector as they impact positively or negatively on the tourism potential of Emfuleni (VAALMET 1994:57):

- Positive factors are those like the water resources, vacant land along water courses, nature conservation areas, national accessibility, and proximity to Greater Johannesburg and Pretoria;
- Negative factors are those like environmental pollution, quarries and mine dumps.

Linkages

Although the tourism and entertainment sector at the moment is still one of the smaller sectors of the Emfuleni economy, it has great development and expansion potential. Labour expenses comprise almost 40% of its inputs, indicating that growth in this sector will have a considerable effect on employment in Emfuleni. This sector has strong backward linkages with the manufacturing sector (37.3% of its total intermediate inputs) and the services sector (29.3%). Local households receive 46.7% of the total outputs of this sector (calculated from Table 7.2).

Multiplier effects

The sector shows strong multiplier effects. An increase in the final demand of

R1,000,000 will cause the following effects:

- 14 new employment opportunities would be created throughout the Vaal economy;
- The Vaal's GGP would increase by R942,000;
- Household income would increase by R640,000.

7.2.3 Classification of key economic activities

Summary of linkages

Table 7.6 gives a summary of the backward linkages of the different sectors of the Vaal economy and Table 7.7 gives a summary of the forward linkages of the different sectors of the Vaal economy.

As shown in Table 7.6, the sectors with the highest backward linkages (i.e. these sectors which are the most dependent on other local economic sectors for inputs) are:

- **Tourism & entertainment** **87.2%**
- Trade 83.2%
- Services 67.9%
- Construction 49.2%
- **Manufacturing** **49.1%**

TABLE 7.6 BACKWARD LINKAGES OF THE DIFFERENT SECTORS OF THE VAAL ECONOMY (PERCENTAGES) (2000)

Sector	1	2	3	4	5	6	7	8	9	10
Linkage	Agriculture	Mining	Manufacturing	Electricity gas & water	Construction	Trade	Transport	Financing	Services	Tourism
Backward linkage (labour included)	16.4	22.3	49.1	36.7	49.2	83.2	15.4	16.9	67.9	87.2

Backward linkage (labour excluded)	9.6	19.9	38.1	6.3	36.7	51.7	2.9	6.4	46.4	48.4
Labour / Total input	6.8	2.4	11.0	30.4	12.6	31.5	12.5	10.5	21.4	38.8
Import / Total input	73.8	69.3	43.7	33.0	45.9	2.9	75.2	68.7	6.6	3.0

• Source: Calculated from input-output table 2000.

TABLE 7.7 FORWARD LINKAGES OF THE DIFFERENT SECTORS OF THE VAAL ECONOMY (PERCENTAGES) (2000)

Sector \ Linkage	1	2	3	4	5	6	7	8	9	10
	Agriculture	Mining	Manufacturing	Electricity gas & water	Construction	Trade	Transport	Financing	Services	Tourism
Forward linkage	60.2	75.1	33.5	58.6	11.3	23.3	10.5	16.5	62.0	42.6
Export/ Total output	17.7	24.9	53.9	24.3	20.7	10.0	49.3	52.8	9.0	9.3

• Source: Calculated from input-output table 2000.

An increase in the demand for tourist and entertainment services would also mean a higher increase in demand for the products of the economic sectors supplying inputs to the tourism and entertainment sector. Although the trade, services and construction sectors also have high backward linkages, these sectors should not be considered as key sectors to stimulate the economy as their growth is mainly dependent on the growth of the local economy. If the economy of Emfuleni grows as the result of an increase of money flowing into the region, then there will automatically be an increased demand for services, trade and construction. As the main purpose of these sectors is to 'serve' the local economy, and as they have little potential to become more export orientated, these sectors cannot be used to stimulate the local economy. Only 10.0% (trade), 9.0% (services) and 20.7% (construction) of these sectors' output is exported.

Although the manufacturing sector does not have such a high backward linkage as the tourism & entertainment, trade, services and construction sectors, it has

the potential to concentrate more on export and in this way to increase its final demand, which in turn will lead to a growth of the local economy. It should also be noted that manufacturing imports 43.7% of its total input. Attention should be given to the possibility of import-substitution, in order to reduce the outflow of money out of the region.

The sectors with the highest forward linkages (most of their output is taken up in the local economic sectors) are (Table 7.7):

■ Mining	75.1%
■ Services	62.0%
■ Agriculture	60.2%
■ Electricity, gas & water	58.6%
■ Tourism	42.6%
■ Manufacturing	33.5%

An increase in the production of all of these sectors will mean an increase in the production of the forward linked sectors, provided there is sufficient demand for their products.

When it concerns the mining and electricity, gas and water sectors, it should be kept in mind that the input-output table covers the Vaal, and these sectors mainly operate in Metsimaholo, as most of the mining activities as well as the power stations are located there. The water section is located in Emfuleni, but as this sector is dependent on an increase in demand of other sectors or on an increase in demand for water from outside the region, this sector cannot be considered as having the potential to stimulate the local economy.

Agriculture has high forward linkages and it can be safely assumed that an increase in production in this sector could easily be taken up by the forward linked sectors. However, the constraining factor here is the limited availability of commercial farmland. Although this sector may not have many possibilities for expansion in commercial agriculture, it has great scope for expansion in the informal sector. If, for example, unemployed persons could make use of open

spaces around houses, open spaces along roads and idle land or land made available by the government for small-scale agriculture (vegetable gardens, etc.), this sector may to a great extent assist in alleviating poverty and reducing crime in Emfuleni (Slabbert & Slabbert 2002b:50).

Summary of multipliers

In Table 7.8 the sectoral multipliers of the Vaal economy are indicated. It states the effect that a R1 change in the final demand of a specific sector has on the economy of the Vaal. In the case of the labour multiplier, it states the effect of a R1,000,000 change in the final demand of a specific sector on the economy of the Vaal.

TABLE 7.8 SECTORAL MULTIPLIERS OF THE VAAL ECONOMY (2000)

Economic sector	Turnover	Income (GGP)	Imports	Labour (per R'million)	Remuneration
Agriculture	1.217	0.240	0.861	7.925	0.111
Mining	1.157	0.268	0.831	4.817	0.108
Manufacturing	4.772	0.396	0.813	5.120	0.229
Electricity/Gas/Water	1.325	0.785	0.586	6.191	0.404
Construction	1.198	0.434	0.813	7.172	0.270
Trade	2.073	0.867	0.637	14.296	0.551
Transport	2.147	0.293	0.860	2.818	0.167
Financing	2.072	0.331	0.806	4.206	0.150
Services & Other	2.500	0.866	0.527	20.110	0.428
Tourism and Entertainment	1.202	0.942	0.645	14.033	0.640

• Source: Nel 2001.

Note: Turnover, Income (GGP), Imports, and Remuneration per R1 change in final demand.

Employment per R1 million change in final demand

The sectors with the highest labour (employment) multipliers are:

- Services 20.1
- Trade 14.3
- **Tourism and Entertainment 14.0**
- **Agriculture 7.9**

- Construction 7.2
- Electricity, gas & water 6.2
- **Manufacturing 5.1**

If the final demand for the products of, for instance, the tourism and entertainment sector increases by R1 million, it will lead to the creation of 14.0 additional employment opportunities.

The sectors with the highest remuneration (or household income) multipliers are:

- **Tourism and Entertainment 0.640**
- Trade 0.551
- Services 0.428
- Electricity, gas & water 0.404
- Construction 0.270
- **Manufacturing 0.229**

In increase of R1 in the final demand for the products of these sectors will increase household income in the region by the amounts mentioned.

The sectors with the highest income (GDP) multipliers are:

- **Tourism and Entertainment 0.942**
- Trade 0.867
- Services 0.866
- Electricity, gas & water 0.785
- Construction 0.434
- **Manufacturing 0.396**

An increase of R1 in the final demand for the products of these sectors will increase the GDP in the region by the amounts mentioned.

The tourism and entertainment, trade and services sectors have the highest employment, remuneration and GGP-income multipliers. As discussed before, the trade and services sectors' growth is dependent on the overall growth of Emfuleni economy, but the tourism and entertainment sector has a great potential for attracting people (and therefore money) from outside the region.

The manufacturing sector has moderate multipliers, but they are not low. Because the manufacturing sector is the largest economic sector in Emfuleni, a small percentage increase in the demand for the products of this sector will have a considerable effect on the economy of Emfuleni as a whole.

7.3 Summary and conclusion

In this chapter, an input-output analysis of the Vaal provided tools for the identification of the key economic sectors of the Emfuleni economy. The 1993 input-output table for the area was updated to be relevant for the year 2000. As the Emfuleni economy forms an integral part of the Vaal economy (85% of the Vaal's population resides in Emfuleni, and Emfuleni contributes 69.3% to the GGP of the Vaal), it was neither possible nor desirable to construct an input-output table for Emfuleni alone. The input-output table was used as an instrument to measure the impact of changes within an economic sector on the economy.

As all the different sectors of the economy are linked to one another, forward and backward linkages are formed. Forward linkages show the extent to which the rest of the sectors in the Vaal are dependent on the sector concerned for inputs. Backward linkages illustrate the effect of a change in demand for the products of a specific sector on its demand for intermediate inputs derived from other sectors. The stronger the linkages of a sector with other sectors, the stronger the impact of a change in economic activity. It is axiomatic that sectors with strong linkages are therefore better suited for stimulating the economy on a whole than sectors with weak linkages. The effect of a change where weak linkages are present will be weak on the rest of the economy.

The sectors with strong backward linkages in Emfuleni and the Vaal are the tourism and entertainment sector, as well as the services and the manufacturing

sectors. However, although the services sector has strong sectoral linkages, this sector is not considered as a key sector for stimulating the economy, as its growth is dependent on the growth of the local economy. If the Emfuleni economy grows as a result of an increase in demand for products produced in the region (money flowing into the region from outside), there will be an increase in the demand for services. But when there is not an increase in the demand for products, this sector will not easily expand, as it is not very export oriented - therefore it is not considered as a sector to be used to stimulate the local economy.

As a result of the linkages between all the sectors of the local economy, a change in the final demand for products from a specific sector will lead to a change in production, turnover, household income and employment, not only in the sectors concerned, but also in the other sectors of the economy. This is called the multiplier effect. Mostly GGP income multipliers, household income multipliers and employment multipliers are used. Briefly, GGP income multipliers measure the change in the local economy's GGP income as a result of a change in output in a specific sector. Household income (remuneration) multipliers measure the change in household income and employment multipliers the change in employment in the area.

The sectors with the highest employment, remuneration and GGP income multipliers are the tourism and entertainment, as well as the trade and services sectors. Just as with the services sector, the trade sector is also dependent on the overall growth of the Emfuleni economy and has therefore little potential for attracting money from outside the region. The tourism and entertainment sector has a great potential for attracting people and therefore money from outside the region. *This sector can therefore be regarded as a key sector to be stimulated for income generation and employment creation in Emfuleni.*

The manufacturing sector has moderate multipliers. As the manufacturing sector is the largest economic sector in Emfuleni and because it has a large potential for attracting money from outside the region through an increase in exports, this sector can also be regarded as a key sector for income generation and employment creation.

It is evident that if the key sectors of the economy could be stimulated sufficiently, it would result in an increase in employment and household income. This, in turn, would lead to a decrease in the extent and depth of poverty. These sectors are the main sectors with a large potential to increase exports and therefore bring 'new' money into the region. This will, in turn, automatically stimulate the other sectors ('service'-providing sectors) like trade, services, financing and construction.

Although the formal (commercial) agricultural sector does not have much expansion potential (because of limited land available) and therefore does not have much scope for stimulating the whole economy in terms of GGP growth, informal and intensive agricultural activities have a high employment potential as well as the potential to alleviate poverty. Informal agriculture has a low cost input for creating employment opportunities (much lower than, for example, in the manufacturing sector). *With this in mind, the agricultural sector may also be regarded as one of the key sectors to be stimulated in Emfuleni.*