

Skilled labour forms an important factor because of its relatively high cost in the production of articles. This cost increases with the sophistication of the work done, hence the machine industry's greater dependency upon it than the iron and steel works. (figure 5.11).

Figure 5.11

Title: Labour costs as a proportion of the value of shipments of selected industries. USA 1962.

Source: U.S. Annual survey of manufacturers 1962 (Estall and Buchanan).

Optical instruments and lens	44%	All manufacturing	24%
Metal cutting machine tools	41%	Steel rolling and finishing	22%
Computing machines etc.	39%	Paperboard	19%
Millinery	34%	Paints and varnishes	17%
Footwear (excluding rubber)	32%	Basic chemicals	16%
Cutlery, handtools etc.	30%	Motor vehicles and parts	11%
Woman's dresses	27%	Meat packing	9%
Jewellery (precious metals)	27%	Flour and meal	6%
Cotton weaving	26%	Petroleum refining	6%

In the case of iron and steel, metal products and the machine industry, both the market and availability of skilled labour are to be found in the most developed parts of the P-W-V viz. Johannesburg and the East Rand; it is apparent therefore that there is a tremendous pressure on those industries to locate in the Central or East Rand.

2.4

The gold mining industry as a market.

The decline of the gold mines as a market for iron and steel, metal and engineering goods has continued, so that the mines consume less than 10% of the output of the majority of those concerns covered by the NRDC survey (figure 5.12).

Figure 5.12

Title: Number of concerns of the base metal (group 15) Metal products (group 16) and Machine industries (Group 17) supplying the gold mines.
Source: NRDC survey 1961

% of output	base metal (group 15)	metal products (group 16)	machine (group 17)
0 to 10	30	288	57
10 to 25	4	33	16
25 to 50	7	43	25
50 and over	8	43	36

The fact that the second highest number of concerns in all three groups supply over 50% of their output to the gold mines shows a degree of specialisation within these firms, to cater for the mining industry. It is unlikely that this number will increase in time, but on the contrary will form a smaller and smaller percentage of the total as the metal and engineering industry expands. The gold mines have remained a large employer of labour and a generator of foreign exchange. Their importance should not be underestimated. For example in Johannesburg in 1960 mining employed 2.55% of the economically active white population and 9.54% of the non-white (the lowest figures for the whole reef) as compared with 1.65% for whites and 1.73% for non-whites in the metal and engineering industry (1960 Pop. Census Vol. 2).

2.5

Distribution ratios

Distribution ratios have been calculated for the purpose of comparing each of the three groups of industries with one another. In each case the number of establishments occupied in the Base Metal Industry (group 15) was taken as one unit and divided into the other two groups (16 and 17). Johannesburg's ratios show a disproportionately large number of metal products and machinery establishments (fig. 5.13) in comparison to its base metal industries, while Vereeniging is below the P.W.V.'s average having more base metal working establishments (group 15) than metal products (group 16) or machine producers (group 17). This disproportion means that the industries of one area must supply the needs of other industries in adjacent areas. Therefore there is a strong interdependency between Johannesburg, Vereeniging and the East Rand. Again this acts as a centralising force in the location of industry.

Figure 5.13

Title: Ratios of the base metal (group 15) to the metal products (group 16) to the Machine Industry in the P.W.V. 1959/60, 1961/2, 1962/3 and N.R.D.C. Survey's ratios for 1961 and the 1968 Survey.

Source: Reports No. 283 (1966), I.C. 1959/60; No. 304 (1968) I.C. 1961/2; unpublished information from the Bureau of Statistics and the N.R.D.C. survey of 1961 and 1968 survey.

DATE	JOHANNESBURG			EAST RAND			WEST RAND			PRETORIA			VEREENIGING			P.W.V.		
	15	16	17	15	16	17	15	16	17	15	16	17	15	16	17	15	16	17
1959/60	1	11.97	4.87	1	4.95	1.82	1	7.0	2.0	1	9.5	1.5	1	2.22	0.89	1	7.49	2.7
1961/62	1	13.06	5.45	1	5.00	2.12	1	3.75	1.75	1	8.00	1.88	1	2.36	0.55	1	7.33	2.92
1962/63	1	13.38	6.03	1	5.40	2.40	1	4.50	1.40	1	7.10	1.70	1	3.55	1.09	1	7.58	3.15
NRDC																		
1961	1	10.63	3.58	1	5.17	2.26	1	25	4	1	12.67	1.33	1	3.17	0.67	1	7.75	2.54
SURVEY																		
1968	1	17.00	7.87	1	6.00	3.75	1	12	5	1	5.25	1.25	1	2.14	1.00	1	7.78	3.89

3. The Central Rand (Johannesburg, economic region 40)

3.1 The Base Metal Industry (group 15)

Many of the base metal (group 15) industries in the Johannesburg area are not iron and steel smelters and producers, although firms like George Stott and the mine workshops do smelt iron and steel. The small growth rate of this group in the Johannesburg area can be ascribed to the trend towards the development of secondary and tertiary metal industries as opposed to primary or basic metal industries in the area. It indicates that the majority of Johannesburg's metal industries use semi-processed or even finished articles in the production or manufacture of other goods.

3.2 The Metal Products Industry (group 16)

In the case of the metal products industry Johannesburg dominates the rest of the P.W.V. numerically. The majority of these establishments are smaller on average than the rest of the P.W.V. (Figure 5.14).

Figure 5.14

Title: Average number of persons per establishment employed in the base metal, metal-products and machine industry in the P.W.V.

Source: I.C. report 283 (1966) and 304 (1968)

<u>Economic area</u>	<u>1959/60</u>	<u>1961/62</u>
40. Johannesburg	46.1	44.9
41. East Rand	115.1	106.2
42. West Rand	108.5	84.1
43. Pretoria	220.1	176.0
44. Vereeniging	462.3	601.9

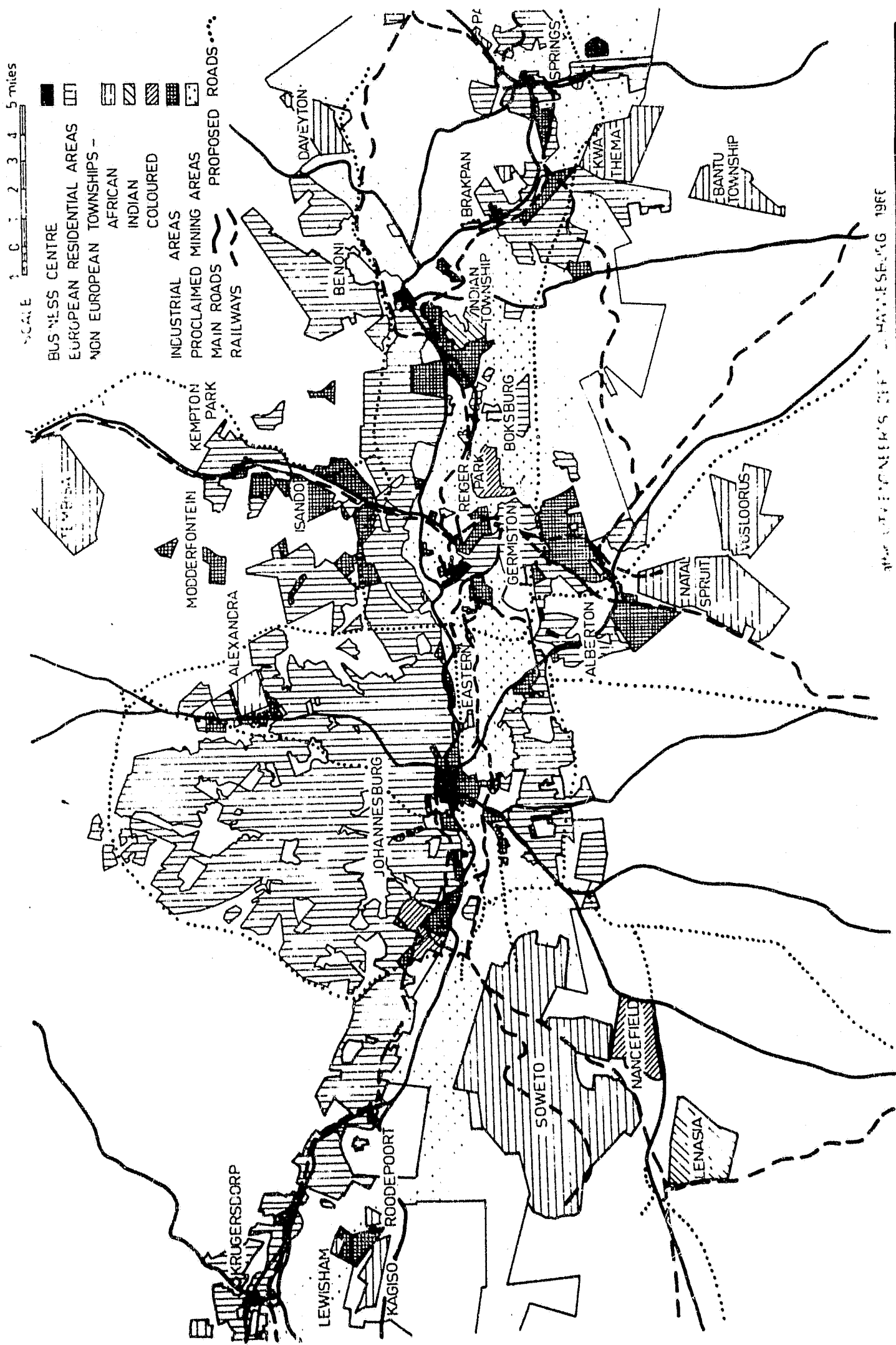
The tendency for Johannesburg to develop markedly smaller establishments indicates a regional emphasis on lighter manufacturing and engineering than anywhere else in the P.W.V. There is also a trend for the average number of workers per establishment to decrease (fig. 5.14). As development occurred (Figure 5.8) the productivity of all metal products workers rose. In 1959/60 the net output per metal worker was R998.50 per annum, by 1961/2 this had risen to R1155.00 p.a. (report 283 and 304). The 15.6% increase in the number of establishments between 1959/60 and 1962/3 was the lowest in the P.W.V. (Figure 5.5)

3.3 The Machine Industry (group 17)

Johannesburg also leads the P.W.V. numerically in the machine industry (group 17). Between 1959/60 and 1962/3 this category showed the greatest increase of all three groups in Johannesburg expanding 21% to include 192 establishments (Figure 5.1 and 5.4). This was the lowest growth rate of the P.W.V. The machine industry as part of Johannesburg's metal industry shows a tendency towards specialisation within smaller establishments and a high productivity per worker.

4. The East Rand

The rapid growth on the East Rand during the early sixties emphasised the regional differences of the Near East Rand and the Far East Rand. Different rates of growth and different types of development occurred in these two areas. They are therefore regarded as separate regions.



JOHANNESBURG CITY COUNCIL - MAY 1966

4.1

The Near East Rand (Kempton Park - Germiston - Alberton)

4.1.1 The Base Metal Industry (group 15)

There were nearly 12 establishments in 1959/60 on the Near East Rand (Figure 5.4) employing more than 1,697 persons of all races (Pop. Census 1960 Vol. 2). By 1962/3 the number of establishments rose to 17 (Figure 5.4) a growth rate of 16.6% p.a. twice that of the P.W.V. as a whole which had an annual growth rate of 7.6%. All of this expansion occurred in Alberton and Kempton Park.

The base metal industry followed the North/South trend in industrial development which was manifesting itself at this time (Fig. 5.15).

4.1.2 The Metal Products Industry (group 16)

Between 1959/60 and 1961/2 the number of metal products manufacturers increased from 101 to 157 (Figure 5.4) or at a rate of 18.48% p.a. as compared to 11.86% for the whole of the P.W.V. Again the most rapid growth occurred in Alberton and Kempton Park. In terms of workers there was a strong Southward movement of job opportunities (Figure 5.16). The axis developed both North/South and East/West linking Johannesburg and Benoni, Kempton Park and Alberton. By 1962/3 Germiston alone had 122 such establishments more than twice that of Boksburg which was second with 42 (Figure 5.4).

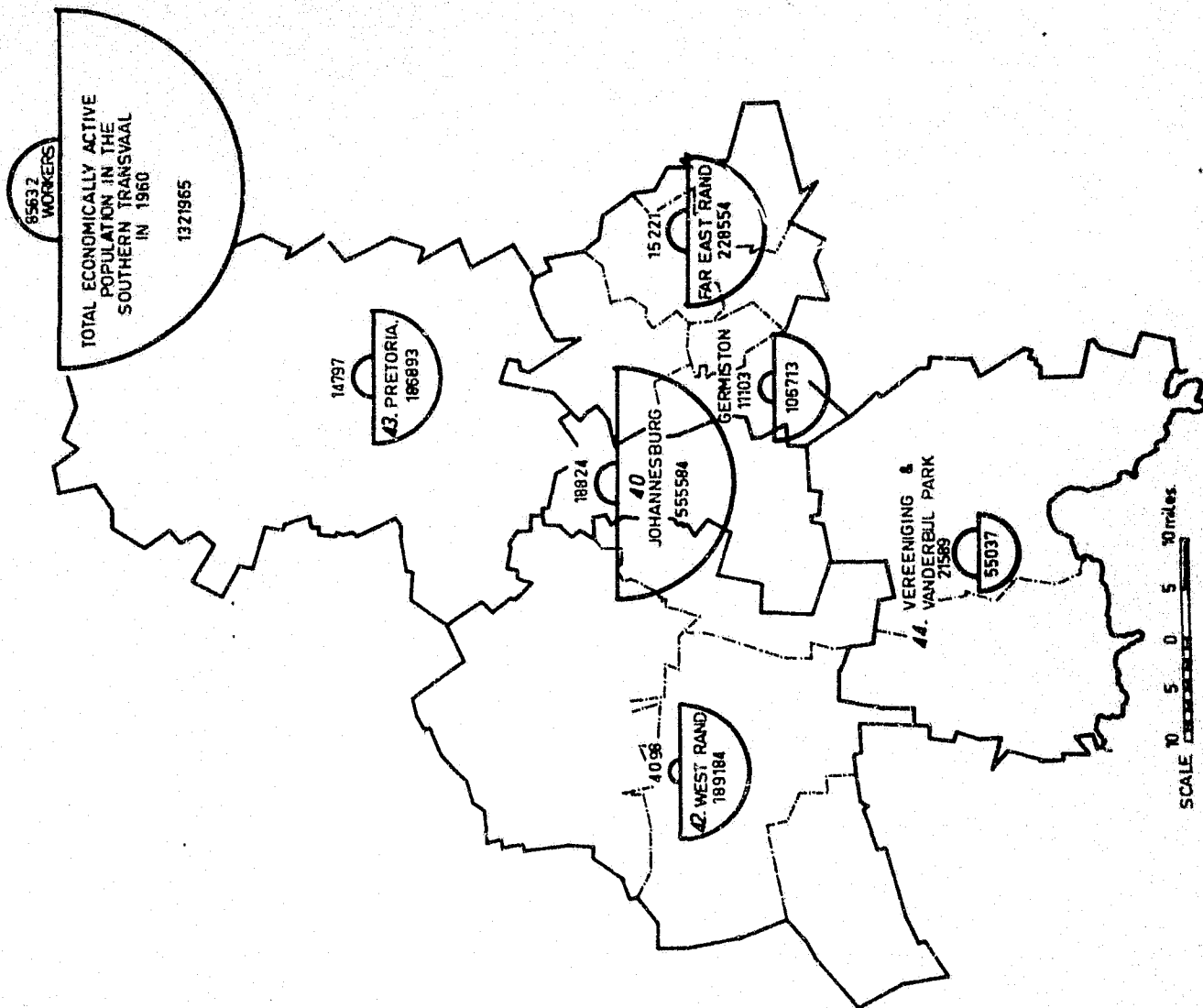
The output of the metal products industry continued to rise throughout 1962 to 1964. This trend is shown by the destination of pipes, tubes and fittings in metal products (Figure 5.17).

Figure 5.17

Title: The destination of pipes, tubes and fittings 1962, '63 and '64.

Source: Board of Trade and Industry's Survey covering the Republic, report No. 6 Part I (1966).

— ECONOMIC DISTRICTS
 --- MAGISTERIAL DISTRICTS



DISTRIBUTION OF THE TOTAL ECONOMICALLY ACTIVE POPULATION AND BASE METAL, METAL PRODUCTS AND AGRICULTURAL MACHINERY WORKERS. 1960.

Source:- Population Census September 1960 Vol. 2. Reports 1 to 12.

Industry	Percentage of total distribution value		
	1962	1963	1964
a) Manufacturing	29.9	31.7	28.2
b) Non-manufactur.	65.0	61.7	65.9
1) Construction & building industr.	5.8	4.7	4.4
2) Merchants	20.7	21.5	21.7
3) Mining	13.2	12.5	10.5
4) SAR & H, Gov & Local authorities	9.9	10.1	16.3
5) Other	15.4	12.9	13.0
c) Exports	5.1	6.6	5.9
Total value in R 000's	42,141	46,162	54,952

Although there was a steady increase in value from R42 million to R55 million, the percentage consumed by the mines declined from 13.2% to 10.5%, while the only dramatic increase was the consumption by the S.A.R. and Harbours and local and Government authorities, an indication of the increased spending which helped create a boom period but also encouraged inflation. The continued increases in demand promoted expansion within the metal industry. This trend continued throughout 1965.

When compared with Johannesburg the Necr East Rand establishments tended to be bigger employing an average of 75.7 as compared to 42.8 for Johannesburg, although Boksburg and Springs had even higher averages (Figure 5.18).

Figure 5.18

Title: Employment on the East Rand

Source: Report No. 283 (I.C. 1959/60) pub. 1966

Area:	1959/60								
	base metal (group 15)			metal products ^a (group 16)			machinery (group 17)		
	No.	%	av./est.	No.	%	av./est.	No.	%	av./est.
Alberton	-	-	-	-	-	-	-	-	-
Germiston	1648	32.2	149.2	7275	40.5	78.21	5877	48.9	183.7
Kempton P	n/a	n/a	n/a	376	2.0	47.0	n/a	n/a	n/a
Boksburg	543	10.6	77.6	5539	30.8	158.2	624	5.2	69.3
Benoni	2412	47.1	219.3	1550	8.8	60.9	3270	27.2	192.3
Brakpan	173	3.4	43.3	125	0.7	25.0	848	7.1	84.8
Springs	341	6.7	68.2	3091	17.2	118.9	1429	11.9	129.9
total	5117		135.8	17,956		93.1	12,028		169.3

The largest number of metal workers on the East Rand (7,275) was found in Germiston with ten percent more than Boksburg (fig. 5.18). This means that Germiston should have the largest pool of skilled labour on the East Rand, an attractive factor to industry. The comparatively low average for Germiston (fig. 5.18) is an indication of the large number of concerns already established in the region and forming a market for other industrial products. These factors enhance the attraction of Germiston, although its position as the communications centre of the Witwatersrand is one of the prime reasons for its present development.

4.1.3 The Machine Industry (group 17)

The machine manufacturing industry's growth rate was 23.5% p.a. between 1959/60 and 1962/3. The number of establishments in the Kempton Park - Germiston - Alberton axis rose from 34 to 53 (Figure 5.4). 5877 workers or 48.8% of the East Rand's machine production workers were employed in Germiston (Figure 5.18). The average number of workers per establishment being surpassed only by Benoni with 192.3 vs. 183.7 for Germiston.

Alberton and Kempton Park showed a growth rate of 450% for new establishments or 150% p.a. during the period 1959/1963. A trend which strengthened the axis and increased its productivity and market potential. Also this is a clear indication of the pressures on industry to centralize.

4.2 The Far East Rand (Boksburg - Benoni - Brakpan and Springs)

4.2.1 The Base Metal Industry

The Far East Rand has a well developed base metal industry which is second only to Pretoria and Vereeniging in importance. The main area is in Benoni (fig. 5.3) where the number of establishments increased from 11 to 14 over the period 1959/60 to 1962/63 (Figure 5.4), a growth rate of 9% p.a. For the Far East Rand as a whole the increase was 27 to 31 or 4.9%. The number increased in all the towns except Springs, (fig. 5.4) so that the far East Rand exceeds all other areas numerically in the P.W.V. In terms of employment, Benoni had 2,412 base metal workers or 47.1% of all those on the East Rand. (fig. 5.18). This number was exceeded only by Pretoria with 12,588 and Vereeniging with 14,493 (1961/2)(Report 302). Yet the industry formed an important part of the Far East Rand's industrial complex producing R4,201,000 net worth of goods in 1959/60 (report 283).

4.2.2 Metal products (group 16)

The number of establishments in this category on the Far East Rand increased from 90 to 102 between 1959/60 and 1961/62, an annual growth rate of 4.4%; this is considerably lower than the 18.48% of the Near East Rand and the 11.86% of the P.W.V. In Benoni the number decreased from 24 to 21 (Figure 5.4). The number of workers employed was highest in Boksburg 5539 which had 30.8% of the East Rand total followed by Springs with 3091 (17.2%)(Figure 5.18). The average number of workers in Boksburg was 158.2 and in Brakpan 25.0 (Figure 5.18). The strength of Boksburg's metal industry (Figure 5.15). These two towns function as an integrated area industrially, forming one of the nodes offering working opportunities and potential for growth (Figure 5.15). Together they produced R11,236,000 worth of goods in net output in 1959/60 or R312,000 more than Germiston. The low growth rate reflects a tendency for smaller businesses to establish in Johannesburg so that Benoni suffered a net loss of establishments during this period.

4.2.3 The Machine Industry (group 17)

The number of establishments rose from 47 in 1959/60 to 57 in 1962/3 exhibiting an annual growth rate of 7.7% (Figure 5.4). Benoni and Brakpan showed no growth, but Springs increased its number from 11 to 19.

The numbers employed were the highest in Benoni with 3270 workers or 27.2% of the East Rand's total followed by Springs with 1,429 (11.9%)(Figure 5.18). The average number of workers per establishment on the East Rand was highest in Benoni (192.3). Springs averaged 129.9, which was third highest. Consequently Benoni's industries tend to be large concerns specializing in heavy machinery, requiring great capital investment and therefore exhibiting a slow growth rate, while Springs machine producers are smaller and more numerous, specializing in lighter machines, some agricultural but the majority engineering. This development shows a second node on the Far East Rand situated towards the south of the mining land, adjacent to the white and non-white residential areas (Figure 5.15). The main lines of communication run east-west and north-south linking Nigel and Heidelberg to the South (Figure 1.8) with the east-west development of the Far East Rand.

The West Rand (Economic region 42)

Only 13,940 persons of the 189,184 economically active were engaged in manufacturing on the West Rand in 1960 and of those only 4,098 were employed in the base metal industries (Figure 5.16).

5.1 The Base Metal Industry (group 15)

The total number of establishments rose from 4 to 10 between 1959 and 1963, an increase of 150% or 50% p.a. (Figure 5.4). In 1961 they produced a net output of R2,688,000 or 2.66% of the P.W.V.'s total (Fig. 5.8). The average number of employees per establishment was 114 in 1961/2 (report 304) versus 135.8 on the East Rand. In comparison to the rest of the P.W.V. this area's base metal establishments are of minor importance (figure 5.3). The most significant developments occurring at Krugersdorp and Roodepoort where non-ferrous metal smelting accounts for two of the four establishments.

5.2 The Metal Products Industry (group 16)

Between 1959/60 and 1962/63 the total number of establishments rose from 28 to 45, an increase of 20.2% p.a. (Figure 5.4). In 1959/60 the 20 establishments in Krugersdorp employed 1,816 persons or 90.8 workers per concern as compared to 93.07 persons on the East Rand. The total number of metal product workers on the West Rand amounted to 1,838 in 1961 or 3.86% of the P.W.V.'s total (report 304). The net output in 1961 was R3,886,000 or 4.34% of the P.W.V. The most rapid growth occurred in Roodepoort and Krugersdorp (Figure 5.4). Roodepoort's growth results from its proximity to Johannesburg and the industrial areas of Maraisburg and Crosby, while Krugersdorp exists to serve local demand (Figure 5.15).

The lack of industries on the West Rand results in a greater reliance upon gold mining and work opportunities elsewhere in the P.W.V. to generate economic activity within the area. There does appear to be a direct correlation between the percentage of persons employed in the gold mining industry in any given area of the P.W.V. and the number of metal and engineering establishments in the area (Figure 5.19).

Figure 5.19

Title: The total economically active percentage of the population engaged in the gold mining industry 1960, and the number of base metal, metal products and machinery establishments during 1959/60.

Source: Population census 1960 Vol. 2 No. 8, 9, 10, 11 and 12 and report No. 280 I.C. 1959/60 (1966).

<u>Metropolitan Area</u>	<u>Gold Mining</u>		<u>No. of Metal Establishments</u>
	<u>% white</u>	<u>% non-white</u>	
Johannesburg	2.55	9.54	55
Germiston	4.18	19.20	136
Far East Rand	19.04	47.62	167
West Rand	29.68	70.32	40

This underlines the importance of the metal industry, because as the total number of establishments rises the area becomes less dependent upon gold mining. The metal industry is therefore a indicator of industrial and manufacturing development as a whole i.e. trends which manifest themselves in the metal industry can be expected to become the norm for industry. The West Rand is therefore more dependent upon gold mining than anywhere else in the PWV.

5.3

The Machine Industry (group 17)

The West Rand's machine industry grew at a rate of 25% p.a. The number of establishments rising from 8 to 14 (1959/60 to 1962/63)(Figure 5.4). Roodepoort and Krugersdorp have the greatest number although the growth appears to be evenly spread throughout the area. In 1961/62 the net output of the region amounted to R3,277,000 or 5.35% of the PWV's total (Figure 5.8). During that same year these establishments employed 1,622 persons or 5.04% of the PWV's total. This meant that each concern employed an average of 115.8 persons as compared to 135.7 on the East Rand and 17.75 in Pretoria. The West Rand's ratio for the three industries was 1:4.5:1.5 while the PWV was 1:7.5:3.0 which indicates a below average performance on the West Rand (Fig. 5.13). In structure the concerns appear similar to those of the East Rand, only numerically there were fewer of them so that their total effect is much less than those of the East Rand.

Of the 14 concerns only one produced agricultural machinery, the rest manufactured industrial, mining and construction machinery. A similar breakdown is observed on the East Rand where 9 of the 91 establishments were engaged in the production of agricultural machinery.

As gold mining declines on the West Rand, industrial growth must occur to replace the work opportunities. The West Rand has no north/south lines of communication so development has occurred parallel to the outcrop in an east/west direction. To the north white residential areas serve some industry close to the outcrop while road and rail access are in an east/west direction. To the South the mining belt isolates Soweto (Figure 5.15) so that future industrial development can only occur in an east/westerly direction on the mining lands.

6.

Character of the Witwatersrand

The Witwatersrand forms a distinctive region within the Transvaal. Although it is linked with both Pretoria and Vereeniging areas by road and rail, they tend to be peripheral and secondary in size and importance to the Witwatersrand, which consists of a core with Eastern and Western spurs.

L.P. Green and Dr. Fair's work (1965) on population growth in South Africa has both indicated and emphasised the Witwatersrand as a separate region from the rest of the Southern Transvaal. Briefly their arguments can be summarised as follows:-

- A. There is a general movement of population - both white and non-white towards the urban conurbations from the rural areas;
- B. the Witwatersrand Metropolitan complex increased at a greater rate than the rest of the country before the War, but since then other centres like Durban and Cape Town have developed;
- C. the Southern Transvaal and the immediate peripheral zone accounted for 12.5% of all races in 1911 and 24.5% in 1960, and 23.4% of the whites in 1911 and 41.7% in 1960. This prompted Dr. Fair's statement that "an enlarged core consisting of a system of cities", is emerging.
- D. On the basis of a statistical assessment of the core (Johannesburg) of the Metropolitan region, L.P. Green forecast that the population of the magisterial districts of Johannesburg, Germiston and Roodepoort would form an ever increasing percentage of the population of the Witwatersrand Metropolitan Region (Johannesburg C.E.D. 1966).

It can be argued on the basis of population alone that the Witwatersrand and especially the Central core forms a distinct area of its own. L.P. Green argues that the area forms a region of its own by virtue of its urban and industrial development.

"The Chief industrial areas are situated along the East-West corridor of mining and manufacturing which stretches with few significant gaps almost fifty five miles from Springs to Krugersdorp and Randfontein. The mining and industrial off-shoots of this main corridor have grown in the directions of Kempton Park and Palmietfontein, to the north and south of Germiston along the north-south railway line, and a significant decentralisation is thus taking place presumably because of transport considerations and lack of space in the main corridor". (Johannesburg C.E.D. 1966).

He then goes on to distinguish an inner and an outer metropolitan area according to population density concluding that:-

"The Metropolitan region as a whole thus approaches 1 000 square miles in area, its inner zone covers up to 340 square miles, and its outer zone extends over a further 500 - 600 square miles. It tends to coincide with the magisterial districts of Springs, Brakpan, Boksburg, Benoni, Germiston (including Kempton Park), Johannesburg and Roodepoort, and the municipal areas of Krugersdorp and Randfontein". (Johannesburg C.E.D. 1966).

It is important to see the Witwatersrand as a whole within the P.W.V. The Pretoria and Vereeniging areas tend to be peripheral to the Witwatersrand, even as far as the metal industry is concerned. There are also a number of interdependencies which have developed in the metal industry within the Witwatersrand.

The East Rand forms an industrial wing to the Witwatersrand which must eventually replace the gold mining industry as an employment and wage generator. The rapid growth of the Kempton Park - Germiston - Alberton axis has emphasised regional differences within the East Rand. Construction and building on an unprecedented scale is changing the character of the East Rand. Most construction has occurred on the Central Rand followed by the axis towns (Figure 5.20).

Figure 5.20

Title: Value of Industrial Buildings constructed 1961 - 1965.
Source: "Metropolitan Johannesburg" C.E.D. Report, 1966 Johannesburg.

<u>TOWN (1961-1965)</u>	<u>TOTAL IN R MILLIONS</u>
Johannesburg	17.14
Rondepoort	0.72
Germiston	5.52
Alberton	3.77
KEMPTON PARK	9.83
Boksburg	2.80
Benoni	4.10

The large scale northward expansion of industry is a new trend for the PWV. Tremendous developments occurred at Kempton Park where R 9.83 million worth of industrial building was constructed (Figure 5.20). The growth of the metal and engineering industry in the axis has resulted in a trend towards industrial and commercial activities similar to those of Johannesburg. As the area becomes more developed, the average number of workers per establishment drops and the ratio of white collar to blue collar rises (Figure 5.21).

Figure 5.21

Title: Relationship of white to blue collar workers on the Witwatersrand 1960.
Source: 1960 Population Census Vol. 2 Nos. 8, 9, 10, 11 and 12, Pub. 1968.

<u>AREA</u>	<u>WHITE COLLAR</u>	<u>BLUE COLLAR</u>	<u>RATIO</u>
Johannesburg	113 728	62 871	1.8:1
Germiston	16 142	16 849	1.0:1
Far East Rand	26 519	32 009	0.8:1
West Rand	18 392	20 030	0.9:1

More commercial and service industries within the axis towns can be expected to develop to satisfy the demands of an ever-increasing industrial complex and social sophistication. These activities will be able to

serve the rest of the East Rand in some of the ways that Johannesburg has served the Witwatersrand in the past. The greater number of industries and higher population densities of Johannesburg have resulted in an increase in administration and service industries, necessitating the employment of more white collar workers than elsewhere in the P.W.V. As the ratio of white collar to blue collar workers approaches 1:1, there is an increased demand for consumer goods and services (including recreation) which may initiate a local economic take off whereby enough regional capital is generated for investment and additional growth is stimulated.

In the case of the Kempton Park- Germiston - Alberton axis, local capital has played a relatively minor part, location being the major factor in attracting capital investment. The axis lies along the north/south lines of communication crossing the established east/west development at Germiston. This means that the axis is close to the country's major market with good access to the rest of Southern Africa.

The growth of the metal and engineering industry has been most rapid on the Near East Rand. On the Far East Rand Boksburg has shown steady growth but Benoni's machine industry appears to be stagnating as a result of industrial land shortages and competition from other areas. Springs has had a decline in base metal production, but the machine industry has shown marked growth. Two industrial nodes have become apparent, one includes the Boksburg/Benoni complex, and the other at Springs. An interdependency is developing between the Far East Rand towns but not to the same extent as Germiston and Johannesburg. All industrial development has occurred along the major lines of communication (Figure 5.15), which means that the Far East Rand's industries have suffered from a lack of good access to the Central Rand and have had to develop a degree of interdependency. As mining declines, the metal and engineering industries of the Far East Rand have developed other markets and a greater degree of self sufficiency. The highest growth rate occurred in the machine industry followed by the base metal workings (Figure 5.22).

Figure 5.22

Title: Increase in the number of establishments on the Far East Rand 1959/60 to 1962/63.
Source: Report No. 283 I.C. 1959/60 (1966) and Bureau of Statistics data unpublished.

<u>INDUSTRIAL GROUP</u>	<u>NUMBER</u>	<u>PERCENTAGE</u>
15 Base Metal	5	19.2%
16 Metal Products	12	13.3%
17 Machinery	10	21.2%
	27	16.5%

Although the greatest number of establishments are metal products manufacturers, the rapid growth of the base metal industry is indicative of a regional trend. The Far East Rand is developing as a distinct region producing smelting base metals required by the metal producers who in turn are supplying a rapidly growing machinery industry. This means that the area is much less dependent upon Johannesburg or Iscor than it had been in the past. The region must also supply areas outside itself with some of its finished goods, i.e. if the metal industry is to continue to develop in this area, other industrial areas must expand to form a market for its finished metal products.

Excluding Vereeniging the average number of workers per establishment was highest on the East Rand which indicates that the East Rand has remained a region of medium heavy manufacturing. (Figure 5.23). It can be expected to continue to grow, especially as mining land to the south becomes available.

Figure 5.23

Title: Average number of workers per establishment 1961/62.
Source: Report No. 304 I.C. 1961/62 (1968).

<u>REGION</u>	<u>BASE METAL</u> (Group 15)	<u>METAL PRODUCTS</u> (Group 16)	<u>MACHINERY</u> (Group 17)
40. Johannesburg	47.6	43.20	48.5
41. East Rand	135.8	87.8	135.7
42. West Rand	114.0	61.3	115.8
43. Pretoria	1573.0	38.9	17.7
44. Vereeniging	1317.0	266.1	743.8
P.W.V.	349.6	64.4	91.2

The East Rand is likely to continue to develop as the medium heavy workshop of the P.W.V. because of the factors listed below:

Physical

- A. Availability of flat land;
- B. good communications;
- C. ready available industrial land and power.

Human

- A. The population is over 525,202 and second only to Johannesburg with 1,149,273 (1960 Census);
- B. the East Rand is NOT a dormitory area to Johannesburg;
- C. an industrial manufacturing infra structure already exists, making the establishment of new industries easier than in undeveloped areas;
- D. the town councils and management committees are aware of the decline of the gold mining industry and actively encourage industrial growth.

The most important factors in the Witwatersrand's inter-relationships can be summarised as follows:-

1. Johannesburg has a marked tendency towards smaller establishments and has proportionally more metal products and machine industries than the rest of the Southern Transvaal. Johannesburg has developed more as a commercial centre (Figure 5.23 and fig. 5.3) and has not attracted heavy metal industries.
2. The near East Rand includes Germiston which was always an important junction. It has developed as node of both the north-south and east-west development of the East Rand. Because of its interdependence with Johannesburg it has links with both the Central and East Rand. In as far as the metal industry is concerned it has developed into the most important town on the East Rand, being the centre of the Kempton Park - Germiston - Alberton axis.
3. The Far East Rand, which includes Boksburg, Benoni, Brakpan and Springs has developed its own industrial centres and interdependency. Benoni has specialised in the basic metal

industry, while Boksburg, Benoni and Springs all have metal producing industries, machinery is also manufactured. The Far East Rand is also developing some regional specialisation in the metal industry with two more or less distinct areas. There is an increasing interdependency between them.

4. The West Rand has not developed to the same degree as the East Rand. The metal industries are the smallest in total employment of any area in the P.W.V. There is a dependency upon gold mining on the West Rand, where the mines are younger than those of the East Rand. The development of the metal industry is hampered by a lack of other industry; flat land and a relatively small economically active population, which is largely dependent upon Johannesburg for its employment. The West Rand could develop into a large middle class dormitory area, but with the use of old mining land for industrial and residential purposes it is likely that development will take place southwards.
5. The communications of the Witwatersrand as a whole are complementary to the main axis of economic activity in the area (Green 1957). This consists of the heavily trafficked railway system connecting the Reef towns and the parallel Main Reef road which carries more industrial and commercial traffic than any other road in the Republic. In contrast to the lineal pattern is a radial system of national roads centred on Johannesburg and connecting Pretoria, the West Rand, Vereeniging and Heidelberg areas. (Figure 1.8 and 5.15). There is a similar radial pattern of railways which connects these areas with Germiston. The inner metropolitan hub of Johannesburg also has a local radial pattern of roads.

There is an inner and outer metropolitan area in the P.W.V., Vereeniging and Pretoria form a peripheral region to the Witwatersrand which is basically a region of secondary metal industries. There are some exceptions, notably Dunswart and Scaw Metal Works in the iron and steel industry and the gold refineries which are classified as base metal (group 15) industries. The Witwatersrand has become a manufacturing area, which applies to the iron and steel, and metal industries as well as any other.

Since 1959/60 the three groups of the metal industry employed 97,293 of a total of 1,321,965 persons engaged in some form of economic activity in the P.W.V. and of those 64,816 were employed on the Witwatersrand (Figure 5.6 and 5.7). By 1961/62 the Witwatersrand had 68,605 of all employees engaged in the three groups while only 41,183 were engaged in the heavy metal industries of the Vereeniging. Therefore the Witwatersrand can be considered as a separate unit, not only from the question of population and urban development, but also in as far as the economy is concerned.

7. Pretoria (Economic Region 43)

7.1 The Base Metal Industry (Group 15)

The number of base metal establishments increased from 6 to 10 during the period 1959/60 to 1962/63 (Figure 5.4) an increase of 66.7% (Figure 5.5) or 33.3% per annum. The total number of workers engaged in the industry fell by 575 from 13,163 to 12,588 (report No. 283 and 304) but output increased from R33,741,000 to R35,496,000 over the same period which means that the productivity per worker rose from R2555 p.a. to R2818 p.a. for all races. The decrease in the number of workers could have been due to the completion of the extensions which had been carried out at Iscor since the early fifties. This R112,000,000 expansion and modernisation scheme was completed during the early sixties, but even before this Iscor had embarked upon an even bigger expansion scheme, costing up to R560,000,000 and scheduled for completion in 1972. The major portion of this however will be spent on the Vanderbijlpark Works.

By 1964/65 the 550 morgen site at Pretoria was producing 1,303,000 ingot tons of iron and steel or about 10,000 tons more than in 1957. This would seem to discount the Iscor works as the source of the decrease in base metal workers, since the 1964/65 record year was preceded by annual increases in production. The combined production of Pretoria and Vanderbijlpark rose steadily throughout the 1960's with peaks during 1961, 1965 and 1967 (Figures 4.11 and 4.12). Pretoria has been surpassed by the Vanderbijlpark Works, where production is increasing more rapidly than at Pretoria.

Five of the six Pretoria establishments in 1959/60 were engaged in the Iron and Steel industry as were five of the eight establishments in 1961/62 (reports 283 and 304) the remaining establishments smelted other ores. The presence of the Iscor works at Pretoria is important to the city and the Witwatersrand.

The fact that the average number of persons employed per metal working establishment in 1959/60 was 220 (Figure 5.9), must be due to Iscor's large employment. By 1961/62 the average number of persons employed per metal working establishment fell to 176, as a result of the increase in the total number of metal industries and a decrease in the Iscor Work's staff. It should be noted that of the 15,305 persons employed in the three groups of industry, 12,588 or 82% were engaged in the basic metal (group 15) industries.

Therefore 9% of the establishments employed 82% of the metal workers. It is clear that in 1961/62 Pretoria's metal industry was heavily dependent upon the basic iron and steel industry, and that despite the decrease in the average number of persons employed per establishment, the dominance of the Iscor Works remained very marked, as it employed about 12,000 persons at that time. The dominance of Iscor over Pretoria's metal industry has resulted in an imbalance of smelting to other engineering establishments. Iscor has produced iron and steel since 1934, but it has been sold on the Witwatersrand, which had remained the major market for the city's metal products. Despite the comparatively long time that Iscor has been in production in the area, the region has not overcome the dominance of the Works. Production at Iscor has increased as the demand on the Witwatersrand has increased. Pretoria's Iron and Steel Industry is linked directly to the manufacturing industry of the Witwatersrand. Pretoria which had suffered from a lack of work opportunities, still has a legacy of 'poor' suburban areas. In fact as indicated by the drop in the average number of persons employed per metal establishment, it is only very recently that any development in the manufacturing of metal goods has occurred.

In so far as the metal industry is concerned, Pretoria by virtue of its monotypic nature has become a peripheral area to the Witwatersrand. The region cannot develop an industrial complex through the Iscor works alone, but must have secondary and tertiary metal establishments to help diversify its metal industry and increase its manufacturing industry. The iron and steel produced by the steel mills cannot be utilised directly by the manufacturing industry. It often has to be processed by secondary and tertiary metal industries, before it is utilised by the manufacturing industry. The iron and steel of Iscor comes to the manufacturers via the construction and building trade, the metal products and alloy industry, the machine and engineering workshops and the wholesale iron and steel yards. Manufacturers cannot be fed on the rich diet of steel mills, they must have the engineering and metal industry to pre-digest the steel products.

At the same time the output of the steel mills are determined by demand from the metal and engineering industry, which in turn is dependent upon the manufacturer for its market. Initially, gold mines had been the market for the metal and engineering industry, but with the decline of the gold mining the metal industry is more and more dependent upon the manufacture for its market.

Therefore Pretoria's iron and steel industry will remain directly linked to, and dependent upon the Witwatersrand (where 73% of its market is) until such time as Pretoria is able to develop its own metal and engineering industry, to supply manufacturers with their metal requirements (Figure 5.24).

Figure 5.24

Title: Distribution of Iscor Sales 1964.

Source: Iscor's annual report 1964.

<u>Type of iron and steel</u>	<u>tons sold in the Rep.</u>	<u>Amount sold in PWV (tons)</u>
Blooms, billets, forgings	79,445	78,262
Sections and bars	352,304	275,862
Rails and accessories	69,317	23,849
Rod and wire	262,518	215,554
Plates	341,438	286,392
Sheets and strip	578,510	493,867
Tinplate and backplate	47,788	24,239
S.A.R. Rails	86,592	
Other products to S.A.R.	86,081	
Total	<u>1,903,933 (100%)</u>	<u>1,398,025 (73%)</u>

The establishment of a large integrated mill alone is not sufficient to support the growth and expansion of industry. The recent development of industry in the Pretoria area can be ascribed to Government support of a border industrial area and not from the development of Iscor.

Therefore despite the fact that Pretoria encompasses a very important part of the metal industry, upon which much of the Witwatersrand metal and engineering industry is based, it remains a peripheral area outside the main region of the metal and engineering industries activities. This could alter with the development of

industry in the Pretoria area, but is not likely to occur until such time as Pretoria loses some of its dependency upon a single sector of the metal industry.

7.2

The Metal Products Industry (Group 16)

The total number of establishments rose from 57 to 71, during the 1959/60 to 1962/63 period, an increase of 24% or 8% p.a. (Figure 5.4 and 5.5). The net output increased only slightly from R3,516,000 to R3,529,000 (Fig. 5.8) while the numbers employed rose from 2,465, to 2,491 an increase of 26. This meant that the 64 establishments of that year employed an average of 39 persons per establishment as compared to 61 for the West Rand, 88 on the East Rand and 43 for Johannesburg (Report 283). Therefore Pretoria's metal products manufacturers have smaller establishments than Johannesburg and that these establishments are consequently concentrating on lighter goods than those produced elsewhere in the P.W.V.

Although the Pretoria area does exhibit a tendency to develop small metal establishments and notwithstanding comparatively rapid growth of the metal products (group 16) industries in recent years within the area; it has still a great dependency upon the basic iron and steel industry for its industrial activity since Iscor employed almost one third of the 31,223 persons engaged in manufacturing in Pretoria in 1960 (1960 Census) (Figure 4.5).

7.3

The Machine Industry (Group 17)

The number of establishments increased from 9 to 17 during the 1959/60 to 1962/3 period, an increase of 88.9% or 26.3% per annum (Figure 5.4 and 5.5). The net output rose from R270,000 to R364,000 which was 0.59% of the total output of the P.W.V. In 1961/2 the 15 establishments employed only 226 persons - an average of 15 persons per establishment as compared to the 9 establishments in 1959/60, which employed 213 persons or an average of 24 persons per establishment. Employment in this industry amounted to 2% of the total of all employees in the three industrial groups in Pretoria in 1961/62 (Reports 283/1966 and 304/1968).

The machine industry of Pretoria remains insignificant despite the high growth rates. Being on the periphery of the P.W.V. it cannot compete with the East and Central Rand, and has to overcome their competition in the local Pretoria market. The machine industry requires an industrial infrastructure to support it, such as exists at Springs.

8.

Vereeniging and Vanderbijlpark (Economic Region 44)

8.1 The Base Metal Industry (group 15)

The total number of establishments increased from 9 in 1959/60 to 11 in 1962/3, an increase of 22.2% or 7.4% p.a. (Figure 5.4 and 5.5). This expansion has occurred at Vereeniging which numerically dominates Vanderbijlpark. Of the six base metal (group 15) establishments in Vereeniging in 1959/60, five were engaged in the production of iron and steel, with only one establishment smelting non-ferrous metals. At the same time the three establishments at Vanderbijlpark were all iron and steel producers. In Vereeniging the six establishments employed 5,825 persons or about 971 persons per establishment. This amounted to 10.58% of the total economically active population and 35% of all workers engaged in the metal industry in the Vereeniging - Vanderbijlpark area (Figure 4.5). During the same period Vanderbijlpark had an average of 786 persons per manufacturing establishment, which means that the three base metal (group 15) establishments would have employed only 2,358 workers. Since the Iscor Works there are larger than the Pretoria Works, it is likely that this figure was closer to 12,000. This means that a large percentage of the working population was engaged in the production of iron and steel in 1959/60 (Figure 4.5).

The 1961/2 Census published some figures for the whole of region 44, which showed that the 11 establishments employed 14,493 persons or 1,317.5 per establishment and that this figure constituted 55.98% of the total number of persons engaged in the three groups of the metal industry. This figure is considerably lower than the 82% employed in Pretoria in the base metal industry which employed 12,588 persons or 1,574 per firm, because Iscor Headquarters are in Pretoria. The numbers employed in Vanderbijlpark are unrecorded which makes comparison with Vereeniging difficult, but the three groups employed 13,353 persons in Vereeniging in 1959/60. The 1960 population Census, (Figure 4.5) on a slightly different basis, showed that there were 21,589 metal workers employed in the whole area, therefore there were approximately 8,200 workers in the Vanderbijlpark metal industry. ++

+ Employment figures were not published by the Bureau of Stats. in 1959/60 Census. (Report No. 283 (1966)).

++ This may be a little low but is the only figure which can be computed from available data. The industrial census of 1959/60 (Report No. 283) was carried out on a different basis, both in areas and categories of industries to the Population Census of 1960 (Vol. 2 Reports 8, 9, 10, 11 and 12). In the case of Vereeniging the area in each report coincide so that differences arise from the classification of industries.

Thus the Vereeniging Works employ more people than the Vanderbijlpark Works so that Vereeniging is the more important centre, both in the number of base metal (group 15) establishments and in the numbers employed. Iscor's largest Works are at Vanderbijlpark and together with the Pretoria Works produce over 70% of South Africa's iron and steel. Of Iscor's total capacity of 2,350,000 ingot tons during the early 1960's Vanderbijlpark supplied 1,250,000 ingot tons. By 1967 the total output of molten iron was 3,037,000 of which Vanderbijlpark produced 1,742,098 tons while Pretoria only produced 1,294,909 tons. The total steel ingot production during the year was 3,150,797 tons, and an increase of 293,619 tons or 10½% over the figure for the previous financial years. In future it is hoped to boost the Vanderbijlpark Work's production to 3,650,000 ingot tons and Pretoria's Works to 1,500,000 ingot tons. However the expansion programme could not develop as scheduled, because of the anti-inflationary measures of the Government, but notwithstanding this, it is hoped that the total annual output will reach 5,150,000 ingot tons by the early seventies. (Ischor 1968).

In 1968, despite the fact that production at the Vanderbijlpark Works was expected to surpass the Pretoria Works by about 500,000 ingot tons, the numbers employed at the Vanderbijlpark Works were 12,305 as compared to 13,849 at Pretoria. Unfortunately, figures detailing the numbers employed in the Works as compared to those employed in the offices are not available, but it is possible that because administration is centred at Pretoria, that the total number of employees there is greater than those at Vanderbijl Park.

Ischor is by far the largest producer of iron and steel in the country (figure 4.12). The second largest iron and steel producing works, the Union Steel Corporation, is also situated at Vereeniging.

'Usco is today next to Iscor the biggest steel producer in the Republic. Close co-operation exists between Iscor and Usco and other steel producers. Usco is believed to be the biggest single producer of hollow drill steel in the world.' (Department of Information 1963).

Usco is considerably smaller than Iscor, producing 190,000 ingot tons in 1960, it has made a valid contribution to the metal industry, particularly within certain ranges of specialised steel. Usco produces a variety of specialities such as tool and drill steels and secondary steel products without fear of destructive competition from the semi-official Iscor. The close co-operation allowed private Iron and Steel

firms to develop and obtain a share of the country's market. Iscor is not intent upon gaining monopoly at the expense of these smaller private producers.

"At its two Works at Vereeniging, the Union Steel Corporation (Usco) produces steel in open hearth furnaces and electric arc and induction furnaces. Usco is rolling ingots into light sections and special products such as hollow drill steel for mining, tool shock resisting, three-ply, solid drill and other alloy steels. It is one of the world's biggest producers of hollow drill steel. Their steel rod and wire department produce coiled rod in mild steel, wire and chain steel, bolt and nut steel, electrode steel and spring steel." (Dr. C.M. Kruger - 1964).

Usco also scheduled an expansion programme for the 1960's which cost R20,000,000 and will result in an increased output of special steels, as well as giving added employment to the country.

The African Metal Corporation (AMCOR) also in Vereeniging, produced 2,230 ingot tons of ferro-alloys during 1963. This company specialises in the production of certain alloys, selling these in South Africa and exporting them. The company, like Usco, is partially owned by Iscor and does not compete with Iscor directly, selling in the least competitive fields of the market. The firm began an expansion programme in 1963 costing R18,000,000. A start was made on one of the world's largest blast furnaces (28 ft diameter) at Newcastle, Natal. This will increase the company's annual production to 3,230 tons and 60% of this increase is to be sold outside the Republic mainly to Japan, where the Yawata iron and Steel Company has placed an order for R150,000,000 worth of cast iron.

These three companies account for 4 of the 11 iron and steel producing establishments in the Vereeniging - Vanderbijl Park area in 1963. They also account for a large percentage of South Africa's total iron and steel production. Approximately 1,500,000 ingot tons or about 57% of the country's entire production of iron and steel (Isco, 1965).

By 1962/63 the ratio of the three groups of Industry in Vereeniging were 1 : 3.55 : 1.09 (Figure 5.13) well below Pretoria and P.W.V. emphasising the importance of the base metal industry to the region.

The high percentage of basic metal establishments and special iron and steel works in the area means that the population is highly dependent upon this sector of the metal industry for employment. In fact the whole town of Vanderbijl Park is directly dependent upon the large Iscor Works for its existence. Nearly 50%

of the entire economically active population of the area in 1960 were engaged in the metal industry. (Figure 4.5)

In 1961/2, 23% of all the metal establishments in Vereeniging were basic metal firms as compared to 9% in Pretoria and 5% in Johannesburg. Vereeniging is even more of a specialist area than Pretoria employing more people in the basic metal industry than any other area in the P.W.V. or the rest of Africa.

The region has always been an important steel producing area ever since USCO started production in 1913 (see chapter 1). This specialisation has given the area a dependency upon the Witwatersrand as a market (figure 5.24), but it has allowed the development of a labour pool specialising in steel production, which supports the region's heavy industries. Unlike Pretoria, Vereeniging has never suffered from inadequate economic development or opportunity. During the period 1959/60 - 1962/3 when Pretoria's labour force in the metal industry decreased, Vereeniging's increased (figure 5.6 and 5.7). This was inspite of the fact that Vereeniging has a much smaller population than Pretoria. (figure 4.3) (Almost 300 000 less). The emphasis on the basic metal industry has been dominant (figure 5.4 and 5.5), but has allowed the industry to improve itself. With the close proximity of various large basic iron and steel firms operating in the area, problems were more easily solved than they might have been, had the firms been separated. The co-operation between the bigger establishments has made this even easier. This has resulted in South Africa being among the cheapest iron and steel producers, while price increases remained the lowest in the world. For example between 1939 and 1963, Iscor's prices increased by about 125%, while the U.S.A.'s went up about 175% and the U.K.'s by 280%. Belgium and Australia's steel prices increased by over 300% during the same period. This means that today Iscor produces plate steel, reinforcing angle iron, rails and wire rod at figures well below those of the United Kingdom, U.S.A., Western Germany, France, Belgium, and Australia (Figure 5.25).

Figure 5.25

Title: Comparative Prices in Rands per small ton * of iron and steel from various countries and Iscor. (1963)

Source: "Pillars of the South African Economy" - Department of Information Pamphlet 1965.

Type of Iron or Steel	ISCOR	U.K.	West Germany	France	Belgium	Australia	U.S.A.
Plate 20' 5' 1/4'	63.8	76.4	89.8	85.2	97.0	68.7	94.4
Re-inforcing Angles 5" 5 1/2"	59.0	72.1	65.9 ^x	63.7 ^x	64.7 ^x	62.2	91.2
	57.0	68.6	76.5	72.6	78.8	64.3	87.2
Rails 90lbs per yd	57.0 [@]	74.4	82.9 ^x	76.0 ^x	82.6 ^x	63.8	86.5
Wire Rod 5 gauge	60.9	71.3	77.1	69.7	81.3	60.1	101.9

* Prices for all countries, excluding Australia and South Africa are those published by the British Iron and Steel Federation and adjusted for railage in the case of "delivered" prices.

@ This price is for 96 lbs per yard rail.

x Basic Bessemer Steel (Also known as Thomas Steel). All other figures are in respect of open hearth steel, which is normally more expensive than Bessemer Steel.

The industry was also favoured by the geographical distribution of its raw materials. Iscor's sources of iron ore and coking coal, are found on both the north and the south of the Witwatersrand (Figure 1.3). This means that the materials do not have to be taken through the congested Witwatersrand before processing, but only the finished article need to be carried into the conurbation. Iron ore from Sishen goes mainly to Vanderbijlpark - a distance of over 300 miles, while manganese comes from Lohathea, a similar distance. Limestone comes from Taungs, and coking coal from Glencoe and Dannhauser, and also travel about 200 miles to Vanderbijlpark. Pretoria receives its iron ore from Thabazimbi, about 100 miles away, while the coking coal comes from Clewer, Broodsniersplaas and Vandyksdrif in the Eastern Transvaal, all within 100 miles. There are no definite rules concerning which area

supplies which works, but generally Pretoria draws its raw materials from areas north of the Witwatersrand. The fact that despite the long distances travelled by the raw materials, the works are still able to produce iron and steel at the world's lowest prices, points to a remarkably efficient system of production and distribution. The Southern Transvaal is unique in this as it is unique in the fact that development of the Vereeniging iron and steel industry, aids the growth of secondary metal industries - NOT in its area - but primarily on the East Rand. This is because the major market for Iscor's products are to be found in this region (see below).

8.2

The Metal Products Industry (Group 16)

The number of establishments rose from 20 to 39 during the 1959/60 to 1962/3 period, an increase of 95% or 31.8% p.a. (Fig. 5.4 and 5.5). Their net output increased from R10,010,000 to R14,016,000 which was 16.4% of the PWV, third after the Central and East Rands (Fig. 5.8).

In 1961/2 the 26 concerns employed 6,917 persons or 26.75% of the metal workers in the area at an average of 266.1 persons per establishment as compared to the 16% or 2,491 workers in Pretoria with an average of 39 persons per establishment. The average size of the Vereeniging establishments is much greater than those found anywhere else in the PWV, - even the East Rand, which has the next largest average number of employees, amounts to only 88 persons per establishment. This also emphasises the difference between Pretoria and Vereeniging. Except for the Iscor Works, Pretoria's metal industry had more than twice the number of metal products industries as Vereeniging, but employed less than half the number of Vereeniging. In terms of numbers employed, the Vereeniging metal products industries were of much more importance than Pretoria's industries. The volume of work done and its value far surpass Pretoria's metal products manufacturers. Large concerns like Vecor are metal products manufacturers. This firm announced an expansion programme costing R3,000,000 during the early 1960's. Vecor was specifically established by Iscor for heavy engineering projects. Vecor produces all requirements for steel mills and can maintain all the heavy equipment used by them. In addition to the production of equipment for Iscor, Vecor produces heavy equipment for all sectors of the economy, including the gold mines, Sasol, the Highveld Steel and Vanadium Company, Amcor and numerous other establishments. This industry is closely tied to the basic metal industry and has been established in an area of relatively intense steel production. Other heavy engineering concerns like Stewarts and Lloyds have developed in the area, because of the concentration of iron and steel

works. Of the 26 establishments in 1961/2, there was only one establishment engaged in manufacturing metal pipes and pipe fittings; tinware and cables, fencing wire and wire products. There were two establishments specialising in beaded and threaded articles and the remaining 21 firms who employed only 1,990 of the 6,917 workers in this field, were engaged in "other metal products". In contrast to Pretoria there were no decreases in any of the categories during the 1959/60 - 1961/2 period.

Separate figures for Vanderbijlpark and Vereeniging have not been published since 1959/60 at which time Vereeniging had 15 metal product industries and Vanderbijlpark 4. The Vanderbijlpark establishments included a new tin processing plant which had been erected by Iscor for the utilisation of the country's tin ore mined and beneficiated at Uis. The greater proportion of the metal products manufacturers were to be found at Vereeniging.

The large size of metal products industries in the region is indicative of their economic integration with the heavy base metal industry. Their main market is within the Vereeniging region and they do not compete directly with the medium heavy metal products industry of the East Rand.

8.3

The Machine Industry (Group 17).

Numerically the machine industry of Vereeniging appears insignificant. There was an increase of 150% between 1959/60 and 1962/3 (Figure 5.5) or 50% per annum, when the number of establishments increased from 8 - 12 (Figure 5.4). Output rose from an estimated R6,926,000 to R9,973,000 (Figure 5.8) or 16.11% of the P.W.V.'s total as compared to Pretoria which produced only 0.59% of the P.W.V.'s total. By 1961/2 there were only three agricultural machinery producers and three industrial, mining and construction machinery establishments in the entire region. These six firms employed 4,463 or 17.25% of all metal workers in the area with an average of 744 persons per establishment. One of the largest averages anywhere in the country. When compared to Pretoria where 15 establishments employed only 226 persons or 15 persons per establishment during the same period, it is clear that the Vereeniging industries are of more significance than Pretoria's, as compared to the East Rand's which had a gross output of R49,524,000 during that same period and employed an average of only 136 persons per establishment.

Vereeniging's lower numerical value, with its greater over-all economic productivity puts it ahead of Pretoria in this field. Despite the fact that there are fewer metal establishments in the Vereeniging area, they employ a larger total than Pretoria does.

9. The Development of the P.W.V.

The early sixties was a period of growth for the base metal industry. The consumption of raw materials rose by 14.6%, while output increased by 24.7% (Figure 5.26).

Figure 5.26

Title: Output of Base Metal industries sampled by the Board of Trade and Industry.

Source: Report No. 6 B.O.T.I. (1968).

<u>Type of Production</u>	<u>1962</u>		<u>1963</u>		<u>1964</u>	
	Tons (000)	Rand (000)	Tons (000)	Rand (000)	Tons (000)	Rand (000)
Pig Iron	2,334	52,326	2,397	53,997	2,909	62,737
Spiegeleisen	12	330	12	332	n/a	n/a
Ferro-alloys	198	11,646	218	13,491	266	18,833
Final rolled and extruded steel	n/a	131,668	n/a	149,943	n/a	165,559
Rough castings	269	31,799	311	38,899	346	45,955

The country's total output of pig iron has increased from 2,443,500 tons in 1962 to 3,755,800 tons in 1966 (SEIFSA) 1968. The physical output of pig iron increased at a rate of 8.7% per annum during the first ten years after the second World War and at a rate of 10% per annum in the years 1956 to 1965 (B.O.T.I. Report No.6 1968). There was a similar increase in steel production so that by 1964 3,650,000 tons of steel valued at R76,723,000 were produced per annum (Fig. 5.27).

Fig. 5.27

Title: The Steel Making Industry 1962/4.

Source: Report No. 6 B.O.T.I. (1968)

Consumption of metals and ores.	1962		1963		1964	
	Tons	Rand	Tons	Rand	Tons	Rand
a) Pig iron	1,789	40,385	1,944	43,834	2,203	49,803
b) Iron and steel scrap	1,205	16,994	1,338	19,302	1,475	22,149
c) Ferro-alloys	27	2,783	27	2,706	30	3,104
d) Non-ferrous metals and scrap	1	363	1	438	1	631
e) Ores	156	861	167	994	141	1,041
	3,178	61,287	3,477	67,281	3,850	76,728

This rapid expansion occurred in the peripheral areas of the P.W.V. i.e. in Pretoria and Vereeniging. The Vereeniging area is the most important iron and steel producing region in Africa and has a population dependent upon this specialisation. Between 1951 and 1960 the population of the area decreased from 153,003 to 120,569. The population engaged in industry (1951) amounted to 23,034 (Figure 4.2) and that in manufacturing in 1960 was 27,137 (Figure 4.5). There was an increase in the number of blue collar workers of establishments engaged in the metal industry, by 1960 the Vereeniging and Vanderbijlpark region had the lowest number of economically active persons of any economic region in the P.W.V. (Figure 4.5). Of the 55,037 economically active persons, 27,137 were engaged in some form of manufacturing and of these 21,589 or 77% were engaged in the basic metal, metal products and agricultural machinery industries. This is the highest percentage in the P.W.V. (Figure 4.5).

The peripheral nature of Vereeniging differs from Pretoria's comparative industrial isolation. The development of Sasolburg across the Vaal River and Free State Gold fields to the South-West give the region an infra-structure different to that of Pretoria, but it remains peripheral to the Witwatersrand conurbation, for basically similar reasons as Pretoria. The Vereeniging area may be considered a peripheral region because : -

- A. It does not have the same population densities or urban development which the Witwatersrand has;
- B. It is separated from the Conurbation by relatively undeveloped land;
- C. It does not have the same mining background as the Witwatersrand;
- D. It does not have the same degree or type of industrial development which the Conurbation has.

The Vereeniging region is of great importance to the industrial development of the PWV, because it contributes more in terms of basic metal requirements than any other region. In 1961 the value of goods produced exceeded that of Pretoria by R91,013,000 in all three groups of industry (Figure 5.8) and employment by 10,573 (Figures 5.6 and 5.7). In 1961/2 Vereeniging had R86,573,000 invested in land, buildings and machinery for these three groups. Pretoria had R51,200,000, Johannesburg R22,009,000 and the East Rand R40,160,000, but the Vereeniging area had the highest net output of any area in the whole of the PWV. (Fig. 5.8). The three groups totalled a net output of R73,583,000 which was followed by the East Rand with R70,870,000. In comparison to this Pretoria's net output amounted to only R39,389,000 less than Johannesburg's which was R56,171,000 (Fig. 5.8). The Vereeniging and Pretoria areas had the highest output in the base metal industry and the lowest in the machine industry, while Johannesburg and the East Rand were lowest in the base metal industries and the highest in the metal products industries, but still being higher than Vereeniging and Pretoria in the machine industry. The heavy industrial areas of Vereeniging are not only important in as far as output is concerned, but also as areas upon which the Witwatersrand and especially the East Rand is dependent. Pretoria's value relates only to its basic iron and steel production, while Vereeniging is developing a specialised secondary metal industry. Industry could spread southwards from Wadeville and Albertyn, especially as the old mine lands become available and the southern areas are developed. It is unlikely that Vereeniging will develop into an integrated part of the Witwatersrand within this century. Its metal industry is very strongly tied to industry on the East Rand and especially to the heavier industrial areas of Germiston and Benoni. Despite this it is peripheral to the Witwatersrand, remaining a very specialised metal area with a degree of interdependence with the Witwatersrand. Vereeniging supplies heavy equipment and iron and steel to the Witwatersrand which in turn processes it and markets it both on the Witwatersrand and elsewhere in the country, with comparatively little going back to Vereeniging, which is a specialised market area.

The movement of iron and steel is more or less one way - from the ore mines to Pretoria to Vereeniging and from there inwards to the Witwatersrand where it is consumed or processed and marketed in the area and elsewhere in the country. Because Pretoria and Vereeniging are on the edge of the manufacturing region and not at its centre they are unable to develop secondary and tertiary metal industries to a large extent within their own towns. Despite regional differences within the P.W.V., the whole functions together as a highly industrialised zone. Specialisations are developing in some areas within the P.W.V. where the metal industry is concentrating on one or other aspect - such as the trend towards medium heavy works on the East Rand, and lighter manufacturing units in the Johannesburg region. If only the metal industry is considered, regional differences are apparent but not as marked as when population trends are considered. It should be noted that the whole of the P.W.V. consists of a number of regions which are all interconnected and inter-dependent, so that even though Pretoria and Vereeniging are peripheral areas, they are still integral parts of the Pretoria - Witwatersrand - Vereeniging complex.

The growth of smaller metal manufacturing concerns on the Witwatersrand resulted in the development of a skilled labour shortage which first began to manifest itself during the early sixties.

"The need for special skills is a further factor of importance in influencing and explaining the location of industry. Some industries still call for a high degree of manual skill. Such processes often tend to concentrate at the point where the industry first grew up and this area naturally attracts newcomers in the business". (Estall & Buchanan 1965).

This concept can be applied to the industrial development of the Witwatersrand, but it is not likely to develop as marked a regional specialisation as say Sheffield in England. The skill of the craftsman is no longer as important as it was. Today new skills are required as new methods are developed.

"Mechanisation gives rise to a demand for super-skilled men both for the maintenance of expensive and intricate plants, and for such occupations as tool making, the importance of which is very greatly increased by mechanisation. Operatives skilled in particular trades are therefore still required, and their availability may have some influence on the location of industry in which they find employment". (Pol & Eco. Planning 1939).

What this means is that factories requiring a large number of European operators or requiring skilled workers to maintain their machines are forced to locate their factories within relatively densely populated European areas. Therefore these factories have to locate in the industrial areas of the P.W.V. This explains their present distribution (Figure 5.15), because in the P.W.V. the market areas coincide with the major skilled labour areas. Future development can be expected to occur as the general economy and government policy dictate, although growth usually results from the establishment of a new industry, this could alter, (Fig. 5.16) and growth occur through expansion of existing industries.

Fig. 5.28

Title: Establishments Planning expansion on present sites 1961.

Source: N.R.D.C. Survey 1961 (unpublished).

<u>INDUSTRY</u>	<u>YES</u>	<u>NO</u>	<u>UNCERTAIN</u>	<u>TOTAL</u>
15. Base Metal	14	23	12	49
16. Metal Products	97	174	136	407
17. Machinery	27	48	59	134
TOTALS	138	245	207	590

In 1961 only 138 or 23% of the firms covered by the N.R.D.C. Survey admitted having plans for expansion, while the majority i.e. 245 or 40% said they had no plans for expansion. In view of developments this indicates a tendency for new concerns to develop as demand grows instead of older established concerns expanding to fill these needs, but the application of the Physical Planning Act (86 o- 1967) could alter this.

10. Summary

From both the industrial Census and the N.R.D.C. Survey figures a number of facts have become apparent:

A. Vereeniging and Vanderbijlpark led the P.W.V. in both investment and production of base metal products.

- B. Pretoria's position as a metal producer ranks very much below that of Vereeniging and Vanderbijlpark, being superseded by both Johannesburg and the East Rand in terms of production value.
- C. The East Rand continued to develop as a market area for iron and steel and metal products.
- D. The tendency for the near East Rand to expand rapidly and develop independent regional characteristics, continued.
- E. A degree of specialisation in base metal was becoming more marked on the Far East Rand.
- F. The Gold Mines were decreasing in importance as a consumer of iron and steel products.
- G. Johannesburg continued to show a tendency to develop as a consumer of metal products more than a producer. This is borne out by the marked tendency for smaller concerns to establish in Johannesburg.
- H. The metal industry throughout the P.W.V. was developing and expanding rapidly.

It can also be concluded that the general patterns emerging from the N.R.D.C. Survey substantiate those determined in the study of the Industrial Census.

CHAPTER VI

THE LATE SIXTIES. 1965 - 1971.

1.0 Sources of Information.

Apart from private surveys, company journals, newspaper reports and Government announcements, there is no official data available covering the 1965-1970 period.

2.0 Economic Trends.

Despite the fact that the Government imposed a "credit squeeze" during 1966 and a severe budget in 1971 in an attempt to curb inflation, growth continued in the metal industry.

Economic indicators show that the metal industries group, up to 1965 experienced what we may wish to term a period of intense industrial activity'. (Drummond 1968)

Drummond (1968) has shown that employment in the metal and engineering industry rose from 175,000 in 1961 to 265,000 in 1965 while the gross annual output increased from R825 million to R1450 million. This is an annual increase in employment of 19.29% and in output of 15.15%. After 1965 the consumption of iron and steel products declined, but still remained higher than in 1965 (fig. 4.12). The production of castings also dropped after 1965 (fig. 6.1).

Figure: 6.1

Title: Production of castings in tons.

Source: SIE FSA Report, Drummond 1966.

<u>Date</u>	<u>Steel Castings</u>	<u>Grey iron castings</u>	<u>Non-ferrous castings.</u>
1963	89,800	193,700	9,700
1964	104,900	272,400	11,300
1965	123,400	252,800	12,100
1966	58,700	117,600	5,900

Castings production is always the first sector of the metal industry to react to economic changes.

There is always a time lag between the slow down in castings production and its impact on other sectors of the Group, notably those groups which are involved in the machinery of castings and the utilisation of castings as components for machinery and equipment'. (Drummond 1965)

In 1967 the demand for iron and steel was higher than in 1966 and Iscor's production of ingot steel exceeded the 1965 figure of 2,853,267 tons by 297,930 tons, to establish a new record output of 3,150,797 tons (fig. 4.12). Profits for Iscor were an estimated R9 million that year, which seems to indicate that the economic restrictions were effective in only some areas of the metal industry. Certainly the reduction in steel castings of 52.3% in 1966 meant that the period of rapid expansion had come to an end, but with the increase in local production in 1967, it is likely that castings again increased.

Despite credit restrictions there were a number of large expansion programs underway in the Transvaal, these included:-

- A. The production of stainless steel at Middelburg, Rand Mines and Eastern Stainless Steel Corp. of U.S.A. had formed the Southern Cross Steel Company (Pty) Limited, which became the country's first stainless steel mill. Of the 25,000 tons produced in 1966 only 7,000 tons were consumed locally, the rest was exported, mainly to Europe.
- B. The development of the Highveld and Vanadium Corp. Limited at Witbank with a total investment of R125 million.
By 1970 Highveld will be producing 480,000 tons of pig iron the majority of which will be converted to steel and 23 million pounds of vanadium-pentoxide contained in slag'. (Skinner 1968).
- C. Increased capital expenditure to augment steel output in existing steel production units. Iscor spent R48.5 million in 1965, R34.4 million in 1966 and R31.3 million in 1967 on 'extensions' under construction.
.....the Corporation is expected to reach an annual output of about 5,150,000 ingot tons by 1970. Of this tonnage the Vanderbijlpark works will produce approximately 3,650,000 and the Pretoria works 1,500,000 ingot tons. (Iskor 1967).
- D. Additional extrusion capacity in non-ferrous metal fields.
- E. Expansion projects for rolling and processing wrought aluminium.
- F. The Phalaborwa activities which will provide for local copper refining requirements metal products produced in the P-W-V.

The boom period resulted in much expansion with many articles being manufactured under license, but further sophistication is limited by the size of the local market.

"The South African market at this stage is too small for production runs enabling the use of automated systems"
(Drummond 1968)

The predicted growth rate per annum for the metal and engineering industry was expected to drop from about 12.5% in 1965 to 3% in 1966 and 1967 (Jacobsz 1966). In 1966 the carry over of orders was maintaining a demand, especially in the metal products industry, but incoming new orders were much lower than previously. As a result delivery times improved. Overtime was still being worked, but not as much as in 1965. The labour situation appeared to be improving at that stage because immigration was above the level required by the economic development programme council. Shortages of rolled steel products such as plates, sheets and sections were no longer so acute. This was partly due to the fact that imported steel had saturated the market and overstocking had occurred because of the slow down in the economy.

This situation was as applicable to the P-W-V as anywhere else in the Republic. Larger developments had slowed down, but were providing a market for the industry. However, because of past demand, iron and steel imports had increased tremendously (fig. 4.12) and the 1966 recession was adversely affecting local producers who had to compete in a saturated market. Despite the slow down, firms were able to continue production and even work overtime to reduce the backlog of orders which had accumulated during the previous boom period. The fact that these establishments were still fully occupied meant that the threat of inflation was still very near. As Dr. F.P. Jacobsz stated in 1965:-

"It is quite clear by now that the extremely rapid expansionary phase has come to an end and the iron and steel and engineering industry as a whole is still in the process of consolidation and re-orientation. This process is by no means completed, a fact which contributes to the persistent inflationary pressure and a further levelling off of economic activity is to be expected. This levelling off will be particularly pronounced in the sphere of investment or rather disinvestment in stocks and expenditure on durable consumable goods." (Jacobsz 1965 page 14).

The average increase for iron and steel and engineering industry was in fact 3½% during 1966 (Dr. Jacobsz 1967) and increases for the various sectors were:-

Basic metals + 2.5%

Metal Products + 0.77%

Machinery + 5.4%

Electrical Machinery + 5.7%

Transport Equipment + 9.0%

The basic metals industry (Group 15) maintained an expansion of 2.5% during 1966 possibly because of the numerous large scale development programme which continued despite the economic slow down.

In the case of metal products (Group 16) industries, a decrease of 0.7% indicates the extent to which the credit squeeze affected the manufacturing sector. In 1965 the "total intermediate demand" on metal products amounted to R314 million (Dept. Planning 1966) which means that the 1966 consumption must have been in the region of R312 million. In 1965 R147 million worth of basic steel products were consumed by the metal products (Group 16) industry and R45 million by the machinery industry (Group 17). This amounts to 51.76% and 15.8% of the "total intermediate demand" on the basic steel products worth R284 million (Figure 6.2)

The main customer of metal products (Group 16) was the construction industry in 1965 which consumed R77 million worth of goods or 24.52% of the "Total Intermediate demand", which amounted to R314 million (Figure 6.2). The next largest consumer of metal products was the metal products industry itself; R44 million or 14.02% of its output by value was re-consumed by it. (Fig. 6.2)

The gold mines were placed on the list of consumers, using only R10 million worth or 3.14% of the "total intermediate demand". The gold mines have been playing a smaller and smaller part in the market of metal products, although the mines consumption of basic non-ferrous products amount to R2 million or 1.5% of its "total intermediate demand". They were the largest consumers of machinery, taking 20.61% or R27 million worth of "total intermediate demand" of group 17 products. The second largest consumer of machinery was the industry itself taking R24 million or 18.32% worth of the "total intermediate demand". This was followed by agriculture, forestry and fisheries which consumed R17 million 12.97% and then quarrying which consumed R15 million or 11.45% (Fig. 6.2).

Figure: 6.2

Source: NDMF: 6th Business Outlook Conference. Re: address "The situation and prospects of the iron, steel and engineering sector" (Dr. F.P. Jacobsz) and economic development programme for the Republic of South Africa 1966 - 1971. (Dept. of Planning).

Title: Consumption Pattern of the Iron, Steel and Engineering Sector - Domestic Consumption of the Output of the Iron, Steel and Engineering Industry in 1965 - R. millions

Consumption Sectors	Sub-Divisions of Iron, Steel and Engineering Sector							Totals	
	Basic Steel Products	Basic Non-ferrous	Metal Products	Machinery (excl. Electrical machinery)	Electrical Machinery and Equipment	Transport Equipment (Excl. motor vehicles)	Motor Vehicles		
Agriculture, Forestry and Fisheries	6		5	17		2	6	36	% 1.4
Gold Mining		2	10	27	6	3		48	1.9
Coal Mining				2	2			4	0.2
Other mining and quarrying			6	15	2		1	24	0.9
Processed Food - stuffs			25	2				27	1.1
Furniture	3		5					8	0.3
Paper and Paper products			4	2				6	0.2
Basic industrial chemicals		3	4	2	1			10	0.4
Miscellaneous chemicals			8					8	0.3
Petroleum and coal products			11	2				13	0.5
Non-metallic mineral products	1		7	4				12	0.5
Basic steel products	11	8	19	9	3			50	2.0
Basic Non-ferrous metals	5	43						48	1.9
Metal products	147	22	44	6	1	1		221	8.7

(Continued) -

Figure 6.2 (Continued) -

Consumption Sectors	Sub-Divisions of Iron, Steel and Engineering Sector							Totals	
	Basic Steel Products	Basic Non-ferrous	Metal Products	Machinery (excl. electrical machinery)	Electrical Machinery and Equipment	Transport Equipment (Excl. Motor Vehicles)	Motor Vehicles		
Machinery (excl. electrical machinery)	45	5	14	24	3			91	% 3.6
Electrical machinery and equipment	8	29	8	7	27			79	3.1
Transport Equipment (excl. motor vehicles)	13	1	7	1	2	7		31	1.2
Motor Vehicles	7	2					171	180	7.1
Construction	15	7	77	2	32			133	5.3
Electricity, Gas and Water					5			5	0.2
Trade					1			1	-
Motor Trade and repairs					2		16	18	0.7
Transport and Communication	8		14		9	21	9	61	2.4
Miscellaneous Services	11		16		2			29	1.1
Office Equipment and services							8	8	0.3
Other Sectors	4	9	30	9	4	3	1	60	2.4
Total Intermediate Demand	284	131	314	131	102	37	212	1211	47.9
Private Consumption Expenditure			27	3	28	11	107	176	7.0
Current expenditure by Government	4		56	8	12	29	23	132	5.2

(Continued) -

Figure 6.2 (Continued) -

Consumption Sectors	Sub-Divisions of Iron, Steel and Engineering Sector							Totals	
	Basic Steel Products	Basic Non-ferrous	Metal Products	Machinery (excl. electrical machinery)	Electrical Machinery and Equipment	Transport Equipment (Excl. Motor Vehicles)	Motor Vehicles		
Gross Fixed Capital Formation			115	381	111	73	135	815	% 32.2
Change in Inventories	26	3	22	73	24	10	38	196	7.7
Total Final Domestic Demand	30	3	220	465	175	123	303	1319	52.1
Total Domestic expenditure	314	134	534	596	277	610	515	2530	100.0
<u>% Distribution of Consumption</u>									
Iron, Steel and Engineering Sector	75.2	82.1	17.2	7.9	13.0	5.0	33.2		
Total Intermediate Demand	90.4	97.8	58.8	22.0	36.8	23.1	41.2		
Total Final Demand	9.6	2.2	41.2	78.0	63.2	76.9	58.8		
% Contribution to Total Domestic Demand	12.4	5.3	21.1	23.6	10.9	6.3	20.4		100.0

One factor which emerges is the importance of the metal industries to themselves as markets.

Since the P-W-V has the largest number of metal and engineering establishments in the Republic it forms an attractive market. In 1965, the metal industry (Group 15,16,17,18 and 19) purchased R410 million worth of their products as compared to the gold mines which purchased only R48 million (Fig. 6.2). The metal industry is far more important to itself than the gold mines are to it.

The post-war development of the metal industry has resulted in its replacing gold mining as a work opportunity generator, despite increased output by the mines. The metal industry stimulates more industrial growth than the mines do,

because of its tremendous demand for metal products which result in a high forward and backward linkage with other industries. *

The average growth rate for the machinery industry in 1966 was 5.4% (Dr. Jacobsz). This large increase is indicative of the time required to effect a slow down of the economy. Trends develop slowly and measures such as the credit restrictions take time to be felt through all spheres of the industry.

The slow down would have to continue through 1970 to be effective (Jacobsz 1966) despite an official projected growth rate of 7% p.a. for the metal and engineering industry over the 1965-1971 period (Dept. Planning 1965). A comparison of figures shows how much lower the actual average expansion was, when compared to the official estimates (Fig. 6.3)

Figure: 6.3

Title: Estimated and actual growth in the metal and engineering industry for 1966

Source: Dr. Jacobsz (1966) Department of Planning, 5 year plan 1965.

<u>Industry</u>	<u>Actual growth rate (%) p.a.</u>	<u>Estimated growth rate (%) p.a.</u>
<u>Group 15</u>		
Basic Steel Products	3.3	8.0
Non-ferrous products	1.3	8.5
<u>Group 16</u>		
Metal products	3.0	6.0
<u>Group 17</u>		
Machinery	2.8	7.8

* A. O. Hirschman (1958) "The Strategy of Economic Development" Yale, New Haven.
 Forward linkage: defined as the value of inter-industry sales as a percentage of the total demand.
 Backward linkage: defined as the value of inter-industry purchases as a percentage of the total demand.

Growth rates have decreased from 10% and 19.2% p.a. during the first half of the decade (reports 283 and 304) to 1.3% and 3.3% p.a., which means that actual growth may be below the official estimate of 7% p.a. for the period 1965 to 1970.

Despite Government attempts to curb inflationary trends within the economy, the demand for iron and steel goods has continued to rise since 1966, surpassing the 1965 figure of 2.9 million metric tons in 1970, when an estimated record total of 3.4 million metric tons of rolled drawn and forged steel products were consumed in South Africa. (IsCOR annual reports 1964 to 1970). IsCOR was able to supply 74.8% of this demand as opposed to 66.4% in 1965. Imports amounted to only 3.9% (IsCOR Annual Report 1970).

Notwithstanding the steady increase in demand, IsCOR's profits have fluctuated between R22.7 million in 1967 to R15.0 million in 1970. This can be partially ascribed to the policy of maintaining as low a price as possible on IsCOR's products. e.g. since 1939 South Africa's manufactured goods have risen over 320%, while IsCOR's have risen less than 240% and have altered less than 50% since 1952 (IsCOR 1970). Wages and salaries have risen from R10 million in 1950 to R80 million in 1970 (IsCOR 1970). In addition, there is a skilled and semi-skilled labour shortage which has not been alleviated by two overseas recruiting companies (1968 and 1970).

The current economic slow down has not effected IsCOR's expansion programme. An estimated R1 300 million will be spent to increase IsCOR's annual capacity from 2.7 million metric ingot tons to 8 million metric ingot tons by 1980. (IsCOR Annual Report 1970).

The Vanderbijlpark works will reach an annual 3.7 million metric tons capacity by 1973 at a cost of R100 million.

The Pretoria works capacity will be rounded off at 1.5 million metric tons p.a. by 1972.

The Newcastle works are due to start production by 1973 and should have a capacity of 4 million metric tons p.a. Additions are already planned for completion by 1974/5.

Further extensions to IsCOR's production capacity are being planned.

"Consideration is also being given to building a fourth IsCOR works by 1984 and a fifth some ten years later. On the 1st August it was announced that five sites were

being considered as possible locations for a fourth and fifth Iscor works. One of these is East London, where the corporation judged it prudent to buy land against the possibility of one of the subsequent works being erected there". (I.G. Fleming, Iscor 1969).

Apart from the base metal industry expansion is expected to continue in the metal and engineering industry (SIEFSA 5/1/71). Since the mid sixties demand has increased steadily and production has risen with it. The growth rate is expected to be 7% during 1971 with production reaching an estimated R2 400 million. Engineering is not expected to match the 9% growth rate experienced during 1970, but exports could again rise by 6% as they did in 1970, earning the country R185 million.

Increased expenditure by the railways, Escom, Post Office and other public bodies as well as capital spending by the private manufacturing sector is expected to benefit the industry through 1971 (SEIFSA, S.A. Fin. Times 5/1/71)

3.0 THE 1968 SURVEY:

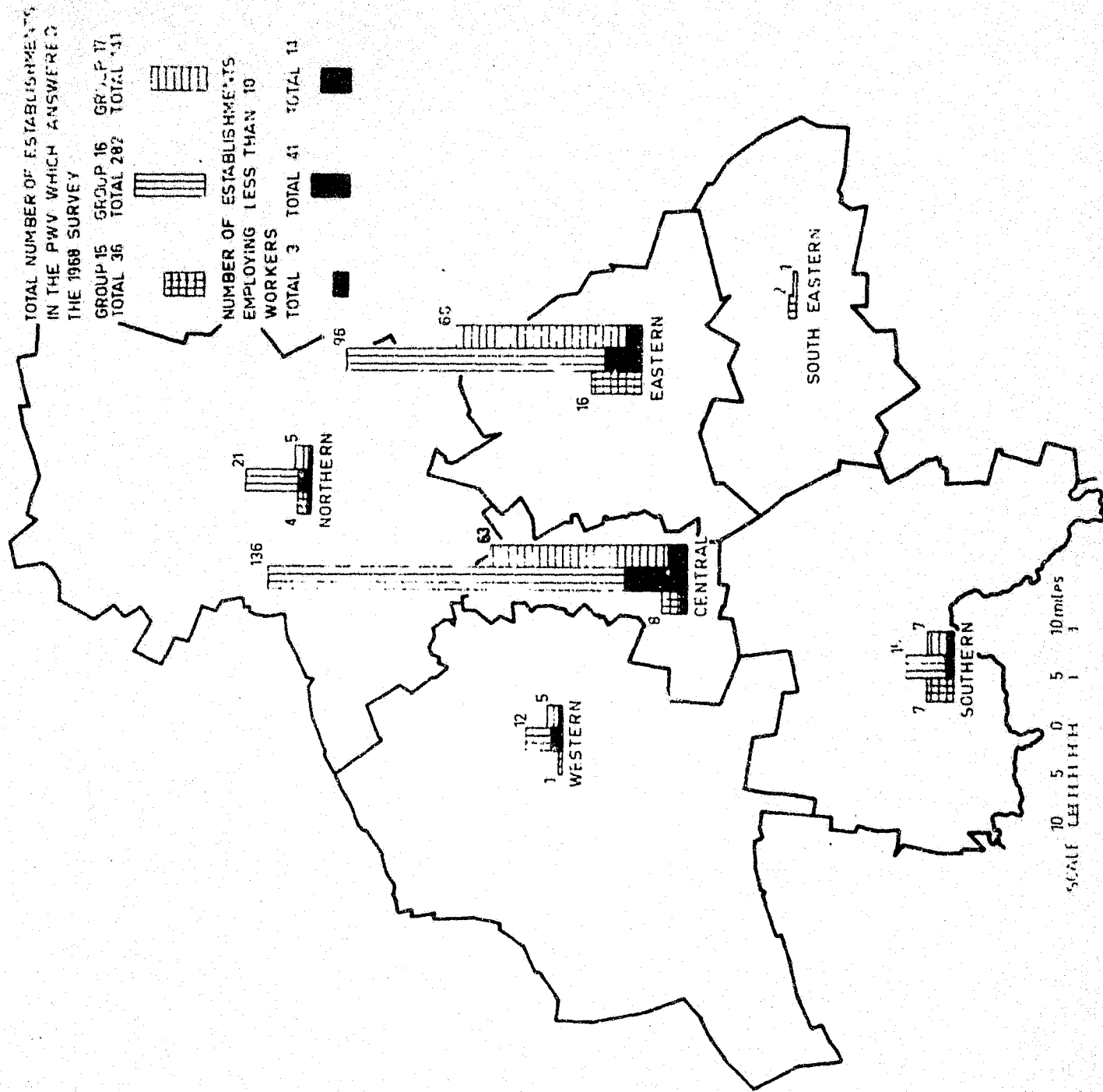
This survey was conducted along similar lines to the N.R.D.C. Survey of 1961, but not in as much detail, only the three groups (15,16 and 17) being circularised. The survey was conducted only in the P-W-V area and enjoyed a 25.88% usable return from the estimated 1 762 establishments in the three groups of industries.

Figure: 6.4

Title: Total number of establishments which answered the two surveys

Source: Computer print out and raw data. N.R.D.C. Survey and 1968 Survey.

<u>GROUP</u>	<u>N.R.D.C. 1961</u>	<u>1968 SURVEY</u>
15 Base Metals	52	36
16 Metal Products	407	279
17 Machinery	134	251
Total	593	566
Total No. in P-W-V	1 136 (I.C. 1961/2)	1 762 (est.)
% Return	52.20%	32.13%



MAPLE SURVEY OF ESTABLISHMENTS IN THE BASE METAL (GROUP 15) METAL PRODUCTS (GROUP 16) AND MACHINERY

INDUSTRIES 1968

Source: Personal Survey conducted during 1968.

For the purpose of easier comparison the 1968 survey followed the basic economic areas used by the industrial census; the N.R.D.C. Survey has also followed these basic regions, but has enlarged the central region to include some of the West Rand and all of the near East Rand (Fig. 5.2 and 6.5) The sub-regions within the larger areas allows the N.R.D.C. information to be compared directly with the 1968 Survey (Fig. 5.3 and 6.5)

A basic comparison of the numbers of establishments and their sizes, shows that the pattern of development did not alter between 1961 and 1968 (Fig. 5.3 and 6.5). The region continued to exhibit a basic "drive to maturity". (Rostow W.W.). Johannesburg remains the centre of the small establishments, followed by the East Rand. The ratio of the three groups of industry (Fig. 6.2) does not appear to have altered greatly. In the case of Johannesburg and the East Rand the proportion of Metal Products (Group 16) and Machine Industries (Group 17) has risen. This means that these two groups of industries are growing at a faster rate than the base metal industry in these two regions. This appears to be the general trend for P-W-V as a whole, because despite the relative decreases of the Metal Products (Group 16) and Machine Industries (Group 17) in the West Rand and Vereeniging area, the totals for the P-W-V show a growing increase in the proportion of these two industrial groups over the base metal industry. This trend has been evident from the beginning of the sixties (Fig. 5.13), especially in Johannesburg which has a tendency to attract the smaller establishment which is most often engaged in the production of metal products. The Metal Products industries (Group 16) have always outnumbered both the Base Metal (Group 15) and Machine Industries (Group 17) in Johannesburg where the degree of specialisation is greater than anywhere else in the country and small establishments continue to develop and prosper. As stated previously, the Johannesburg market area actually includes a much larger area than just the economic region 40 (Fig. 5.16) because of the fact that many industries from all over the P-W-V purchase goods in that area.

Since trends uncovered by the N.R.D.C. Survey of 1961, were the same as those shown in the Industrial Census 1961/2 (304/1968) the 1968 survey has been analysed on a similar regional basis i.e. starting with area 40 (Johannesburg) and ending with area 44 (Vereeniging) inclusive.

3.1 The Central Area (Economic Region 40)

The Johannesburg magisterial district (Fig. 6.5) still dominates the rest of the Witwatersrand numerically, having 45.1% of all establishments which responded to the survey. It retained the largest number of establishments employing less than 10 workers - 28 or 48.28% of the total in the P-W-V. The average number of persons employed per establishment was 69 as compared to the 44.9 computed from the Industrial Census figures for 1961/2 (Fig. 5.14).

Johannesburg has the smallest establishments in the P-W-V except for the Pretoria Machine Industry (Fig. 6.6)

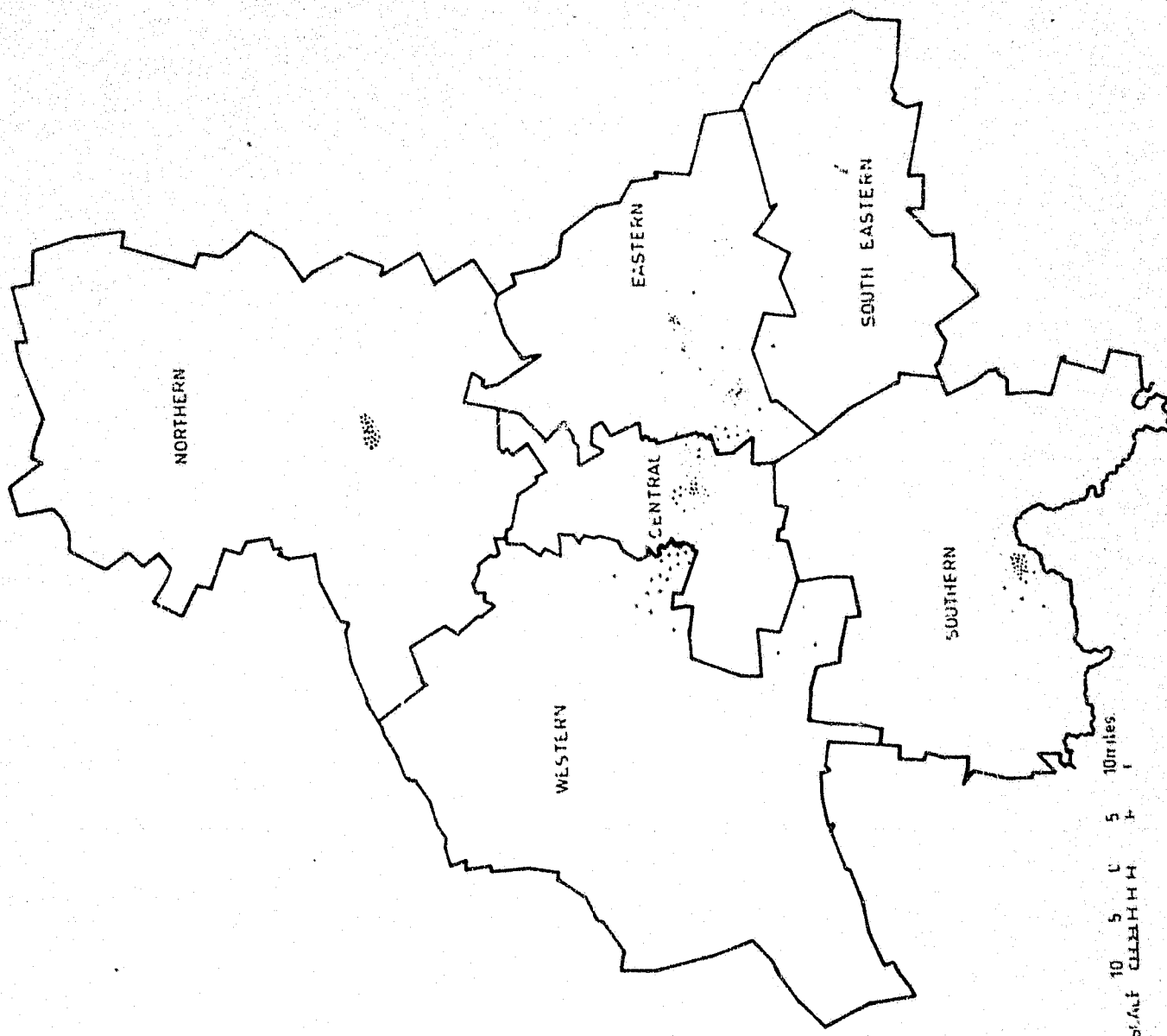
Figure: 6.6

Title: Average Number of Employees per Establishment in the P-W-V.

Source: The Industrial Census 1961/2, Report No. 304, the N.R.D.C. Survey 1961 and the 1968 Survey.

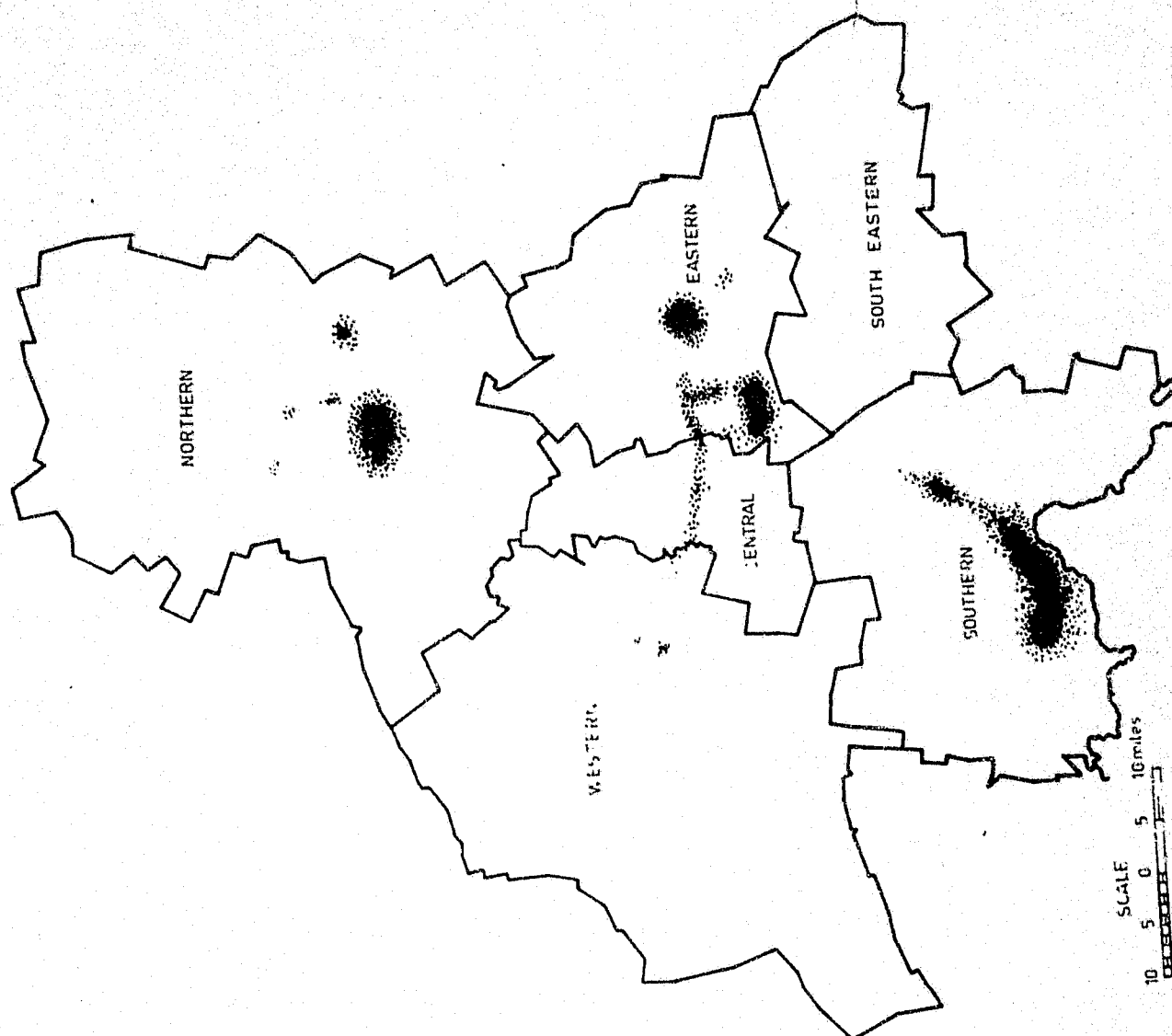
<u>AREA</u>	<u>GROUP 15</u>			<u>GROUP 16</u>			<u>GROUP 17</u>		
	<u>1961/2</u>	<u>NRDC</u>	<u>1968</u>	<u>1961/2</u>	<u>NRDC</u>	<u>1968</u>	<u>1961/2</u>	<u>NRDC</u>	<u>1968</u>
JOHANNESBURG	47.57	60.46	68.38	43.2	46.4	60.2	48.5	73.9	59.7
EAST RAND	133.80	113.6	433.5	87.8	110.4	126.4	135.7	187.3	201.1
WEST RAND	114.0	194.0	160.0	61.3	82.2	83.9	115.8	219.5	85.4
PRETORIA	1578.0	92.3	3576.75	38.9	56.6	113.2	17.7	18.8	27.0
VEREENIGING	1317.0	71.8	2779.43	266.1	285.4	366.9	743.8	412.0	622.9
P-W-V	349.6	89.7	1150.0	64.4	87.6	90.0	91.2	131.9	148.4
ALBERTON		31.3	425.0		37.0	122.18		110.4	150.0
GERMISTON		187.8	1025.3		114.0	122.88		284.1	129.0
KEMPTON PARK		39.0	n/a		35.9	73.11		n/a	89.9
BOKSBURG		92.0	170.0		150.1	228.17		72.14	431.5
BENONI		120.2	458.1		103.3	37.17		282.0	317.0
BRAKPAN		54.0	45.0		5.99	64.2		85.3	53.4
SPRINGS		152.5	n/a		116.5	232.12		151.89	287.75
TOTAL		113.6	433.5		110.4	126.4		187.3	201.1

ONE DOT EQUALS TEN WORKERS



SAMPLE SURVEY OF EMPLOYEES IN THE BASE METAL (GROUP 15) INDUSTRY 1961.
Source:- Department of Planning, N.R.D.C. Survey (unpublished data) 1961.

ONE DOT EQUALS TEN WORKERS



SAMPLE SURVEY OF EMPLOYEES IN THE BASE METAL (GROUP 15) INDUSTRY. 1968.

Source:- Personnel Survey conducted during 1968.

6.8

The high degree of interdependence between Johannesburg and Germiston is emphasized in travel pattern. Nearly 9 500 people travel daily from Germiston to Johannesburg and about 5 300 people from Johannesburg to work in Germiston. Bus commuting from Germiston to Johannesburg exceeds the numbers travelling by train over the same distance. Of the 92 000 daily trips made by trucks registered in Johannesburg, 10 000 are to areas east or west of the central area.

"The trips to Roodepoort are about one-half the number to Germiston and those of the other two towns (Kempton Park and Alberton) being about one-third of those to Germiston The car work trips from Roodepoort are about equal to those from Germiston, but the truck trips from Germiston are about 100% greater than those from Roodepoort. This indicates the importance of Germiston as an industrial and commercial centre and of Roodepoort as a residential centre". (Johannesburg C.E.D. 1966).

The increasing importance of Germiston as a commercial centre is further emphasized by the fact that, during the 1961-65 period, the amount spent on the development of commercial and financial buildings in the town centre totalled R7.4 million, second only to Johannesburg's R25.6 million.

It has been argued by some that since there is this growing interdependency between the two towns on the industrial and commercial level, they should be considered as one area. However, there are marked differences between the sizes and types of industries developing in these two areas which are listed separately by the Industrial Census. Germiston therefore has been excluded from the Central Area and included as part of the East Rand.

3.1.1 The Base Metal Industry (Group 15)

Johannesburg has remained an area of relatively little importance with regard to the base metal industry. (Fig. 6.7 and 6.8) In total employment in this field it ranks second last (Fig. 6.9) employing only 4.18% of the total base metal workers of the P-W-V in 1961/2. The 1968 survey shows an apparent drop in this figure to 1.32% (Fig. 6.10).

Figure: 6.9

Title: Number of Persons Employed in Various Industries - 1961 to 1968

Source: Report No. 304 - 1961/2 Industrial Census, N.R.D.C. Survey 1961 and 1968 Survey.

<u>AREA</u>	<u>GROUP 15</u>			<u>GROUP 16</u>			<u>GROUP 17</u>		
	<u>1961/2</u>	<u>NRDC</u>	<u>1968</u>	<u>1961/2</u>	<u>NRDC</u>	<u>1968</u>	<u>1961/2</u>	<u>NRDC</u>	<u>1968</u>
Johannesburg	1475	1149	547	17502	9377	8179	8191	5026	3758
East Rand	5840	2612	6937	18877	13134	12012	12354	9736	12072
West Rand	912	194	160	1838	2055	1008	1622	878	427
Pretoria	12588	277	14307	2491	2151	2378	266	75	135
Vereeniging	14493	431	19456	6917	8596	5137	4463	1648	4430
TOTAL	35308	4663	41407	47625	35313	28714	26896	17423	20762

Figure: 6.10

Title: Number of Persons Employed in the three groups of Industry - as a Percentage of the Total for that Year

Source: The Industrial Census 1961/2, Report No. 304, N.R.D.C. 1961 Survey and the 1968 Survey.

<u>AREA</u>	<u>GROUP 15</u>			<u>GROUP 16</u>			<u>GROUP 17</u>		
	<u>1961/2</u>	<u>NRDC</u>	<u>1968</u>	<u>1961/2</u>	<u>NRDC</u>	<u>1968</u>	<u>1961/2</u>	<u>NRDC</u>	<u>1968</u>
Johannesburg	4.18	24.65	1.32	36.74	26.56	29.04	30.40	28.83	18.09
East Rand	16.52	56.01	16.72	39.65	37.18	41.31	45.98	55.90	58.14
West Rand	2.58	4.16	0.39	3.86	5.82	3.01	6.03	5.04	2.06
Pretoria	36.66	5.94	34.52	5.23	6.09	8.40	0.99	0.77	0.36
Vereeniging	41.06	9.24	47.05	14.52	24.34	18.24	16.60	9.46	21.55
TOTAL %	100.	100.	100.	100.	100.	100.	100.	100.	100.

The average number of persons employed per establishment in the base metal industry (Group 15) in Johannesburg has consistently remained the lowest in the P-W-V.

In 1961/2 the value of goods produced by the base metal industry in Johannesburg amounted to R2 415 000 or about 4% of that produced in the Vereeniging-Vanderijlpark Area. Since then there has been a relative decline in the growth rate of base metal establishments in the Johannesburg region. Of the seven new base metal concerns known to have established themselves in the P-W-V since 1960, only two are situated in Johannesburg. (Fig. 6.11)

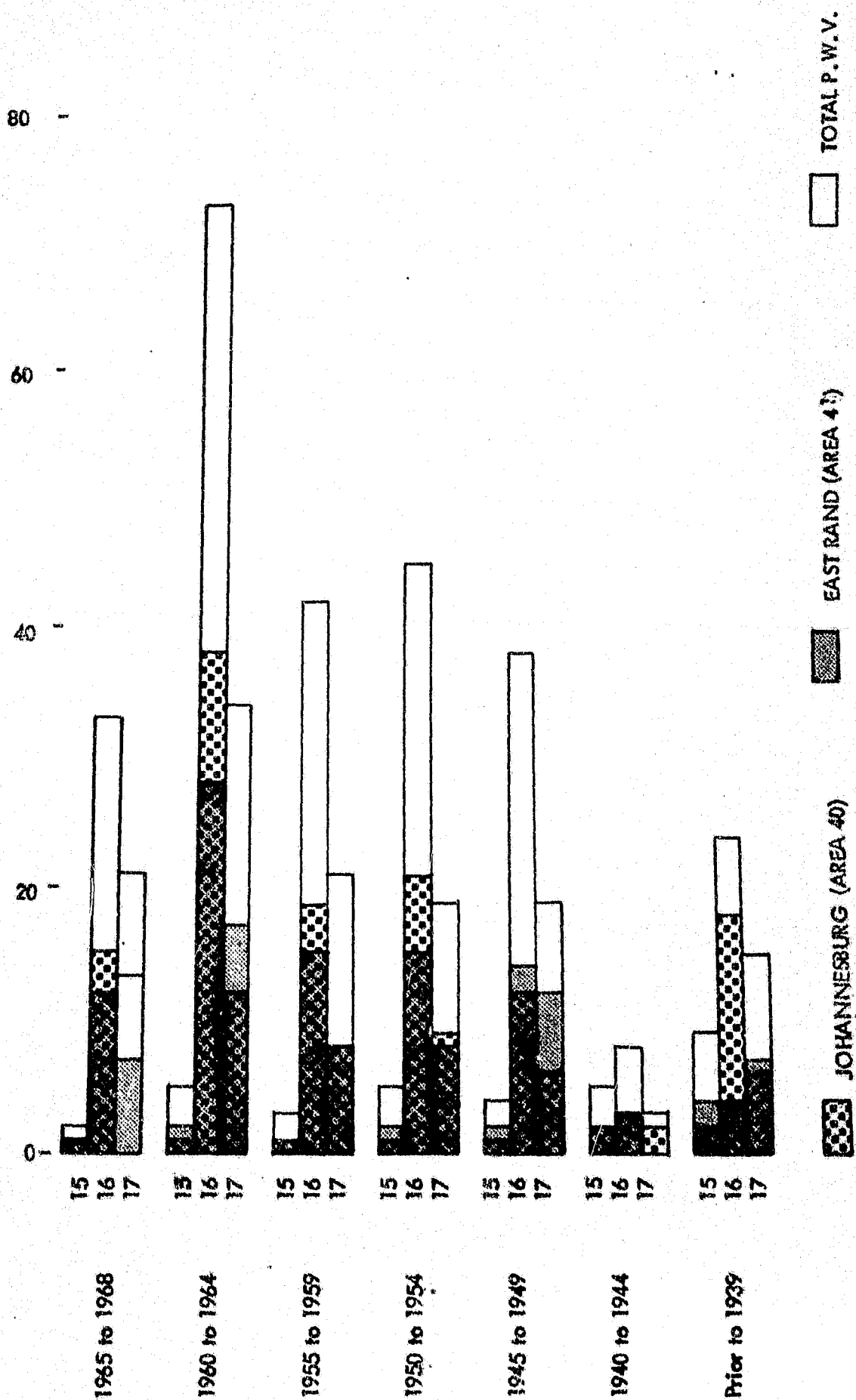
Figure: 6.11

Title: Number of new Establishments in the Base Metal (Group 15), Metal Products (Group 16) and Machine Industries (Group 17)

Source: 1968 Survey

	<u>EAST RAND</u>			<u>JOHANNESBURG</u>			<u>TOTAL P-W-V</u>		
	Groups			Groups			Groups		
	15	16	17	15	16	17	15	16	17
1965/68	1	12	7	1	15	13	2	33	21
1960/64	2	28	17	1	38	12	5	73	34
1955/59	1	15	8	1	19	8	3	42	21
1950/54	2	15	8	1	21	9	5	45	19
1945/49	2	14	12	1	12	6	4	38	19
1940/44	2	3	0	2	3	2	5	8	3
Prior to 1939	4	4	7	2	18	6	9	24	15

The distribution of establishments within the Central Area follows the southern industrial belt (Fig. 5.15) in an East-West direction. The distribution of workers emphasizes this (Figures 6.13 & 6.14). In the case of the N.R.D.C. Survey (which had a better return from Johannesburg than the 1968 Survey) there is a concentration of Base Metal (Group 15) industrial workers to the east. This is quite probably due to the development of Malvern East and Denver as industrial areas whose markets include both the Central and East Rand.



NUMBER OF NEW ESTABLISHMENTS IN THE BASE METAL (GROUP 15) METAL PRODUCTS (GROUP 16) AND MACHINE (GROUP 17) INDUSTRIES.

Source: - 1968 Survey.

6.11

3.1.2 Metal Products (Group 16)

In the case of the metal products (Group 16) industries, Johannesburg leads the P-W-V and South Africa. By 1962/3 429 of the 843 or 50.77% of the country's metal products (Group 16) industries were to be found in Johannesburg (Fig. 5.4) and in 1961/2 their net output amounted to R31 274 000, second only to the East Rand in value, although Johannesburg establishments outnumbered East Rand establishments by nearly two to one (Fig. 6.12). This trend has continued. Of the 279 Metal Products (Group 16) establishments which answered the 1968 Survey, 136 or 48.7% were in Johannesburg. This was 14% more than the next highest number, which was on the East Rand. The fact that the larger number of establishments in Johannesburg continued to produce less net profits than those of the East Rand is again indicative of the fact that smaller goods are being produced in Johannesburg (Figures 5.3 and 6.5).

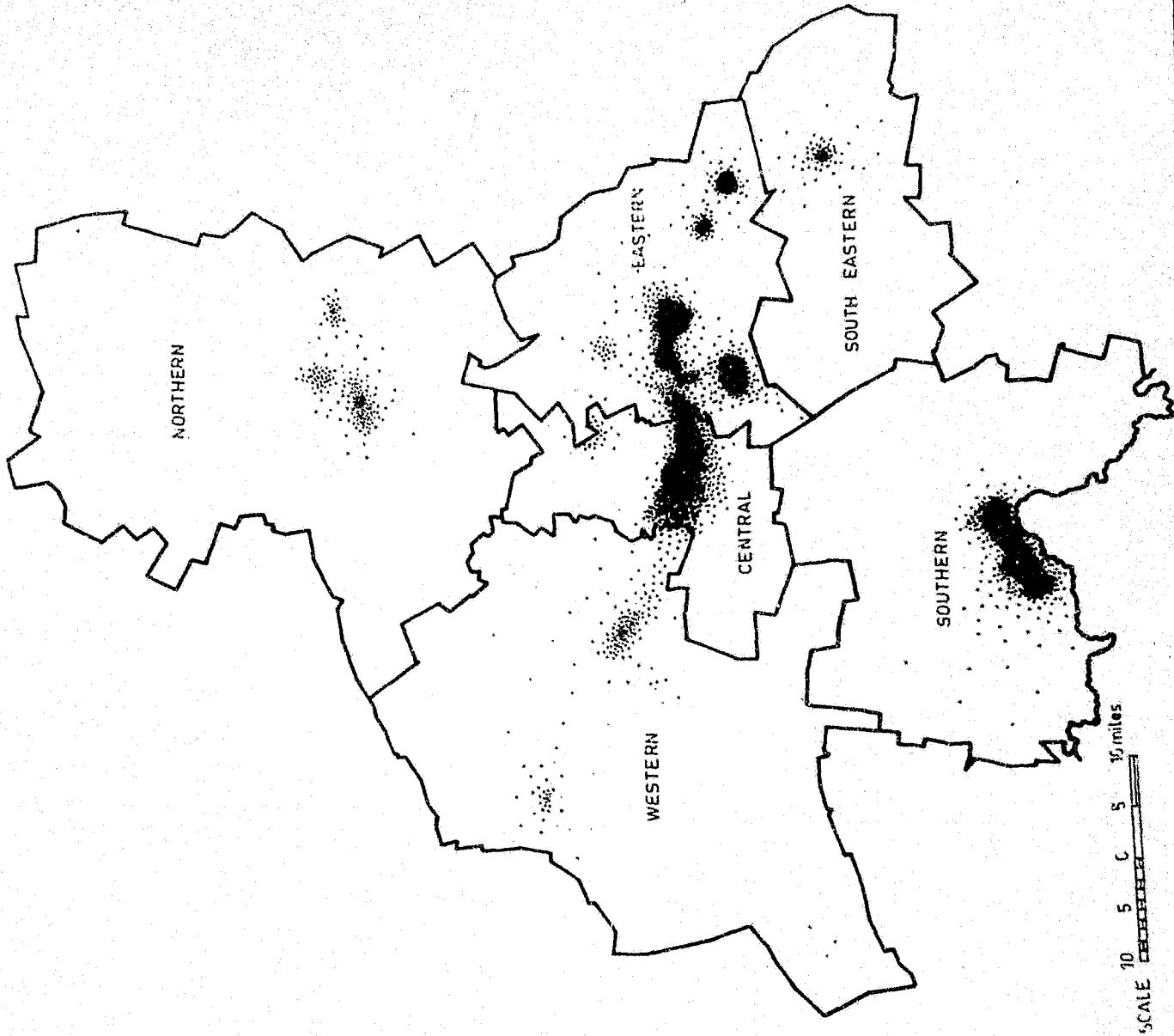
Figure: 6.12

Title: The 1968 Survey Returns - Number of Workers and Establishments

Source: 1968 Survey

Area	No. of Estab. with less than ten workers			Total Workers			Number of Establishments			Total
	15	16	17	15	16	17	15	16	17	
Johannesburg	2	20	6	547	8758	3758	8	136	63	207
East Rand	0	12	5	6937	12012	12072	16	96	60	172
West Rand	0	3	1	160	1008	427	1	12	5	18
Pretoria	1	4	1	14307	2379	75	4	21	5	30
Vereeniging	0	2	1	19456	1537	4430	7	15	7	29
Sub-total:	3	41	14	41407	25115	20762	36	280	140	456
South Eastern	0	0	0	0	62	n/a	0	2	1	3
Total P-W-V	3	41	14	41407	25177	?	36	282	141	459

ONE DOT EQUALS TEN WORKERS

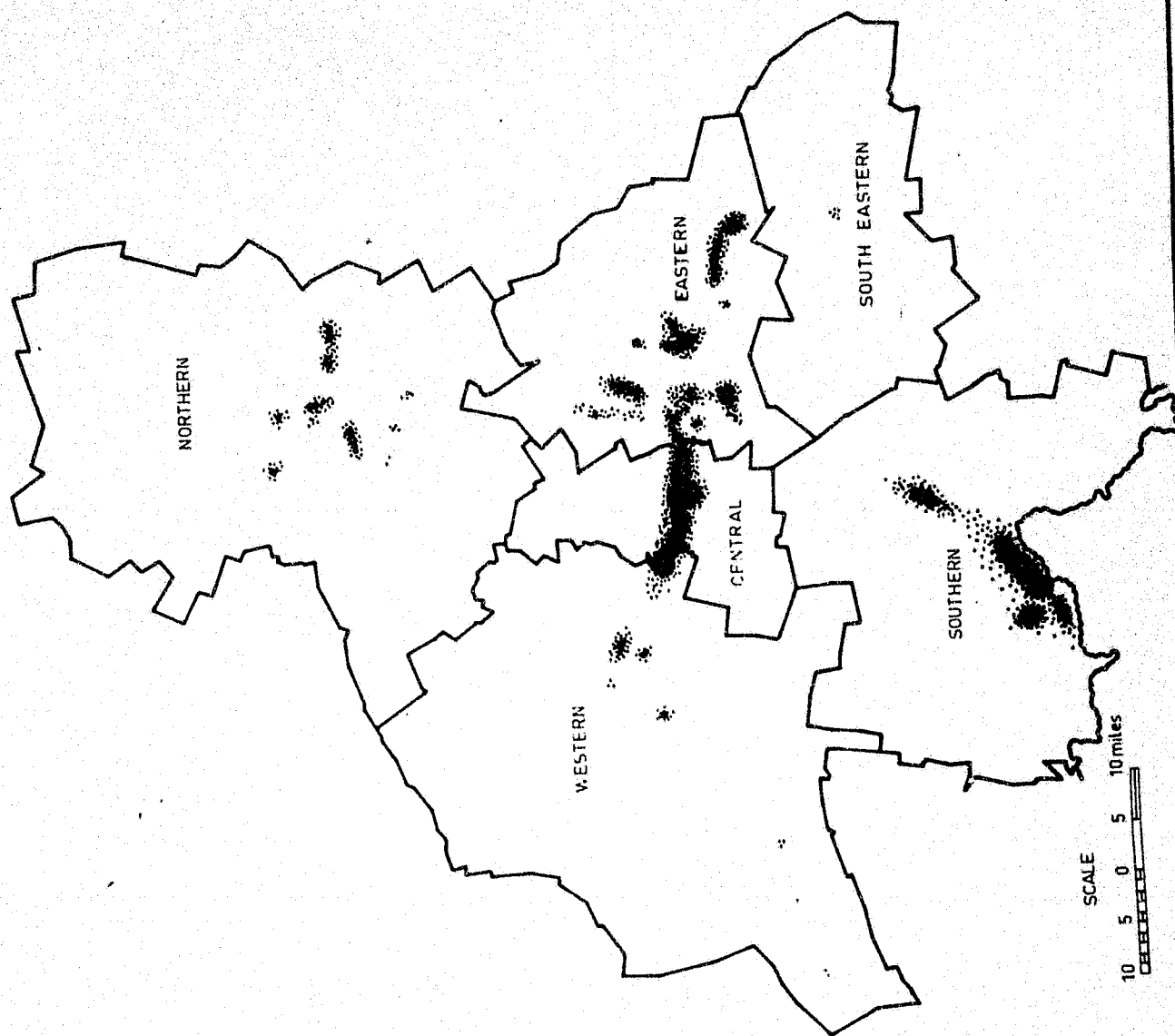


6.13

SAMPLE SURVEY OF EMPLOYEES IN THE METAL PRODUCTS (GROUP 16) INDUSTRY 1961

Source: ~ Department of Planning. N.R.D.C. Survey (unpublished data) 1961.

ONE DOT EQUALS TEN WORKERS.



SAMPLE SURVEY OF EMPLOYEES IN THE METAL PRODUCTS (GROUP 16) INDUSTRY 1968.

Source:- Personal Survey conducted during 1968.

6.14

Johannesburg's metal products workers are more densely concentrated than on the East Rand (Fig. 6.13 & 6.14 & 6.12) although the total number of these workers in Johannesburg amount to about only one-third of those on the East Rand. This means that the trend towards establishing smaller concerns in the central region continued. The average wage paid in Johannesburg to employees in the metal products (Group 16) industries amounted to R1 000 as compared to R1 051 on the East Rand. However, in terms of value, the costs of materials in Johannesburg amounted to 51.46% of the gross output in 1961/2 as compared to 54.31% on the East Rand. This means that since the costs of both materials and wages were lower in Johannesburg, this area should have been able to produce better profits than the East Rand. The fact that it could not is indicative of the greater productivity of the larger concerns on the East Rand. The 1961/2 end values of land and buildings utilized by Johannesburg metal products (Group 16) industries amounted to R5 357 000 as compared to R7 360 000 on the East Rand. The value of the plant, machinery and transport equipment on the East Rand exceeded that of Johannesburg industries by R2 262 000, which shows the comparative smallness of Johannesburg establishments. (I.C. 1961/2 Report 304).

The anomaly can only be explained by the fact that the Johannesburg's smaller metal products (Group 16) industries have not developed a large enough market to enable them to compete in volume with the heavier articles produced on the East Rand.

The fact that the value of land used by the Johannesburg establishments is lower than that of the East Rand is surprising. Particularly in the view of the higher prices which have always existed for properties in Johannesburg and the general lack of industrial land.

Nearly twice as many metal producing concerns in Johannesburg had used up all the land available to them as compared to the East Rand (Fig. 6.15) and in fact land was most in demand in Johannesburg. This would normally increase the value of available industrial land, but in this case the East Rand total exceeds Johannesburg's.

Figure 6.15

Title: The percentage of establishments using all the land available to them in 1968 *
Source: The 1968 Survey.

<u>Area</u>	<u>Group 15</u>	<u>Group 16</u>	<u>Group 17</u>
East Rand:-			
Alberton	0	54.5%	42.85%
Germiston	0	44.4%	66.6%
Kempton Park	0	27.7%	29.0%
Boksburg	0	40.0%	60.0%
Benoni	50%	50.0%	20.0%
Brakpan	0	33.3%	16.6%
Springs	n/a	0	0
Sub total	23.07%	39.28%	36.66%
Johannesburg	28.57%	67.79%	64.91%
West Rand	100.00%	8.30%	20.00%
Pretoria	50.00%	42.10%	100.00%
Vereeniging	16.60%	27.27%	28.57%
Total P-W-V-	29.02%	51.23%	50.37%

* This table is an attempt at measuring the potential growth and is of importance because of the stated Government Policy of curtailing industrial development in the P.W.V.

The total number of workers on the East Rand has exceeded that of Johannesburg since 1961/62 (Figure 6.9). The N.R.D.C. Survey and the 1968 Survey both show an excess of nearly 4,000 or about 30%. Johannesburg still employs approximately 32% of all the workers engaged in the metal products (Group 16) industries covered by the 1968 Survey. (Figure 6.10).

Therefore maps 5.3 and 6.5 could be misleading. The large number of metal products (Group 16) industries in the Johannesburg area do not produce as much as the East Rand in value, do not employ as many as the East Rand, do not own as much land as the East Rand industries or have as much invested in plant and machinery as the East Rand. Although figures for production employment and total numbers are not available from the industrial census, indications are that since 1961/2 the importance

of Johannesburg has further declined as a metal products centre. (Fig. 6.10).

Figure 6.1

Title: The destination of metal products from the P.W.V. Metal establishments.
Source: 1961 NRDC Survey and 1968 Survey.

Area	Group 15		Group 16		Group 17	
	NRDC (%)	1968 (%)	NRDC (%)	1968 (%)	NRDC (%)	1968 (%)
P.W.V.	47 (90.4)	34 (94.5)	374 (91.9)	247 (88.2)	120 (89.6)	205 (81.1)
E. Tvl.	23 (44.2)		210 (51.5)		80 (59.7)	
W. Tvl.	27 (51.9)	36 (100)	212 (52.1)	153 (54.6)	90 (67.2)	133 (52.9)
N. Tvl.	19 (36.6)		186 (45.7)		68 (50.8)	
Natal	20 (38.5)	2 (5.6)	178 (43.7)	35 (12.5)	73 (54.5)	48 (19.1)
Cape	23 (44.2)	1 (2.8)	177 (43.5)	45 (16.1)	72 (53.7)	37 (14.7)
O.F.S.	29 (55.8)	5 (13.9)	189 (46.4)	37 (13.2)	94 (70.2)	54 (21.5)
S.W.A.	18 (34.6)	3 (8.3)	139 (34.2)	22 (7.9)	69 (51.5)	26 (10.4)

The vast majority of metal producers have stated that Johannesburg formed their main market. 91.9% in 1961 and 88.2% in 1968 have shown that their major market is within the P.W.V. (Figure 6.16). This means that the relatively high number of metal producers already established within Johannesburg must face stiff competition which could account for the relatively low earnings which the group had in 1961/2 (Report 304 1968).

The fact that Johannesburg and the East Rand form such an important market area for metal products is due to the nature of the products produced. They are consumed largely by the other manufacturing concerns, often forming the raw materials from which other articles are made. Apart from the food industry which consumed R25,000,000 worth of metal products and the metal industry whose consumption totalled R77,000,000, the construction industry formed the largest single consumer taking another R77,000,000 worth of metal products (RFig. 6.2). The total value of industrial and commercial construction in Johannesburg during the 1961 - 1965 period amounted to R42.7 million as compared to R39.7 million on the rest of the Witwatersrand (Johannesburg 1966). This indicates the importance of Johannesburg as a market for metal products.

Figure 6.17

Title: The results of the 1968 Survey covering the whole P.W.V. by Economic Region.
Source: Field Work (See Questionnaire in Appendix).

Question No.	Group 15.						Group 16.						Group 17					
	40. Johannesburg	41. East Rand	42. West Rand	43. Pretoria	44. Vereeniging & Vanderbijl Park	Total.	40. Johannesburg	41. East Rand	42. West Rand	43. Pretoria	44. Vereeniging & Vanderbijl Park	Total	40. Johannesburg	41. East Rand	42. West Rand	43. Pretoria	44. Vereeniging & Vanderbijl Park	Total
2/A Yes	2	1	0	2	1	6	47	36	3	5	5	96	39	71	5	3	4	132
No	6	15	1	2	6	30	89	60	9	16	11	185	24	101	0	2	3	130
B Yes	8	16	0	4	7	35	121	93	12	20	15	261	55	162	5	4	7	233
No	0	0	1	0	0	1	15	3	0	1	0	19	8	10	0	1	0	19
5/A Yes	7	14	1	4	6	32	132	93	12	21	15	273	62	173	5	5	7	252
No	1	2	0	0	1	4	4	3	0	0	0	7	1	9	0	0	0	10
B Yes	4	16	0	3	4	27	3	6	0	1	0	10	4	32	1	0	1	38
No	4	0	1	1	2	8	132	87	12	20	14	265	58	136	4	5	6	209
7/A Yes	8	14	1	4	7	34	118	87	11	19	12	247	46	148	2	4	5	205
No	0	2	0	0	0	2	9	5	1	0	2	17	16	20	3	1	2	42
B. 40	8	9	1	3	6	27	116	65	9	6	7	203	43	113	1	2	2	162
41	5	14	1	3	4	27	53	69	5	6	7	140	29	120	0	0	2	151
42	1	8	1	3	4	17	38	33	4	6	5	86	25	64	1	0	1	91
43	2	4	1	4	3	14	34	29	3	17	4	87	24	54	0	3	0	81
44	3	6	1	3	5	18	33	31	2	4	10	80	25	55	0	0	4	84
C. Cape	0	0	0	1	0	1	16	11	1	2	5	35	12	21	2	0	2	37
Natal	0	2	0	0	0	2	13	15	1	1	5	35	15	29	2	0	2	48
O.F.S.	0	4	0	1	0	5	18	11	2	1	5	37	16	33	2	0	3	54
T.V.L.	8	16	1	4	7	36	123	86	12	18	14	153	59	59	5	5	5	133
S.W.A.	0	2	0	1	0	3	12	5	1	1	3	22	11	13	2	0	0	26
D. Yes	0	1	0	0	1	2	3	1	1	0	0	5	3	5	0	0	1	9
No	8	15	1	4	6	34	122	89	11	19	14	255	55	161	5	5	6	232
8/A in	6	10	1	3	3	23	115	84	11	15	13	238	46	136	4	4	5	195
Road out	8	14	1	3	5	31	125	86	12	19	11	253	49	145	4	4	5	207
SAR & H in	3	12	0	2	5	22	40	29	5	10	4	88	28	70	1	1	3	103
out	0	7	1	3	5	16	38	28	5	4	9	84	28	67	2	2	4	103
AIR in													2	1				3
out													1	2				3
OTHER in								1				1	1	1				2
out					1	1	1	2				3	3	2				5

B																			
incoming	4	11	0	2	6	23	60	42	7	10	6	125	24	80	2	0	3	111	
outgoing	5	8	1	2	2	18	109	74	9	16	12	220	55	130	3	5	5	198	
C																			
telex	2	3	1	1	5	12	8	14	1	1	4	28	11	35	0	1	3	50	
computers	0	4	0	1	3	8	5	8	0	1	4	18	5	22	0	1	3	31	
electricity	8	16	1	4	7	36	134	94	22	21	15	276	63	170	4	5	7	249	
gas	3	6	0	1	4	14	36	27	1	3	5	72	12	52	0	1	3	68	
coal	5	14	1	4	6	30	21	28	2	5	8	64	6	58	1	1	1	67	
10/A																			
skilled																			
semi-																			
unskilled																			
B.																			
skilled	6	11	1	2	6	26	79	58	9	11	11	168	42	116	1	3	5	167	
semi	3	5	0	2	2	2	39	26	2	6	2	75	22	46	1	0	1	70	
unskilled	5	5	1	1	0	12	31	36	2	3	1	73	10	41	0	0	0	51	
C. Yes	2	5	0	1	5	13	46	40	4	10	5	105	21	77	3	1	6	107	
No	6	11	1	3	2	23	88	56	8	11	10	162	41	94	1	4	2	142	
Misanswered	1	0	0	0	0	1	10	9	0	2	2	21	9	12	1	1	0	23	
TOTAL ANS	8	16	1	4	7	36	136	95	12	21	15	279	63	171	5	5	7	251	

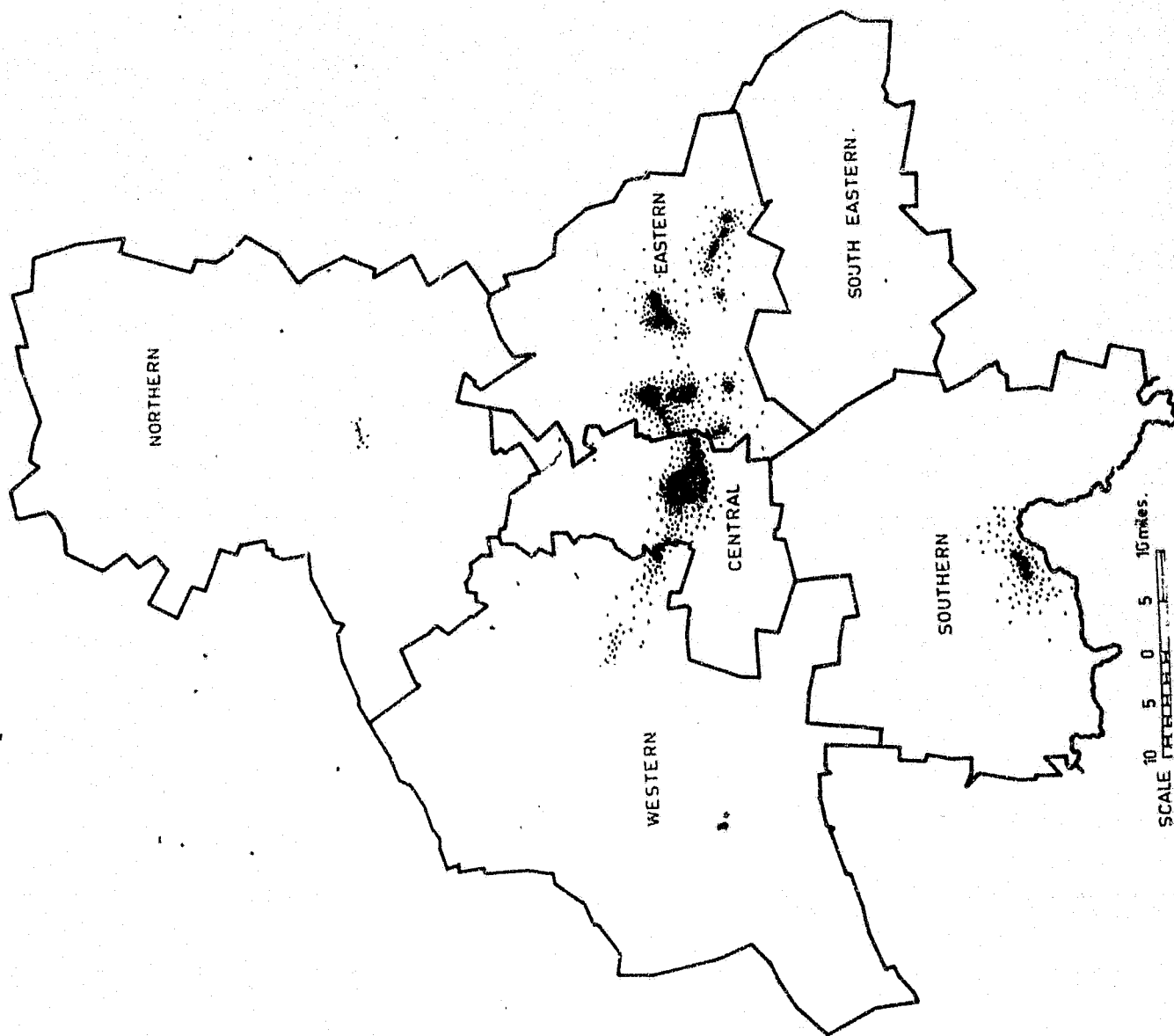
The 1968 Survey revealed that the majority of firms use motor transport in the P.W.V. 125 out of 136 concerns shipped their finished articles to market by road. In Johannesburg 79 or 58.0% of all the establishments had trouble finding skilled labour,* but only 22.8% were short of unskilled workers. Despite this 64.71% of the establishments had no company training schemes.

The metal products industry of Johannesburg is a manufacturing activity (88.98% were engaged in the production of articles) drawing its raw materials from the base metal and other industries (97% used semi-processed raw material). Yet their overall output in value, has been traditionally lower than on the East Rand. In spite of the fact that overheads in Johannesburg were lower than on the East Rand in 1961 (Report No. 304, 1968). This anomaly can be ascribed to:-

- increased competition in Johannesburg among local firms
- competition from firms on the East Rand
- the possibility that the larger concerns of the East Rand are better equipped to mass-produce articles cheaply
- the larger concerns of the East Rand can attract skilled labour and pay higher wages than the smaller firms

* There was some problems in defining the term skilled, semi-skilled and unskilled as each firm applied its own criteria arbitrarily.

ONE DOT EQUALS TEN WORKERS.

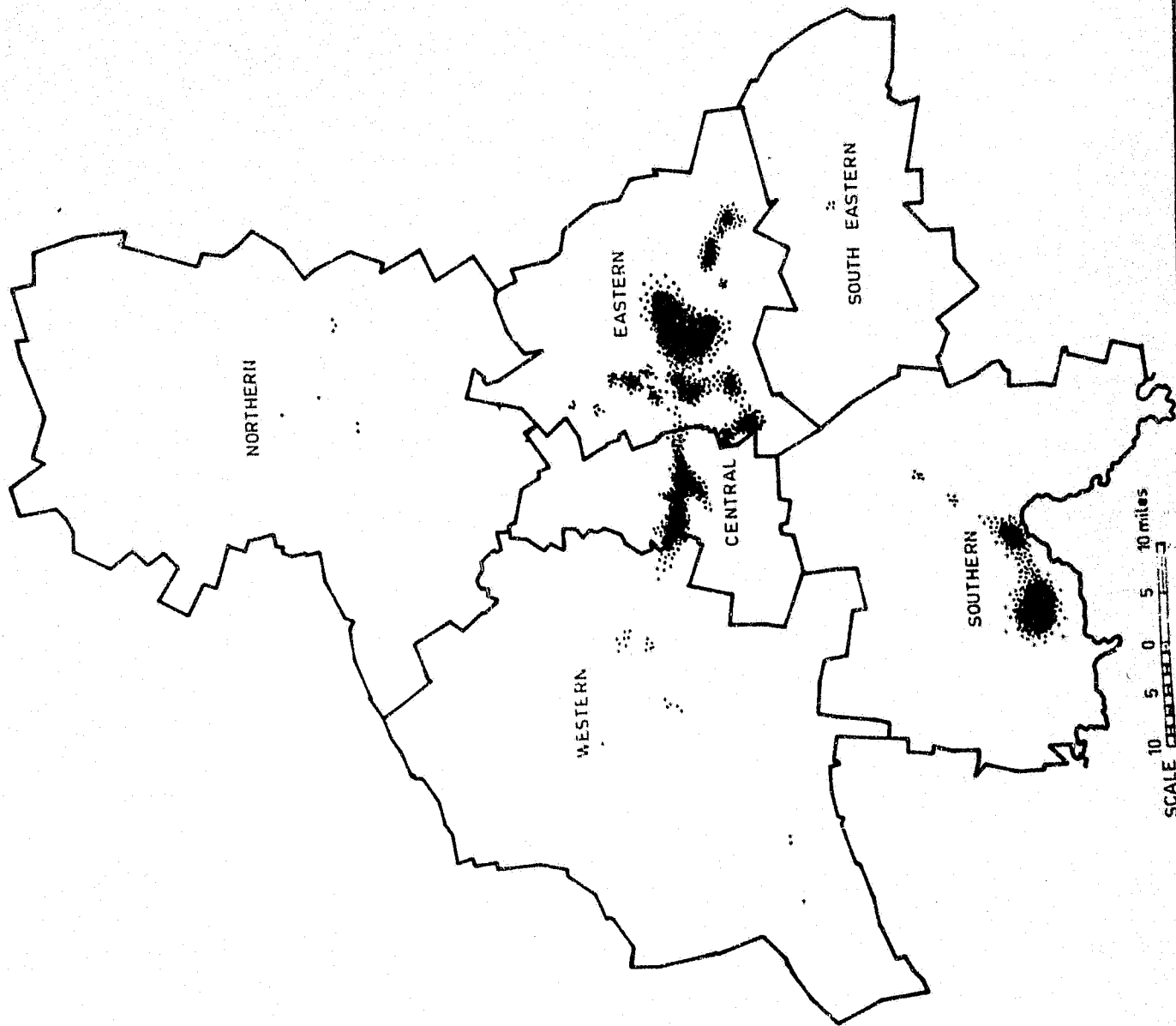


SAMPLE SURVEY OF EMPLOYEES IN THE MACHINE (GROUP 17) INDUSTRY 1961.

Source:- Department of Planning. N.R.D.C. Survey (unpublished data) 1961.

6.18

ONE DOT EQUALS TEN WORKERS



SCALE 10 5 0 5 10 miles

6.19

SAMPLE SURVEY OF EMPLOYEES IN THE MACHINE (GROUP 17) INDUSTRY 1968.

Source:- Personal Survey conducted during 1968.

in Johannesburg

- during periods of rapid industrial growth demands increase so rapidly that only the larger concerns can expand quickly enough to cope with the greater needs of industry.

3.1.3

Machinery (Group 17)

As in the case of the base metal and metal products industry, the machine-industry of Johannesburg is located in the east-west belt (figure 6.18 and 6.19). Much industrial activity occurs in this narrow belt to the north of the outcrop (figure 5.3 and 6.5). Johannesburg has the largest number of machine producers of any area in the P.W.V. In 1961/62, 169 establishments or 57.3% of all machine producers in the P.W.V. were to be found in Johannesburg (Report No. 304, 1968).

Figure 6.20

Title: The number of various industrial establishments in the P.W.V.

Source: Industrial Census 1961/2 (Report No. 304, 1968), N.R.D.C. Survey 1961 and 1968 Survey.

Area: ++	GROUP 15 (Base Metals)			GROUP 16 (Metal Products)			GROUP 17 (Machinery)		
	1961/2 (%)	NRDC (%)	1968 (%)	1961 (%)	NRDC (%)	1968 (%)	1961 (%)	NRDC (%)	1968 (%)
40	31 (30.5)	19 (36.6)	8 (22.2)	405 (54.7)	202 (50.1)	136 (48.7)	169 (57.3)	68 (51)	63 (44.5)
41	43 (42.8)	23 (44.2)	16 (44.4)	215 (29.0)	119 (29.5)	95 (34.1)	91 (30.8)	52 (39.5)	60 (43.2)
42	8 (7.9)	1 (1.9)	1 (2.8)	30 (4.1)	25 (6.3)	12 (4.3)	14 (4.8)	4 (3.0)	5 (3.6)
43	8 (7.9)	3 (5.8)	4 (11.1)	64 (8.7)	38 (9.4)	21 (7.5)	15 (5.1)	4 (3.0)	5 (3.6)
44	11 (10.0)	6 (11.5)	7 (19.5)	26 (3.5)	19 (4.7)	15 (5.4)	6 (2.0)	4 (3.0)	7 (5.0)
Total	101	52	36	740	403	279	295	132	140

++ Refers to the economic regions used by the Government in the publication of data i.e. 40-Johannesburg, 41-East Rand, 43-Pretoria, 44-Vanderbijl Park and Vereeniging.

The output of the machine industry in Johannesburg amounted to R22,485,000 in 1961/2 or about R3 million less than the East Rand. Similarly the size of these establishments in Johannesburg was smaller than elsewhere in the P.W.V.

In 1961/2 the average number of people employed per establishment was 48.48, in 1968 it was 59.65 (1968 Survey 32% return). It is lower than any other area in the P.W.V., except Pretoria. In 1961/2 30.4% of all workers engaged in machine industry (Group 17) establishments in the P.W.V. were to be found in the Johannesburg area. Only the East Rand exceeded this number. According to the 1968 survey 18.09% of the total workers engaged by these industries were employed by Johannesburg firms. This amounted to 3,758 employees, or about a quarter of the number of the East Rand (Figure 6.9).

The machine industry exhibits the same trends in Johannesburg as the metal products industry.

3.1.4 GENERAL

The increase in the number of establishments of both metal products and the machine industries was significant in Johannesburg in the early part of the 1960's decade. This rapid rate of development was less than that of the East Rand and the area declined in its relative importance to the rest of the P.W.V. The trend towards smaller establishments did not result in any relative increases in the numbers employed.

Johannesburg declined in relative importance between 1961/2 and 1968 (Figure 6.10). The percentage of the total workers of the P.W.V. employed in Johannesburg has dropped. This does not mean that the actual numbers have decreased, it means that the relative importance of Johannesburg to the rest of the P.W.V. has decreased. In the case of the base metal industry the percentage has dropped by almost 75%, this could be expected since Johannesburg was never an important iron and steel producing centre. Metal products and machinery also dropped by about 4% and 2% respectively. The relative importance of the numbers of establishments in Johannesburg is also decreasing (Figures 5.3 and 6.5). In the case of the base metal industry it should be remembered that the NRDC Survey did not appear to include Iscor and Usco, which accounted for Johannesburg's high percentage (figure 6.7 and 6.8). There was a definite decrease in all three groups of industry in the relative importance of the number of establishments as well as employees. Unfortunately figures for capital investment and output are not available but with this relative decline in both employees and establishments it is quite probable that the output of the Johannesburg metal industries has also declined in comparison to the rest of the P.W.V. and the East Rand in particular.

Since the number of new industrial establishments in Johannesburg far exceeds those of any other area of the P.W.V. (figure 6.11), this decline in the base metal, metal products and machine industry does not signify a general decline of industrial activity in the area. What is occurring is specialization in the industrial activities of Johannesburg. The area has always been the commercial centre of the P.W.V. and the Republic. It has the highest construction value for new building (Johannesburg (C.E.D. 1966) and the highest white collar worker ratio (figure 5.21) in the P.W.V. both of which point to increased specialization in industrial land use.

3.2

The East Rand (Economic Region 41)

The last decade has seen an increase in the importance of industry on the East Rand. Numerically it may rank second to Johannesburg (figure 6.5 and 5.3) but the base metal, metal products and machine industry of the East Rand produced R14,699,000 worth of goods more than Johannesburg in 1961 (Report No. 304, 1968). Growth rates have tended to be higher (figure 5.21) on the East Rand than Johannesburg, although they have varied within the region (figure 5.21).

In accordance with the previous regional classification adopted, the East Rand will be considered under two headings - The Near East Rand and the Far East Rand. At the present time the Kempton Park - Germiston - Alberton axis which forms the Near East Rand is developing rapidly as an industrial centre. The Far East Rand (Boksburg, Benoni, Brakpan and Springs) forms a slower developing eastern arm of the Witwatersrand. This can be explained by the relative isolation from the commercial centre (Johannesburg) and its position east of the traditional lines of communication to that centre.

The new motorway system will encourage expansion and improve Spring's communication with Johannesburg (figure 5.15). The northern area of Johannesburg is mainly residential, with industrial development in the Isando - Kempton Park area. The African townships of Natalspruit, Vosloorus, Bantu township and Kwa Thema are all far enough to the south of the East Rand's commercial centres to allow an industrial belt to develop between them. The decline of mining activities in this area will release land for industrial and residential development.

In the north, Tembisa has been established to supply the labour needs of Kempton Park and is situated far enough northwards to allow for the expansion of industries along the axis (figure 5.15).

3.2.1 The Near East Rand.

3.2.1.1 Base Metals (Group 15)

The industrial areas of the Kempton Park - Germiston - Alberton axis have developed since World War II (figures 5.3 and 6.5). During the period 1961 to 1965 the total value of new industrial buildings in the axis amounted to R19.12 million (C.E.D. Johannesburg 1966), which exceeded Johannesburg's total by R2 million. In the case of new financial and commercial buildings Johannesburg lead the axis towns by R15 million.

Although Germiston has a 1:1 ratio of white to blue collar employment, it has a 2.5:1 white collar to blue collar employment opportunity ratio (C.E.D. Johannesburg 1966) while Alberton has a 0.3:1 and Kempton Park a 0.2:1 ratio. This means that Germiston is short of white collar workers and has the potential to develop into the commercial and financial centre of the axis.

The dependency of Kempton Park and Alberton upon industry is indicated by the low white collar ratio of employment opportunities in these areas. In 1962 Germiston had 1426 acres of industrial land which amounted to 15.2% of the total municipal area. Of this 1,198 acres or 12.8% was utilised by heavy industry while 4,912 acres of 52.5% was residential (C.E.D. Germiston 1962).

The importance of heavy industry in the area is emphasised by the fact that in 1963 there were 7 gold mines operating in the area, and these employed only 694 Europeans and 9,623 non-Europeans, as compared to the 417 general manufacturing industries which employed 11,656 Europeans and 24,151 non-Europeans (Rep.No.283 of 1966). There were eleven base metal concerns in the Germiston area in 1960 (figure 5.13). Five were iron and steel producers, five were engaged in the welding of non-ferrous metals and one was the Rand Gold Refinery or a smelter of precious metals. Figures are not available for these industries individually, but as a whole the group employed 1,648 persons of all races, had a gross output of R7.2 million and a net output of R2.812 million. This amounted to 4.7% of the total net output of all industries in Germiston for that year.

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1968 Survey Results.

		Group 15.								Group 16.								Group 17.								GRAND TOTAL	
		Alberton	Germiston	Kempton Park	Boksburg	Benoni	Brakpan	Springs	Total	Alberton	Germiston	Kempton Park	Boksburg	Benoni	Brakpan	Springs	Total	Alberton	Germiston	Kempton Park	Boksburg	Benoni	Brakpan	Springs	Total		
Question No.																											
2/A	Yes	0	0	0	0	0	1	0	1	2	11	5	5	1	5	7	36	6	7	6	4	3	3	5	34	71	
	No	2	3	0	2	7	1	0	15	9	17	12	12	7	1	2	60	1	5	4	6	6	3	1	26	101	
	B	Yes	2	3	0	2	7	2	0	16	11	26	17	17	8	5	9	93	5	9	8	10	9	6	6	53	162
	No.	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3	2	3	2	0	0	0	0	7	10
5/A	Yes	2	3	0	2	5	2	0	14	11	27	17	16	8	5	9	93	7	9	9	10	9	6	6	56	173	
	No	0	0	0	0	2	0	0	2	0	1	0	1	0	1	9	3	0	3	1	0	0	0	0	4	9	
	B.	Yes	2	3	0	2	7	2	0	16	1	2	1	1	0	0	1	6	0	2	2	1	3	0	2	10	32
	No	0	0	0	0	0	0	0	0	0	10	25	16	16	7	5	8	87	7	10	8	9	6	6	3	49	136
7/A	Yes	2	3	0	2	6	1	0	14	9	25	16	16	7	5	9	87	4	10	9	8	6	5	4	46	148	
	No	0	0	0	0	1	1	0	2	2	1	1	1	0	0	0	5	3	2	1	2	3	1	1	13	20	
B. 40		2	1	0	1	5	0	0	9	9	21	13	11	3	2	6	65	2	10	8	7	5	4	3	39	113	
41		2	3	0	2	6	1	0	14	7	18	10	15	5	5	9	69	4	10	7	7	5	2	2	37	120	
42		2	1	0	1	4	0	0	8	4	10	6	6	2	1	4	33	2	3	6	4	4	3	1	23	64	
43		1	1	0	1	1	0	0	4	4	10	4	6	1	2	2	29	2	5	7	4	1	1	1	21	54	
44		1	1	0	1	3	0	0	6	5	12	4	5	0	1	4	31	2	4	6	4	2	0	0	18	55	
C. Cape		0	0	0	0	0	0	0	0	3	4	1	2	0	0	1	11	3	2	0	3	2	0	0	10	21	
Natal		0	0	0	0	2	0	0	2	4	4	1	4	0	0	2	15	3	2	0	4	3	0	0	12	29	
O.F.S.		0	0	0	0	3	1	0	4	5	3	0	2	0	0	1	11	2	4	1	4	4	2	1	18	33	
T.V.L.		2	3	0	2	7	2	0	16	11	24	15	16	6	5	9	86	7	12	9	10	9	6	4	57	159	
S.W.A.		0	0	0	0	2	0	0	2	1	0	1	2	0	0	1	5	1	2	0	1	2	0	0	6	13	
D. Yes		0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	1	1	0	1	0	1	0	0	3	5	
	No	2	3	0	1	7	2	0	15	10	25	17	17	6	5	9	89	6	12	9	10	8	6	6	57	161	
8/A	in	1	2	0	2	5	0	0	10	10	23	15	15	7	6	8	84	4	10	8	4	6	5	5	42	136	
	out	2	2	0	2	7	1	0	14	10	25	15	17	5	6	8	86	6	10	8	7	4	5	5	45	145	
SAR&H	in	2	1	0	2	5	2	0	12	5	8	4	8	1	1	2	29	4	6	4	8	5	1	1	29	70	
	out	0	1	0	1	4	1	0	7	6	9	5	5	1	1	1	28	4	6	4	6	7	3	2	32	67	
Air	in																										
	out																										
Other	in									1							1									1	
	out									1	1						2									2	

B.																									
incoming	2	2	0	2	5	0	0	11	3	11	10	5	3	3	7	42	4	6	2	5	4	3	3	27	80
outgoing	1	2	0	1	2	2	0	8	10	23	13	14	6	4	4	74	7	10	10	8	6	5	3	49	131
telex	0	0	0	1	2	0	0	3	0	5	3	4	2	0	0	14	4	2	1	4	5	0	2	18	35
computers	0	1	0	1	2	0	0	4	1	4	0	2	1	0	0	8	1	2	1	2	3	0	1	10	22
9/																									
electricity	2	3	0	2	7	2	0	16	11	26	17	17	8	6	9	94	7	12	10	10	9	6	6	60	170
gas	1	1	0	2	1	1	0	6	1	8	5	6	4	2	1	27	1	4	4	2	5	1	2	19	52
coal	2	2	0	2	6	2	0	14	1	5	5	8	3	3	3	28	1	2	2	3	3	1		6	58
10/A																									
skilled	10	11	0	25	20	15	0	16	24	31	22	25	17	42	36	28	39	33	41	36	41	26	4	43	26%
semi %	12	25	0	20	0	7	0	16	19	21	21	15	16	13	20	18	26	25	20	19	19	32	11	22%	18 %
Unskilled	78	65	0	55	79	77	0	70	56	45	60	63	78	43	44	55	49	52	39		56	32	34	34%	48%
B. Skilled	2	2	0	1	5	1	0	11	7	17	9	12	3	1	9	58	5	10	7		9	3	3	47	116
Semi	1	2	0	0	2	0	0	5	2	12	3	4	3	0	2	26	1	5	3		2	0	1	15	46
unskilled	1	2	0	1	1	0	0	5	3	9	4	6	2	1	1	26	2	2	2	1	2	0	1	10	41
C. Yes	1	1	0	1	1	1	0	5	5	11	6	10	3	2	3	40	5	6	4	5	7	3	2	32	77
No	1	2	0	1	6	1	0	11	6	16	11	7	5	4	6	55	2	6	6	5	2	3	4	28	94
Misanswered	0	0	0	0	0	0	0	0	2	2	1	1	2	1	0	9	0	0	0	0	2	0	1	3	12
TOTAL	2	3	0	2	7	2	0	16	10	28	17	17	8	6	9	95	7	12	10	10	9	6	6	60	171
ANS.																									

The 1968 Survey covered a total of three base metal industries in Germiston (Figure 6.21) and they employed a total of 3,076 workers or nearly double that employed by the eleven in 1959/60. (Report No. 283, 1966). This again is indicative of the tremendous expansion which has taken place within the last decade. The total area of land utilised by these three concerns amounted to about 60 acres or about 30% of the land owned by them. Hence further expansion is possible. Moves by the Base Metal industry (group 15) to relocate outside the axis region are unlikely, because of the great capital expense involved in plant and equipment. Expansion has continued through 1970 as demand has remained high since 1966.

One added the proviso that the area was central to raw materials, labour, services and markets. The East Rand forms the major market for all three establishments, followed closely by the rest of P.W.V. None of the establishments had any important markets outside the P.W.V.

Kempton Park had one base metal industry in 1960 (Report No. 283, 1966). Unfortunately the 1968 survey did not receive any base metal industry's returns from the area (Figure 6.15). One establishment did respond to the N.R.D.C. survey. This establishment employed 38 persons or 1.5% of the total number employed on the East Rand in the base metal industry who responded to the N.R.D.C. survey. In comparison to this Germiston employed 939 or 35.9% during the same year. This appears to have risen considerably because the 1968 survey showed an employment of 45.8% (Figure 6.22).

Figure 6.22

Title: The number of persons employed on the East Rand in the three groups of industry, which responded to the Questionnaire.

Source: N.R.D.C. and 1968 Survey.

	Group 15.		Group 16.		Group 17	
	N.R.D.C. %	1968 %	N.R.D.C. %	1968 %	N.R.D.C. %	1968 %
Kempton Park	39 (1.5)	0 (0)	359 (2.7)	1316 (10.0)	0 (0)	899 (1.1)
Germiston	939 (35.9)	3076 (45.8)	5357 (40.8)	3072 (25.6)	4262 (43.8)	1537 (22.1)
Alberton	94 (3.6)	850 (12.3)	37 (0.28)	1344 (11.2)	552 (5.7)	1050 (8.3)
Boksburg	460 (17.6)	170 (2.5)	3601 (27.4)	3079 (32.2)	505 (5.2)	4315 (33.9)
Benoni	721 (27.6)	2751 (39.7)	1549 (11.8)	223 (1.9)	2538 (26.0)	2853 (22.4)
Brakpan	52 (2.0)	90 (1.3)	17 (0.13)	321 (2.7)	512 (5.3)	267 (2.1)
Springs	305 (11.7)	0 (0.0)	2214 (14.15)	1857 (11.4)	1367 (14.0)	1151 (9.1)
Total	2612 (100)	6937 (100)	13134 (100)	12012 (100)	9736 (100)	12072 (100)

Alberton had 13.14% of all base metal establishments on the whole East Rand. The N.R.D.C. survey covered only three establishments which employed a total of 94 persons, or 3.59% of the total base metal workers on the East Rand (Figures 6.22 and 6.24). The 1960 survey shows a decrease in the percentage of establishments (12.5%) but an increase in the numbers employed to 850 persons or 12.3% of the total on the whole East Rand. Of the two establishments covered by the 1968 survey, both had their major markets on the Witwatersrand and on the East Rand in particular. The major method of transport of the finished goods was by road, while raw materials

were brought in by rail. Electricity formed one of the major sources of power, followed by coal. Gas was also used by one of the establishments, but to a lesser degree. The majority of workers were considered unskilled by the concerns. There was also a shortage of skilled workers (Figures 6.7 and 6.8), but this does not appear to be as acute as it was elsewhere on the East Rand (Figure 6.21).

3.2.1.2 Metal Products (Group 16)

The N.R.D.C. survey covered a greater number of these establishments than the 1968 Survey (Figures 5.3 and 6.5). Both surveys show that Johannesburg outnumbers the East Rand in metal producers, but that the East Rand establishments are larger, employ more and produce more than those of Johannesburg (Figure 6.6). The largest metal producers are located in Germiston, Boksburg, Benoni and Springs.

Germiston's average employment of 122.8 persons per establishment places it third on the East Rand. The importance of the axis is not diminished however as Alberton's average has risen from 37 in 1961 to 122.8 in 1968, and Kempton Park's from 38.2 to 73.11. This means that the greatest growth in the P.W.V. has occurred in the axis (Figures 6.13 and 6.14).

Figure 6.23

Title: Employment on the East Rand 1959/60

Sources: Report No. 304, 1968 - Bureau of Statistics, Industrial Census.

Area	Group 15			Group 16			Group 17		
	No.	%	av.	No.	%	av.	No.	%	av.
Alberton	1648	32.2	148.2	7275	40.5	78.2	5877	48.9	183.7
Germiston									
Kempton Park.	n/a	n/a	n/a	376	2.1	47.0	n/a	n/a	n/a
Boksburg	543	10.6	77.6	5539	30.8	158.2	624	5.2	69.3
Benoni	2412	47.1	219.3	1550	8.6	61.0	5170	27.2	192.3
Brickpan	173	3.4	43.3	125	0.7	25.0	848	7.1	84.8
Springs	341	6.7	60.2	3091	17.2	118.9	1429	11.8	129.9
Total	5117		135.8	17956		93.1	12028		169.3

Of the East Rand's total of 40% of all P.W.V. metal products workers, Germiston, Alberton and Kempton Park employed 42% in 1959/60 (figure 6.23) 44% in 1961 (NRDC) and 47.73% in 1968 (Figure 6.22). The axis maintained its expansion through the 1965 boom period and has been able to consolidate its position to date. The region also had 48.74% of all metal product manufacturers on the East Rand in 1961 (NRDC Survey) and 57.89% in 1968 (1968 Survey) (Figure 6.24).

Figure 6.24

Title: The number of establishments on the East Rand 1961 and 1968.
Source: NRDC Survey 1961 and 1968 Survey.

Area	Group 15		Group 16		Group 17	
	NRDC %	1968 %	NRDC %	1968 %	NRDC %	1968 %
Alberton	3 (13.1)	2 (12.5)	1 (0.8)	10 (10.5)	5 (9.6)	7 (11.6)
Germiston	5 (21.7)	3 (18.8)	47 (39.5)	28 (29.4)	15 (28.8)	12 (20.0)
Kempton P.	1 (4.3)	0	10 (8.4)	17 (17.9)	1 (1.9)	10 (16.7)
Boksburg	5 (21.7)	2 (12.5)	24 (20.2)	17 (17.9)	7 (13.5)	10 (16.7)
Benoni	6 (26.1)	7 (43.8)	15 (12.6)	8 (8.4)	9 (17.3)	9 (15)
Brakpan	1 (4.3)	2 (12.5)	3 (2.5)	6 (6.3)	6 (11.5)	6 (10.0)
Springs	2 (8.6)	0	19 (15.9)	9 (9.5)	9 (17.3)	6 (10.0)
Total	23	16	119	95	52	60

The development of the industrial areas of Isando, Wadeville and Alrode have offered good locations for new metal products establishments so that the axis towns have a higher growth rate of smaller and more numerous establishments than the Far East Rand. The result has been that Germiston has tended to become the nodal centre of the East Rand, with financial and commercial prospects. The larger concerns of the Far East Rand employed more workers per establishment (figure 6.6) and produced more in value (R4,383,000 in 1960) than the axis towns (figure 6.25).

However they lack the locational advantages of Germiston which in addition to its relative proximity to Johannesburg, lies on the north/south - east/west lines of communication. The trend towards Germiston's

development as a financial and commercial centre is evident by the fact that it has a 2.5 to 1 white collar to blue collar job opportunity ratio which is almost as high as Johannesburg with a 2.8 to 1 ratio (C.E.D Johannesburg 1966).

Figure 6.25

Title: The net output of the three groups of industry. (R1,000's)
Source: Industrial Census 1959/60. Report No. 283. (1966)

Area	Group 15.	Group 16.	Group 17.
40. Johannesburg	1,985	25,466	16,590
41. East Rand			
Kempton Park	n/a	754	n/a
Germiston	2,312	10,924	10,220
Boksburg	697	8,793	856
Benoni	4,281	2,443	5,856
Brakpan	299	154	1,533
Springs	647	4,671	3,524
42. West Rand.			
Krugersdorp	0	3,347	1,079
Randfontein	n/a	n/a	0
Rodepoort	n/a	281	562
Oberholzer	0	0	0
43. Pretoria	33,741	3,516	270
44. Vereeniging	11,878	7,653	1,807
Vanderbijl Park	n/a	2,357	n/a
TOTAL	99,717	70,543	47,416

Figure 6.25.1

Title: The net output of the three groups of industry 1961/2. (R1,000's)
Source: Industrial census 1961/2. Report No. 304 of 1968.

Area.	Group 15.	Group 16.	Group 17.
40. Johannesburg	2,415	31,274	22,485
41. East Rand	10,605	34,596	25,669
42. West Rand	2,688	3,886	3,277
43. Pretoria	35,496	3,529	364
44. Vereeniging	49,594	14,016	9,973
Total	100,798	87,301	67,768

Since 1960 the axis towns may have increased their output to surpass that of the Far East Rand. More recent figures are not available but in 1961, 16% of all metal product workers in the P.W.V. were employed on the Near East Rand and 21.6% on the Far East Rand (Report 304 1968). The 1968 Survey showed that 16.5% were employed in the axis and 21.9% in the Far East Rand, but the average number of workers per establishment increased from 87.8 to 126.4 (figure 6.6) and by 1968, 54% of all metal producing works which responded were in the axis region. This points to the increasing importance of the Kempton Park - Germiston - Alberton axis as a heavy engineering and metal producing region.

Germiston alone has the highest output in the metal products (group 16) and machine industry (group 17) of any town in the P.W.V. (figure 6.25). Only Benoni with the Dunsward works and Pretoria and Vereeniging exceed Germiston's output in the base metal industry. With Germiston as its centre and the rapid industrial development of Kempton Park and Alberton, the axis will become one of the most important industrial areas of the Republic.

Germiston maintained its lead during the sixties decade. The availability of industrial land enabled manufacturers to take full advantage of the economic boom for expansion. Wadeville industrial area has been extended and the land zoned for industrial use has virtually doubled to include parts of Klippoortjie No. 136 and Union Settlement as far south as the Heidelberg Road. This has meant that industry on the Near East Rand has not been short of land. Of those firms which responded to the 1968 Survey in Germiston, 44.4% said they had utilised all the land on their present sites, while in Johannesburg the figure was 64.9% and in Benoni 50%. This means that of the three areas, Germiston was in the best position to encourage expansion. Germiston has adequate room to the south for expansion, (figure 5.15) whereas Benoni has residential suburbs to the north and Brakpan to the south of it. Future industrial areas will have to be developed to the east, which will take them away from the Central Rand. Despite the advantages offered by Benoni, industry is likely to develop more rapidly to the south of Germiston. Added to this is the fact that both Kempton Park and Alberton are expanding very rapidly as industrial areas.

When compared on an individual basis the axis towns metal establishments outnumbered all others on the East Rand in 1968. (Figure 6.24). 94.54% of all metal establishments in the Kempton Park - Germiston

Alberton axis had their major market in the P.W.V.; 78.18% in Johannesburg and 63.63% on the East Rand (Figure 6.21). This emphasises the importance of market upon location. 90% of the establishments used motor transport for moving both raw materials and finished goods.

Only 25% used telex machines and computers, 100% used electricity, 28% gas and 22% coal. The percentage of unskilled workers was less than in the case of base metal works, i.e. 55% vs 57%, while skilled workers were in great demand; 60% or 33 establishments stated that they had trouble in finding skilled labour and suffered from a shortage of this type of worker; however only 40% or 22 establishments offered any kind of training to its employees (figure 6.21). It should be noted that the labour shortage does not appear to have been eased at all by the credit restrictions which were introduced as an anti-inflationary measure. The demand for skilled workers by industry has resulted in wage increases which adversely affect smaller establishments, not as capable of competing for labour as larger concerns. Wage increases without productivity increases result in continued inflation.

The high apparent growth rate and the demand for skilled labour, even during the non-boom periods is indicative of the Near East Rand's growth potential in the metal products industry.

3.2.1.3 The Machinery Industry (Group 17)

Generally the machine industry exhibits similar trends to the metal products industry. Germiston had 47 machine producers in 1962/63, more than twice that of Benoni which had 17 (Figure 5.4). In 1959/60 the Near East Rand had 34 machine producers or 47.86% of the total on the East Rand (Report No. 2831966) by 1962/3 this had risen to 58 or 50.43% (Figure 4.5). This general increase in the number of establishments appears to have continued although the 1968 survey showed that the area had only 48.33% of all machine producers on the East Rand, the NRDC survey showed only 40.38%. (Maps 5.3 and 6.5).

The Near East Rand employed more than 5877 persons in 1959/60 (Figure 6.23). This was 48.85% of all the workers engaged in the machine industries (Group 17) on the East Rand in that year. According to the two surveys this percentage has since decreased. The NRDC survey covered 4,814 workers in the Near East Rand which amounted to 49.47% of the total machine workers on the East Rand. The 1968 Survey covered only 3,486 workers on the Near East Rand which amounted only to 31.43% of the total on the East Rand (Maps 6.18 and 6.19).

It would appear from these figures that the percentage of machine producing workers in the Kempton Park - Germiston - Alberton axis is decreasing while the relative number of establishments is increasing. In 1959/60 the average number of workers employed per machine producing establishment was 183.7 (Figure 6.23). According to the NRDC Survey it was 197.25 and the 1968 Survey 139.49 (Figure 6.6). This is indicative of a trend towards smaller establishments on the Near East Rand. Alberton had a larger number of workers per establishment than Germiston in 1968 (Figure 6.6).

Larger machine producers are moving to Alberton where land is easily obtained. Sixty-six percent of the machine industries in Germiston utilised all their land while 42.85% had done so in Alberton and only 29% in Kempton Park (Figure 6.15). The Alberton industrial area offers room for industrial expansion near the central Witwatersrand. Alberton's percentage of the total number of machine industries on the East Rand has risen from 9.62% to 11.66% (Figure 6.24) while the numbers employed rose from 5.67% to 8.25%.

During the 1960 - 65 period development in this field was rapid (Figure 6.11). It was greater than anywhere else in the P.W.V. Of the seven machine producing establishments which answered the 1968 Survey, six had been in Alberton since 1960, which was the same number of new establishments which located in Germiston.

The majority of machine producers in the axis produce and maintain articles but some just service and repair machines without actually producing them. 23 of the 29 or 79.30% of them had their main market in the P.W.V. 21 or 72.41% included the East Rand and 20 or 68.96% Johannesburg (Figure 6.21).

Only 7 or 24.17% included the Orange Free State, which indicates that these establishments supply industry and to a lesser degree agriculture. This is born out by the fact that over 75% of the establishments used the roads to transport their goods. All the establishments used electricity while 9 used gas and only 5 coal, possibly because of the costs and difficulty of transporting coal especially during the winter. 22 or 75.86% of the establishments suffered from a shortage of skilled labour while only 9 or 31.63% were short of semi-skilled labour and 6 or 20.74% were short of unskilled labour. Only 53.72% of the concerns had any form of training for their employees (Figure 6.23).

The possible shortage of skilled labour in this area could be explained by the nature of the work performed. The production of machinery requires more skilled workers than the production of metal products or base metals, because of the greater degree of precision required in machining parts. Only 60% of the metal products industries in this area suffered from a skilled labour shortage which is 15% fewer than the machine industry.

In short it appears that the Near East Rand is developing more rapidly than the Far East Rand and is following the trend of metal producing industries in the development of smaller concerns, except in the case of Alberton where most of the larger firms are being

3.2.2 The Far East Rand

3.2.2.1 The Base Metal Industry (Group 15)

The Far East Rand includes the magisterial districts of Boksburg, Benoni, Brakpan and Springs. It has always been outnumbered by the Near East Rand in base metal smelting establishments (31 vs 17, 1963) from 1959 to 1963 the growth rate of the Far East Rand's base metal industry has been 3.9% p.a. while that of the Near East Rand has been 13.9. (Fig. 5.4).

The Far East Rand has employed more base metal workers than the Near East Rand, but the more rapid growth rate of the latter has resulted in a more equitable distribution of establishments and workers (Figure 5.3, 6.7, 6.8 and 6.26).

Figure 6.26

Title: Number of persons employed in the base metal industry 1959, 1961 and 1968.

Source: Report No. 283 (1959/60 I.C.), 1961 NRDC Survey and 1968 Survey.

Area	1959	1961	1968
Near East Rand	1,648 +	1,072 @	3,926 @
Far East Rand	3,169 +	1,538 @	3,011 @

+ Only total figures available

@ Sample figures not complete

Although Benoni employs an average of 219.3 persons per base metal working establishment as compared to 148.2 for Germiston (Fig. 6.23) the growth of new foundries and smelting works has not occurred as rapidly on the Far East Rand as in the axis. The rapid growth between 1963 and 1965 (Figure 6.11) occurred primarily on the Near East Rand (Fig. 6.7 and 6.8) resulting in a comparative decline in the relative importance of heavy industry on the Far East Rand.

The towns of the Far East Rand are actively trying to attract industry. Springs has opened two new industrial areas - New Era (432 acres) and Nuffield (328 acres). Benoni and Brakpan are encouraging development but during periods of rapid growth the region is not able to expand its industrial base as rapidly as the Near East Rand. This can be attributed to the Government's policy of de-centralisation as well as a lack of fast communication with the Central and Near East Rand which forms the major market area. As the Near East Rand has developed it has become more important as a market (Figure 6.21) and so has competed better than the Far East Rand in attracting new industry.

Benoni forms the centre of the Far East Rand's base metal industry with the well established Dunsward Iron and Steel Works. In 1959, 2,412 persons or 47.13% of all base metal workers on the entire East Rand were employed in the 11 establishments in Benoni, by 1968 the average number employed per establishment had risen to 458.1 (Figure 6.6). Although during the same period the total for Germiston rose to 1025.3.

The Far East Rand's industrial zones are grouped in three areas (Figure 5.15). The Boksburg, Benoni townships form an industrial node which has expanded northwards. Anderbolt and Klipfontein already have railway sidings and are developing rapidly. In Benoni, expansion of the industrial area has not been continuous with that of other areas. The New Apex industrial area is separated from the original industrial area by an African township at present but this is planned to be converted to an Indian township in the future, which will mean that the Africans will be moved further southwards to Kwa Thema at Springs or to Brakpan's township. This could raise the cost of labour in Foundries since African labour is not likely to be replaced by Indian.

As gold mining on the Far East Rand declines, industry will have to be developed to give the necessary work opportunities required by the increasing population. Since the base metal industry forms a basis from which

other industrial development can occur, it is very important that this industry be encouraged in the area. The area offers several advantages for this kind of development.

- A. The original Dunswart Iron and Steel Works was founded in 1910 to supply the local gold mines with iron and steel, and to utilise the vast amount of scrap which had accumulated. This gave the area a twenty-year start on Iscor, and allowed it to develop a market on the East Rand,
- B. gold mining on the Far East Rand is still more important than in Johannesburg or Germiston. In the early fifties, Boksburg and Benoni had one person in eleven and one in eighteen respectively working on the mines, while Springs had one in five, which was about five times as high as Germiston and twelve times as many as Johannesburg (Figure 4.4). By 1960 the average for the Far East Rand was still one in five or 19.04% of the total white population of the area, as compared to 4.38% in Germiston and 2.55% in Johannesburg. This means that the manufacturing industries on the Far East Rand which supply the mines create a demand for basic iron and steel products,
- C. Benoni is comparatively central, being 19 miles from Johannesburg, and 12 miles from Jan Smuts and Germiston,
- D. industrial land is cheap and available,
- E. railway spurs are laid to all the industrial areas and the services are the quickest and cheapest on the East Rand,
- F. there is a labour pool in the area,
- G. rates and taxes are low,
- H. electricity and water are comparatively cheap,
- I. there is a large local supply of cheap coal,
- J. all services and a growing population already exist in the area.

The active encouragement of industrial development has been followed by the authorities in an effort to widen the

basis of the area's activity and reduce its dependence upon the goldmines.

This policy of encouragement of industrial development is being followed throughout the Far East Rand, but the Boksburg - Benoni industrial area is by far the most developed area. Expansion has been rapid and costs have been comparatively low. In 1959/60* for example, Benoni's base metal industry spent an average of R449,540 per establishment on material to produce a net output of R389,180, while the average Germiston establishment spent R398,900 to produce a net output of R255,600. In other words the average net output amounted to 86.56% of the material cost, while Germiston's amounted to only 64.06%.

This means that the Benoni area has an advantage over the Germiston area and is therefore likely to develop more rapidly in as far as the base metal industry is concerned. In this respect the rest of the East Rand is relatively unimportant. (Figure 6.7).

The metal industry on the East Rand is developing faster than in the Johannesburg area, and Benoni is likely to take the lead in the expansion of the base metal industry on the East Rand.

3.2.2.2 The Metal Products Industry (Group 16)

Again the rapid growth of the Near East Rand between 1959 and 1963 exceeded that of the Far East Rand by 14.0% p.a. The total number of metal products establishments on the Far East Rand rose from 90 to 102 as compared to a rise of 101 to 157 on the Near East Rand (Figures 5.3, 5.4 and 6.5).

Figure 6.27

Title: Number of persons employed in the metal products industry, 1959, 1961 and 1968.

Source: Report No. 283 (1959 / 60 I.C.), 1961 Survey NRDC and 1968 Survey.

Area	1959	1961	1968
Near East Rand	7,651 +	5,753 @	5,732 @
Far East Rand	10,305 +	7,441 @	6,200 @

@ Sample figures not complete

+ only total figures available

* Latest available figures on a magisterial breakdown within the P.W.V.

The Far East Rand did maintain its position as a leading metal products region employing more workers than the Near East Rand (Figure 6.27) and producing a more valuable output. Although no single Far East Rand town produced more than Germiston's net output of R10,924,000 in 1960, Boksburg produced R8,793,000, Springs R4,611,000 (Figure 6.25) and the Far East Rand's total of R16,061,000 exceeded that of the Near East Rand by R4,383,000.

The average number of workers per establishment of Boksburg and Springs has always been higher than that of Germiston (Figure 6.28).

Figure 6.28

Title: Average number of workers per metal products establishment.

Source: Report No. 283 (1959/60 I.C.) 1961 NRDC Survey and 1968 survey.

Area	1959/60	1961	1968
Germiston	78.21	114.00	122.88
Boksburg	158.20	150.10	228.17
Springs	118.9	166.5	232.12

Both the numbers employed per establishment and the higher output in value of the metal product industries on the Far East Rand are indicative of a heavier type of industry than that found on the Near East Rand. The fact that the axis towns have smaller but more numerous concerns indicates that diversification is occurring and as the Near East Rand is developing it is following the trend set by Johannesburg. It also means that smaller industries must eventually develop on the Far East Rand as diversification begins to occur there (Figure 6.13 and 6.14).

The industrial areas of Boksburg and Benoni are linked forming an important industrial nucleus on the Far East Rand (Figure 5.15). The fact that Benoni leads the whole East Rand in base metal production, while Boksburg is second in the output of metal products and Benoni second in the output of machinery, is indicative of the importance of this area (Figure 6.25). Alone it does not form as big or as important an industrial area as is found to the south of Germiston but if Brakpan and Springs are included the output of the Far East Rand exceeded that of the Near East Rand.

The advantages offered to industry by Benoni are in the majority of cases the result of an industrial conscious town

(listed previously). In the case of Springs similar policies are followed by the local authorities, so that the towns on the East Rand are in a sense competing for industry one against another. However the Springs - Brakpan industrial areas have the disadvantage of being more remote than the Boksburg - Benoni areas (Figures 6.13 and 6.14).

The Springs industrial areas tend to be much smaller than either those of the Boksburg - Benoni area or the Germiston - Albertyn section (Figure 5.15). They do have room for expansion which could occur to the north, south and east.

The proposed new road will connect the southern part of Springs with the central Witwatersrand (Figure 5.15). This will greatly enhance the Nuffield Industrial area as well as the Vulcania Industrial township of Brakpan. The northern branch of the new highway (Figure 5.15) is designed to cater for the large residential areas to the north of the Far East Rand. Benoni and Daveyton do not have any industrial areas to the north of this road and it is unlikely that it will affect the Boksburg - Benoni industrial area as much as the southern branch will improve Springs.

It should also be noted that the industrial areas of the East Rand are comparatively small. Workers are spread over large areas (Figure 6.13 and 6.14). In fact the number of workers employed in the industry need not have any apparent relationship to the industrial area. This is shown in the case of Springs where the small industrial area employs a large number of workers. This means that Figures 6.13 and 6.14 as well as Figures 4.3 and 4.15 can be misleading unless studied in conjunction with Figure 5.15.

Springs has the most land available for further expansion (Figure 6.15). Not one of its nine establishments have used all their land. In the case of Boksburg 40% of the firms already utilise all their land, while in Benoni 50% of them no longer have room to expand on their present premises.

Although these figures are all lower than Johannesburg and Albertyn they are indicative of the problems facing the East Rand towns. Benoni suffered most in terms of industrial land shortages with Springs and Brakpan being the least affected by it. At the present time this may not be too serious a threat

to the metal products industries but in the future this could affect all forms of industry.

The metal products industries of the East Rand are better off in this respect than Johannesburg and even Pretoria.

The major market area for the metal products of the Far East Rand is the P.W.V. (Figure 6.16). Of the 40 metal products establishments on the Far East Rand which answered the 1968 survey, 37 stated that their main market was in the P.W.V. and of this 34 included the East Rand in their major market areas, while only 23 included Johannesburg. The areas of the West Rand, Pretoria and Vereeniging were included by only 13 of the establishments. These areas are definitely preferable to the major market which is the East Rand itself. 25 of the 40 establishments or 62.48% suffered from a shortage of skilled workers as compared to 33 of the 54 or 61.1% of the firms on the Near East Rand and 58.09% in Johannesburg. This seems to indicate that there is a definite relationship between the availability of skilled labour and distance from Johannesburg (Figures 6.13 and 6.14). In the case of Springs for example (Figure 6.21) all nine establishments suffered from a shortage of skilled workers while in Benoni only 3 of the 8, or 37.5% were short and in Boksburg 12 out of 17, or 70.6%. In Germiston this dropped to 60.7%. The comparatively low figure for Benoni can be explained by the fact that Benoni has the largest residential area of the Far East Rand (Figure 5.15) and a comparatively small number of establishments (figure 5.4) employing an average of only 60.9 persons per establishment in 1959/60 which amounted to 8.63% of all metal product workers on the East Rand in that year (Figure 6.23).

The 1968 Survey returns showed that Benoni had only 8.42% of all the establishments while Boksburg had 17.89% and Springs 9.47% (Figure 6.24). Benoni's metal products industry employed 11.86% or 223 workers while Boksburg's employed 3879 or 32.23% and Springs 1857 or 11.39%. The low figures for Benoni are partially due to a poor response from that area but these trends were already apparent in the 1959/60 and 1961/62 Industrial Census.

The trends on the Far East Rand differ from those of the Near East Rand. There has been no decrease in the numbers employed per establishment and establishments are tending to increase in size. The number of white collar workers is comparatively low (see above). Money spent on new financial and commercial buildings in Boksburg and Benoni during the 1961 - 65 period amounted to R500,000 and R2,100,000 respectively, considerably less

than the R7,400,000 spent in Germiston. In as far as new industrial buildings are concerned, the area does not appear to have invested much more. Boksburg spent R2,800,000 and Benoni R4,100,000 while Kempton Park spent R9,830,000 during the same period. In the case of Springs there has been considerable development.

"With the exception of Springs, where there is considerable multi-storey development, and excluding Johannesburg, the pattern of development was predominantly one-storey buildings, many of which are outdated in quality

"As regards shopping, Springs was the best in quality and had the appearance of becoming a model centre for the surrounding districts. Benoni, in area possesses more shops, but a large number are of poor quality

..... Both Springs and Krugersdorp have reasonably strong office development."

"Benoni and Krugersdorp appear to have the strongest concentration of Government buildings."

(Johannesburg , C.E.D. 1966)

The relatively small industrial areas of Boksburg, Benoni and Springs are very important to the Far East Rand. There is at the moment no trend towards the development of smaller businesses as is the case on the Near East Rand. Springs could develop into an important area having a greater number of white collar workers and becoming the administrative and commercial centre of that area in the same way Germiston is developing on the Near East Rand. The Far East Rand is however likely to remain an area of heavier engineering and large concerns catering for the central and east Witwatersrand.

3.2.2.3 The Machine Manufacturing Industry (Group 17)

From 1959 to 1963 the growth rate in the number of new establishments on the Far East Rand amount to 18% p.a. compared to 23.5% on the Near East Rand (Figure 5.4). Again the tremendous growth of the Near East Rand is emphasised. The machine industries major market is the central Rand followed very closely by the East Rand with Germiston as the prominent centre (Figure 6.21). In employment numbers and average numbers of workers per establishment the Far East Rand has outstripped the axis towns (Figure 6.29.)

Figure 6.29

Title: Number of workers in the Machine Manufacturing Industry.

Source: Report No. 283 (1959/60 I.C.), 1961 NRDC Survey and 1968 Survey.

Area	1959	1961	1968
Near East Rand	5,877 +	4,814 @	3,486 @
Far East Rand	6,171 +	4,922 @	8,586 @

+ Only total figures available

@ survey figures incomplete

The rapid increase in the number of workers employed in the machine industry on the Far East Rand has occurred in Boksburg which employed 5.19% of the whole East Rand's machine workers in 1959 (Figure 6.23) and 33.9% in 1968 (Figure 6.6). The average number of employees per establishment rose from 69.3 (Figure 6.23) to 431.5 (Figure 6.6) over the same period. Springs' average rose from 129.9 to 287.75.

The machine industry does tend to have larger establishments than the metal products industry and the increases in average workers employed per establishment indicates an expansion in the size of firms on the Far East Rand (Figures 6.18 and 6.19). The Near East Rand increased its total number of concerns but in total output the Far East Rand may now exceed it. In 1959/60 Germiston's output amounted to R10,220,000 as compared to R5,856,000 for Benoni (Figure 6.25). At that time Boksburg's output amounted to only R856,000 the smallest on the whole East Rand. The increased importance of Boksburg is shown by the fact that it was the only town on the Far East Rand which increased its total percentage of machine manufacturers (Figure 6.24) between 1961 and 1968, from 13.5% to 16.7%.

All other towns declined, Springs falling from 17.3% to 10%. This means that although growth did occur in absolute terms, it was slower than in the axis and Springs exhibited the slowest growth in the machine industry. Benoni's growth was also low, its share of the total East Rand's machine industry falling by 2.3% so that the town is now second to Boksburg in numbers and size (Figure 6.30).

Figure 6.30

Title: Number of establishments and average number of employees per establishment.

Source: Report 283 (1959/60 I.C.) NRDC 1961 Survey and 1968 Survey.

Area	1959/60		1961		1968	
	establishment	workers	establishment	workers	establishment	workers
Boksburg	9	(69.3) +	7	(72.14) @	10	(431.5) @
Benoni	17	(192.3) +	9	(282.0) @	9	(317.0) @

+ Only total figures available

@ Survey figures not complete

All establishments on the Far East Rand used electricity while 10 or 32.25% used gas and 11 or 35.48% coal (Figure 6.21). The greater use of coal on the Far East Rand, than on the Near East Rand (where only 17.24% of the establishments used it) could be due to the coal mines at Brakpan and Springs. Twenty four or 77.41% of the establishments suffered from a shortage of skilled labour which is about 2% more than on the East Rand. This could be expected since the total working population of the Far East Rand is much smaller than in Johannesburg although blue collar workers on the Far East Rand outnumber white collar workers (Figure 5.21). In the case of semi-skilled labour only 6 or 19.36% of the establishments were short while 4 or 12.9% had difficulty in finding unskilled labour. Both these figures are lower than on the Near East Rand where unskilled labour is in more demand. A higher percentage of Far East Rand establishments have some form of job training than the Near East Rand - 54.85% vs. 51.72%. This could be as a result of the slightly higher demand for skilled labour on the Far East Rand.

Another reason for the shortage of skilled labour and larger percentage of training schemes on the Far East Rand could be the fact that the average size of the establishment is larger than those on the Near East Rand or Johannesburg. Despite the fact that there are fewer firms on the Far East Rand, they employ more people and so require more labour - hence the shortage of skilled labour. Also a large concern is better able to organise and invest in an 'on the job training scheme' than smaller firms are.

3.3 The West Rand (Economic Region 42)

3.3.1 The Base Metal Industry (Group 15)

(Figures 5.3 and 6.5)

The West Rand remained an area of relative unimportance to the base metal industry although the total number of smelters rose from 4 to 10 during the period 1959 to 1963. They employed a total of 912 workers in 1961/2 (Report No. 304) or 2.5% of the total number employed in the P.W.V. (Figures 6.7 and 6.8). By 1968 the West Rand had 2.8% of the P.W.V.'s total base metal smelting establishment (Figure 6.9). The average number of employees per establishment on the West Rand rose from 114 in 1961 to 160 in 1968 (Figure 6.6) which is indicative of some growth. Krugersdorp has shown the greatest growth in the area (Figure 5.4) but the base metal industry has not shown any significant development in the region.

3.3.2 The Metal Products Industry (Group 16) (Figures 5.3 and 6.5)

From 1959/60 to 1962/3 the total number of metal products manufacturers rose from 28 to 45 which is a growth rate of 20% p.a. Roodepoort showed the most rapid increase rising from 5 to 11 or 40% p.a. (Figure 5.4). The average number of persons employed per establishment also rose from 61.28 to 83.97 over the period 1961 to 1968 (Figure 6.13 and 6.14).

Krugersdorp employed an average of 90.8 persons per establishment in 1959/60. According to the 1968 Survey this had dropped to 78.4, which is low, but is still more than the 1961/62 figure of 61.28. Krugersdorp had larger concerns than the rest of the West Rand until recently when it fell below the average for the whole area. This means that the new concerns developing in Roodepoort are relatively large, while those establishing themselves in Krugersdorp are smaller because of the limited market.

Unfortunately the most recent output figures available for Krugersdorp are 1959/60 when the town led the West Rand, producing R3,367,000 worth of goods, while Roodepoort's output amounted to only R281,000. The total West Rand's output was R3,628,000 (Figure 6.25) and by 1961/62 it had risen to R3,886,000.

While Krugersdorp may be similar to some East Rand towns, employing about 80 persons per establishment and producing more than Benoni in 1959/60, as a whole the West Rand's metal products industries are not nearly as developed as on the East Rand (Figure 6.25). The average number of people employed per establishment is about 80 as compared to 126 on the East Rand.

Industrial land on the West Rand covers a far smaller area than on the East Rand which is indicative of the smaller potential of the area, especially when it is noted that the residential areas are extensive, again emphasising the area's role as a dormitory suburb of the Central Rand.

All establishments on the West Rand in 1968 used semi-processed goods for their raw materials, no alloying or smelting from ores being practised. This means that the base metal industry of Pretoria and Vereeniging must supply the area's needs. Eleven of the 12 establishments or 91.64% said their main market was in the P.W.V. (Figure 6.16), of these 10 or 74.9% included Johannesburg in their main market area, 5 or 41.67% the East Rand, 4 or 33.34% the West Rand, 3 or 25% Pretoria and 2 or 16.66% Vereeniging and Vanderbijl Park.

The region depends upon Johannesburg and the East Rand for its market, since its own metal and engineering establishments are not large enough to create sufficient demand for goods which are produced in the area. It also shows that the industry is not nearly as dependent upon the gold mines as it was previously, since the most active mines and the highest proportion of miners per working population are to be found on the West Rand (Figure 4.4). The main market for metal products is to be found in the area with the largest number of metal producers since they form their own best market (Figure 6.2 after Dr. F.P. Jacobsz. 1966). The fact that 100% of the establishments use motor transport is indicative of the fact that their markets are on the Witwatersrand. However 41.69% also use rail transport for both incoming and outgoing goods. All the establishments used electricity, 0.8% used gas and 16.6% used coal. The lower consumption of coal on the West Rand is probably due to a lack of local coal deposits. This means that the area is more dependent upon electricity than elsewhere in the P.W.V.

9 Establishments or 74.99% stated that skilled labour was difficult to find, which is about the same as the Near East Rand and lower than the Far East Rand (Figures 6.13 and 6.14). This is considerably higher than the 58.09% for Johannesburg due to the fact that wages are higher in Johannesburg than anywhere else in the P.W.V. and so workers commute daily between the West Rand and Johannesburg, although employment opportunities may exist

for them on the West Rand. Only 16.6% of the establishments suffered from shortages of semi- and un-skilled labour, possibly because of the nearby African township of Soweto. Only a third of the concerns had any form of training scheme for their employees.

3.3.3 The Machine Industry (Group 17)

The total number of machine producers on the West Rand rose from 8 in 1959 to 14 in 1963 an increase of 75% or 25% p.a. (Figure 5.4). These establishments constituted 4.8% of the P.W.V.'s total and employed 1,622 workers in 1961/62 or 6.03% of the P.W.V.'s total. The output amounted to R1,641,000 in 1959/60 and R3,277,000 in 1961/62 as compared to R25,669,000 for the whole East Rand (Figure 6.22). Despite the fact that these machine shops totalled a higher percentage of the P.W.V. than was the case of the more numerous metal producers, they remain of relatively minor importance (Figure 5.3 and 6.5).

The average number of persons employed per establishment was higher than Johannesburg, but much lower than the 201.1 of the East Rand (Figure 6.6). The drop from 115.8 workers per establishment in 1961/62 to 85.4 in 1968 could indicate a period of readjustment and consolidation. Only 1 establishment (20%) was short of skilled labour, as compared to about 75% in metal products (Group 16) and about 74% on the East Rand's machine (Group 17) industries. (Figures 6.18 and 6.19). This is due to the fact that the area supports a substantial population and that 60% of the establishments have some form of job training.

The West Rand was the only area in the P.W.V. where all the machine producers did repairs and services and is indicative of the relatively small market which must exist, because elsewhere on the Witwatersrand, and especially on the East Rand many firms did not do repairs or services at all (Figure 6.17). On the West Rand the comparative shortage of repair workshops means that producers also have to do repairs.

The West Rand machine industry is not nearly as extensive or important to the P.W.V. as that on the East Rand (Figures 6.18 and 6.19). Establishments are concentrated in the Krugersdorp industrial or the Roodepoort region which is an extension of the Johannesburg industrial belt (Figure 5.15).

The Witwatersrand forms a distinct region within the P.W.V. Developments during the late sixties have not altered its relationship to that of the rest of the region, it remains the industrial and manufacturing core of the P.W.V. The growth of the Witwatersrand has continued at a faster rate than that of the P.W.V. especially the Kempton Park - Alberton - Germiston axis. Gold mining has decreased (as shown by the B.O.T. and I.reports) (Figure 5.12) as a market for metal goods. There has been a continued expansion of the metal and engineering industry in the area even after 1965 and a corresponding population increase has occurred.

The following trends are apparent

- A. The tendency for Johannesburg to develop smaller industries has continued.
- B. The East Rand has developed into two regions.

The Near East Rand which includes Kempton Park, Germiston and Alberton and is closely linked with Johannesburg.

This area is developing as an administrative and commercial centre as well as showing a trend towards small industries.

The Far East Rand which has two industrial areas, one which includes Boksburg, and Benoni and the other at Springs. As a whole the area has a tendency towards large industries and small commercial centres, except for Springs, which could develop into a regional centre.

- C. The West Rand whose relative unimportance has remained unaltered.

The importance of the East Rand to the country as a manufacturing and market region is increasing. Official policies of de-centralisation appear to have done little to curb this growth, a phenomenon experienced throughout the world where controls are attempted. The percentage of land which is unused by establishments is therefore an important measure of potential growth in the region. Johannesburg has always had the highest growth rate in the number of metal and engineering establishments, except for two periods when the East Rand surpassed it. The first period was shortly after World War II when many firms were establishing large new works as a result of their increased activities. The other was during the 1965 period when more machinery manufacturers were established on the East Rand than anywhere else. This can be explained by two factors.

- A. The whole country was experiencing an industrial boom, which meant that there was capital available as well as a need to expand business, and
- B. it was only the machine industry (Group 17) which expanded more rapidly because these firms tend to be large and require extensive sites.

The East Rand produced 68.5% by value of the output of the P.W.V.'s metal products and machine industry (Groups 16 and 17). Only the iron and steel production (Group 15) of Pretoria, Vereeniging and Vanderbijl Park exceeded the East Rand's production (Figure 6.22).

The importance of the metal and engineering industry on the Witwatersrand was emphasised by L.P. Green in 1957

"From west to east the main types of industrial employment in each magisterial district are as follows : Randfontein, metal and engineering; Krugersdorp, metal and engineering, building and contracting; Roodepoort, metal and engineering and stone and clay processing; Johannesburg, metal and engineering, textiles, building and contracting, and food processing; Germiston, metal and engineering, building and contracting, chemical and textiles; Boksburg, metal and engineering, and stone and clay processing; Benoni, metal and engineering, and textiles; Brakpan, metal and engineering; Springs, metal and engineering, stone and clay processing and printing." (C.E.D. Johannesburg 1966).

The importance of the metal and engineering industry in the Witwatersrand is great. It is no longer being generated by demands from the mines but is creating its own demands upon other industries, forming a market for its own goods and others. It employs more persons than any other category of manufacturing 109,829 vs a total of 339,866 for the Transvaal (Report No. 304, 1968) and should be encouraged as a basis upon which other industry can develop to offer new work opportunities as the mines close down. The areas utilised by industry are comparatively small (Figure 5.15) although they offer many work opportunities (Figures 5, 16, 6.18 and 6.19) which means that industry can easily replace mining activities. Industry is not a natural occurrence but is entirely dependent upon man and his ability to develop and exploit nature. This means that its effects are not always as apparent as some natural phenomenon and that the true picture cannot be seen from demographic maps and graphs alone, but that they must be seen in chronological perspective (Figure 5.15) i.e. spatially over time.

The current mining ground will supply land for both industrial and residential expansion on the Witwatersrand so that although there may be an apparent shortage of industrial land especially in the developed area this is unlikely to become a problem for some years yet. The continued development of the metal and engineering industry on the East Rand will be able to absorb both workers and capital as the gold mines close down. Already many of the new metal industries on the East Rand are wholly or partially owned by the large mining houses.

The mid and late sixties do not appear to have altered the general pattern of development on the East Rand. The development of the Kempton Park - Germiston - Alberton axis was already apparent, as was the growth of the two industrial centres of Boksburg - Benoni and Springs. It is possible that Brakpan may now develop as communications with Johannesburg improve and expansion in Benoni is limited.

Improved communications both east-west and north-south may accelerate the trend for Germiston to develop a greater variety of smaller industries in addition to the larger concerns which already exist. This means that the axis will continue to grow as the main manufacturing centre of the Republic.

Extensive motorways are planned and under construction throughout the P.W.V. (Figure 5.15). These will effect the development of the outlying areas and could encourage the growth of an area like Springs. In addition to this there are large amounts of mine land which are about to be developed and could slow down the outward spread of industry. (Figure 5.15). The release of some of this land for industrial purposes would ease the pressure on Johannesburg's industries which have the highest percentage of establishments using all their land (Figure 6.15).

In any event the metal industries and particularly the metal products industries which are more orientated towards their market than the base metal or machine industries are, are likely to continue to locate on the Witwatersrand (NRDC 1961). The metal industries which already exist there form the largest market for metal goods of any area in South Africa and so will continue to exert an attraction for more metal industry. The area must experience growth in the future, especially since it is able to generate both a demand and the need to develop new concerns. The trends towards the establishment of large concerns on the East Rand is likely to continue. The high average employment of Alberton (170.7 for all three groups in 1968) is indicative of the southwards spread of heavy industry,

into an area where industrial land is relatively cheap and yet is still centrally placed. The motorways to the south of the East Rand could result in the area developing both heavy and light engineering from Wadeville to New Era in Springs. Certainly if any decentralisation is to occur within the P.W.V. it is likely to be along the southern boundary of the East Rand.

3.5 Pretoria (Economic region 43)

3.5.1 The Base Metal Industry (Group 15)

ISCOR dominates the scene entirely (Figures 5.3 and 6.5).

In 1970 the Pretoria Works produced 1,235,835 tons of molten iron which was 382,000 tons less than the Vanderbijl Park Works (Annual Report 1970). This was a decline of 2.9%, but total steel ingot production increased by 1% to reach 3,384,896 tons.

The high demand for iron and steel continued and was as much as 25% above the long term projected demand for some products.

"Although this unusual build-up in demand was a reflection of the increased economic activity, which took place throughout the country during 1969 and 1970, there were other factors which contributed to the exceptionally high level of orders received. These were firstly, that before the Government imposed stricter control on the issue of export permits, considerable tonnages were sold by undertakings engaged in the export trade; secondly, consumers placed larger order than normal, in anticipation of a possible shortage of steel and thirdly, as the possibility of a price increase had been widely mooted, it was natural that attempts would be made to build up stocks." (ISCOR 1970).

The dominance of the base metal industry in the Pretoria region is indicated firstly by the rise in the average number of workers per establishment to 3,576.75 as compared to 433.5 for the East Rand (Figure 6.6); secondly by the fact that the total number of base metal workers was 14,307 as compared to 6,937 on the East Rand (Figure 6.9) and thirdly that 34.52% of all base metal employees in the P.W.V. are to be found in Pretoria (Figures 6.8, 6.9 and 6.10).

Although improvements are being made at the Pretoria Works no extensions are planned.

"No major increases in steel making capacity are planned for the Pretoria Works, owing to site limitations, but some modifications and improvements will in due course be carried out in the metallurgical divisions to improve operating economics. These will include improved methods of charging coal into the coke ovens, uprating the hot-blast stove capacities on the existing blast furnaces and an increased oxygen supply." (ISCOR 1968).

The economic slow down within the country has not resulted in any cut backs in staff or basic production although the price of iron and steel has been raised (from July 1970) as a result of inflation which has not disappeared with the recession. In 1961/2 Pretoria's ISCOR works had a net output of R35,496,000, by 1968 it had risen to R87,680,000 which is an increase of over 100% (ISCOR report 1968).

The remaining 9 establishments in the area employed a total of approximately 1000 workers and specialised in small jobs and alloy production, much of it related to repair and maintenance work. Half of the base metal concerns in Pretoria did repair and service work (1968 Survey), all used semi-processed goods, including ISCOR which purchased 60,000 tons of billet and blooms for processing. Three quarters of them used unprocessed raw materials, including iron ore, coke dolomite, manganese, zinc, tin and chalk. All included Pretoria and the P.W.V. as their major market area.

Although railways were used to move raw materials, road transport was becoming more important. Three quarters of all establishments reported reliance upon it and ISCOR has undertaken extensive civil engineering work to prepare suitable access roads to permit a greater use of road transport (ISCOR 1968). Even coal is being shipped in by road since only half of the establishments use the railway service (Figure 6.17).

Half the establishments suffered from a shortage of both skilled and semi-skilled labour. ISCOR launched a recruiting campaign in France during the latter half of 1968 to alleviate the chronic shortage of skilled workers, especially at the Vanderbijl Park works. The inability to solve the manpower shortage has been a contributing factor to the inflationary spiral which has showed no sign of slowing during 1969 and early 1970.

3.5.2 Metal Products (Group 16.) (Figures 5.3 and 6.5)

The relative unimportance of Pretoria in this field is shown by the fact that these concerns produced only R3,529,000 in 1961/62 or R357,000 less than the West Rand (Figure 6.15.1). Although the growth between 1959/60

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