

Capital investment increased rapidly during this phase, (Figure 2.4) most of it initially being invested in machinery on the Witwatersrand. In fact during 1933/34/35 and 36, the amount invested in machinery on the Witwatersrand exceeded that invested in land and buildings throughout the Union. This caused an increase in productivity per head and allowed the industry to gain profits which were badly needed to further expansion and improvements. As the economy in the country improved and gold production increased, the Witwatersrand engineers extended their scope and markets, a situation closely associated with a gold price rise from R12.50 an ounce in 1933 to R15.50 an ounce in 1939 (Houghton 1964).

In 1938 there were 548 private metal engineering, machinery and cutlery works in the Southern Transvaal. Of these 270 or 49% were engineering works, 82 or 15% were electrical apparatus and engineering works, while 60 or 11% were mine workshops. The remaining 3% included repair shops for scales, typewriters, sewing machines, locksmiths etc. The Government maintained 91 engineering establishments throughout the country, mainly for repairs to the railways, telephones and other Government property. Some of these were on the Witwatersrand, but as they did not supply products to the public or mines, they can be considered rather as consumers of the metal industry's products and form only a small portion of the market. After the mining industry's large share in the market, the next consumer of iron and steel products was the building and construction industry. This industry was even more dependent on the general state of the economy for its well being. The building industry is closely associated with capital investments and was perhaps one of those most susceptible to fluctuations, expanding in boom times when capital was readily available and declining during recessions.

A wide range of products were produced by the metal industry prior to the Second World War. The two most valuable articles were "Pipes, tubes and fittings" (iron and steel) and "structural steel work manufactured" (Figure 2.9). These were used by many industries including the mines and construction works. Plumbing and galvanising works were second only to engineering works on the Witwatersrand, constituting 22% of the establishments.

The same table shows that the greatest volume and value of output came from those manufacturers whose articles could find markets apart from the mines. This meant that the industrial sector of the country was beginning to develop sufficiently to play a noticeable part in the marketing of engineering products. An example of this is the plumbing industry which catered not only for the mines and construction industries, but also for the manufacturing industry, public and even the service industries. Because of this comparatively wide market for plumbing products, engineering works specialising in their manufacture were able to produce and market R2 687 524 worth in 1938.

Figure 2.9

Title: Quantity and Value of some of the Chief Articles Produced by Private Establishments engaged in the Metal Industry in the Union during 1935-36 to 1937-38.

Source: After Government Industrial Census 1937/8 U.G. 21/1941

Name of Articles	Unit	1935-36		1936-37		1937-38	
		Quantity	Value	Quantity	Value (£)	Quantity	Value (£)
Gates and fences	Nos.	n.a.	144,669	n.a.	197,633	n.a.	193,293
Iron and Steel Furniture	"	n.a.	72,352	n.a.	91,413	n.a.	127,094
Metal Doors & Windows	"	n.a.	260,465	n.a.	429,839	n.a.	460,275
Pipes, Tubes & Fittings	Tons	n.a.	799,812	44,762	1,165,770	49,035	1,343,762
Reinforcing Metal Work	"	23,294	481,910	29,702	665,515	22,638	614,502
Rock Drills & Spares	"	n.a.	338,207	1,068	388,998	985	373,848
Steel Ceilings	"	n.a.	168,755	3,549	137,525	3,275	135,726
Steel Tanks	Nos.	1,663	70,343	1,937	86,874	2,028	87,641
Structural Steelwork.							
Manuf.	Tons.	n.a.	1,239,127	43,308	1,152,980	46,219	1,347,452
Wheelbarrows	Nos.	n.a.	38,823	44,633	46,139	38,976	45,854
Tanks	"	17,236	86,580	17,083	88,906	18,239	95,296
Steel Trunks	"	2,698	1,273	5,969	2,006	3,254	1,569
Baths	"	58,486	17,764	77,915	23,341	78,921	30,289
Galvanized iron articles	"	n.a.	245,528	n.a.	305,995	n.a.	273,111
Tin Plate Articles	"	n.a.	436,387	n.a.	502,182	n.a.	443,460
Electric Batteries					+	+	+
Electric Accumulators		n.a.	n.a.	n.a.	58,607	n.a.	59,996
Electric Heating Apparatus		n.a.	n.a.	n.a.	16,004	n.a.	18,010
Electric Cooking Apparatus		n.a.	n.a.	n.a.	32,719	n.a.	23,521
Electric signs		n.a.	n.a.	n.a.	69,622	n.a.	93,210
Other Electrical Appliances		n.a.	n.a.	n.a.	156,127	n.a.	346,755

n.a. - Not Available

+

- Less than four establishments

After Government Census 1937-38. U.G. 21/1941

G.P.S. 16619-1941-1,400

The only product directly linked to the mining industry was "rock drills and rock drill spares". 985 tons or R747 696 (£373 848) worth, were produced during 1937/38. This is a small amount when compared to the R2 694 904 (£1 347 452), worth of structural steel which was also produced in the country.

It is apparent therefore that with more than 47.5% of the country's engineering in the Southern Transvaal, the mines remained the major stimulant to this industry. However, it should also be realised that the vast majority of articles produced by them for the mines were such, that they could be used in other spheres of the economy without further adaptation. Thus a factory which produced pipes for the mines, could also sell these to the Navy or Army. The eight years following the 1933 depression had seen the development of a good growth rate. The tempo of this expansion has been maintained since. South Africa's modern industrial economy dates from the recovery of the depression. The Second World War which lasted from 1939 to 1945 had its own effect upon this growth, but it found a much better prepared country in 1939 than had existed in 1914 when the First World War started. The boost given by the Second World War was better utilised than that of the First. The growth and expansion had been initiated in the early thirties and was enhanced by the necessities of the Second World War.

In conclusion one might observe that the Metal and Engineering industry in South Africa followed the spread of the European Population. Starting at the coast it spread inland with the mineral discoveries. On the Witwatersrand the industry was dependent upon the gold mines for its main market. The First World War and the resultant curtailment of imports produced increased demands upon the industry. With the fall of prices and the depression after the war, the industry came under a severe strain. The internal market diminished and foreign competition increased. Protective tariffs, introduced after 1924, did a little to help, but the industry remained much dependent upon the gold mines. After the 1930 depression, expansion and development occurred as never before. This was the result of an improved economic climate, which together with protective tariffs encouraged industrialisation. New manufacturing concerns were developed and older firms expanded to keep up with local demands. The South African engineering industry was attempting to supply the internal market and in doing so was itself furthering the industrialisation of the country and expanding the local market. From 1933 onwards the engineering industry entered a period of sustained growth, which placed it in a good position to benefit from the demands of World War Two.

CHAPTER III

THE DRIVE TO MATURITY OF THE BASE METAL, METAL PRODUCTS AND MACHINE INDUSTRY 1939 - 1945

1.0 The War Effort:

The period of rapid recovery from the depression had placed South Africa in a much better position than it had been in 1914. Between 1936 and 1939 efficiency improved and production at ISCOR increased to 350 000 ingot tons per annum. Profits also increased to approximately R2 000 000 a year. The rapid growth of secondary engineering establishments resulted in the need for expansion at ISCOR (Figure 3.1)

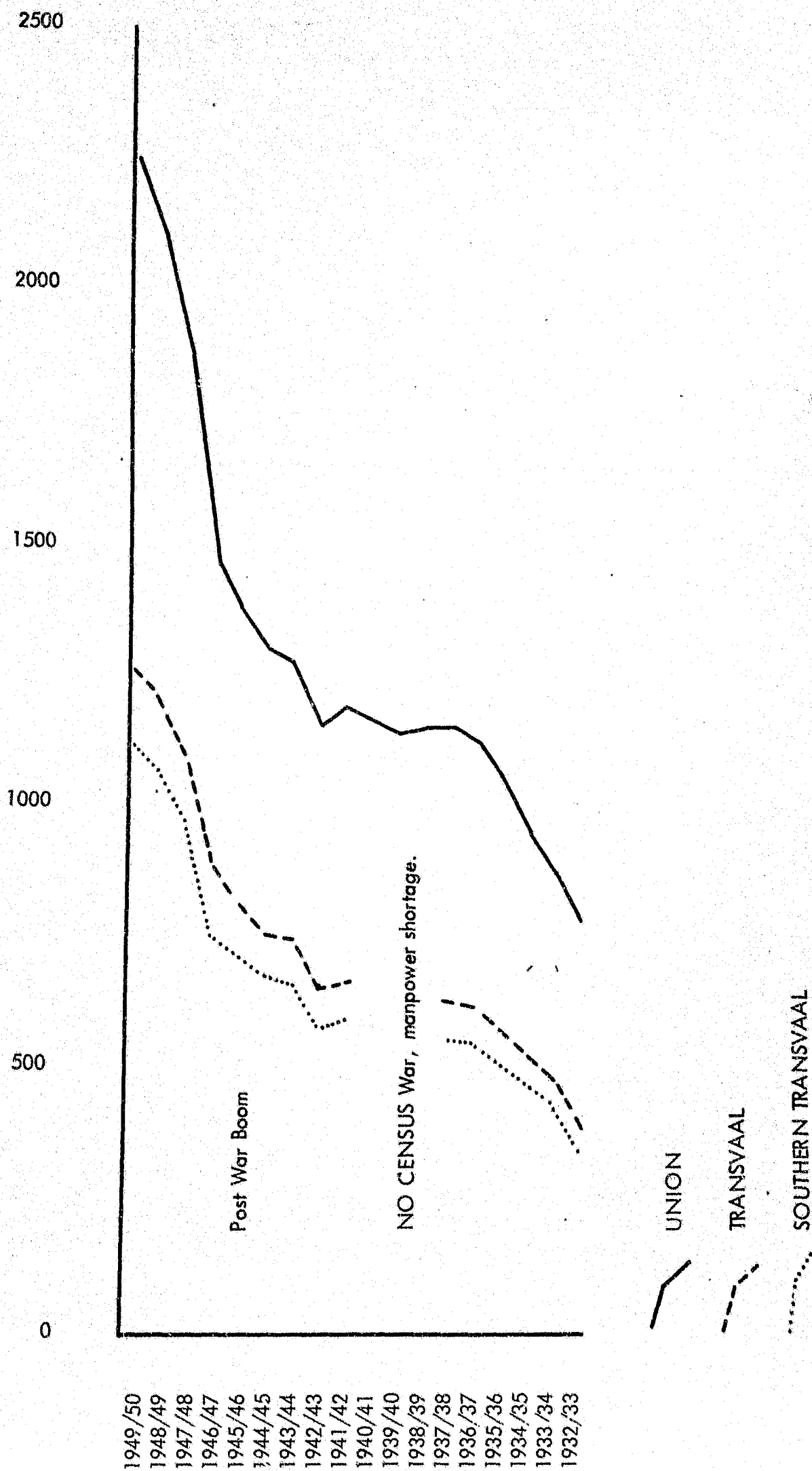
In 1938, ISCOR had R2 500 000 in free funds which Dr. van der Bijl wanted to invest in a new steelworks in the Vereeniging area, but the declaration of war occurred before financial assistance could be obtained in London and expansion was limited to Pretoria. A second coke oven battery and two 25 ton Bessemer converters were planned. These alterations and additions were designed to increase output by 100 000 tons per annum.

At the outbreak of war in September 1939, South Africa had 1 134 establishments engaged in metal and engineering work. These firms employed 66 151 people of all races, had an investment of R25 132 000 and a gross value of production of R61 258 000.

Despite the phenomenal growth during the previous decade (Figure 2.3) the industry in the Transvaal was limited to jobbing, repairing and maintaining equipment for the mines and secondary industry.

By 1941 ISCOR had converted from a peace-time to a war-time basis. Production was geared to include helmet steel, bayonet steel, trench mortar, barrel steel and many other varieties designed to serve the needs of war. At the same time ISCOR lost a number of its more experienced staff who were Germans and who were interned. Output also declined through the necessity of making special steels in furnaces never intended for such work. Sales decreased and costs rose, but ISCOR, which had been supported by the Government during the depression by the establishment of anti-dumping duties, now repaid its debt by keeping prices down, even though profits dropped.

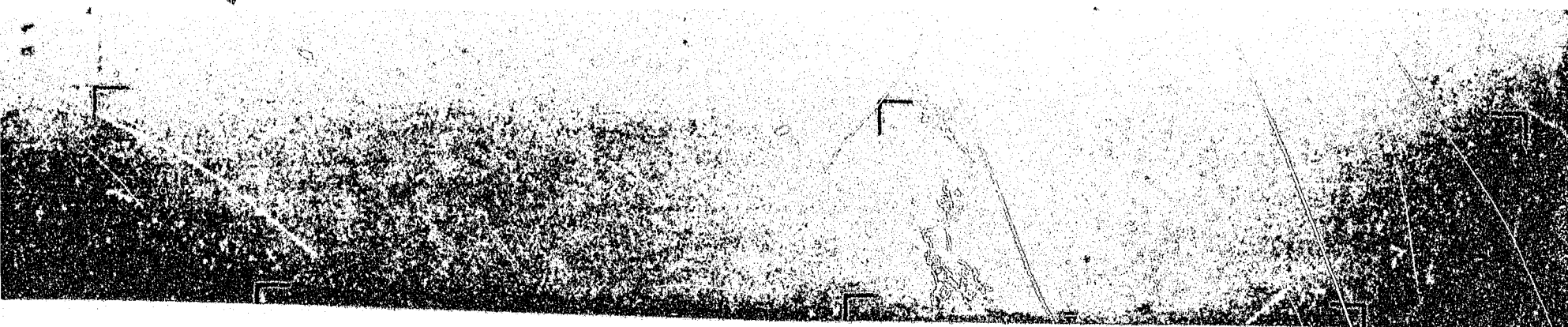
The isolation and difficulty of importing special steels at this time resulted in a need to expand the works to keep pace with demands. Louis Marks offered van der Bijl land a few miles west of Vereeniging below the ruling market price.



NUMBER OF METAL AND ENGINEERING ESTABLISHMENTS.

Source: - Government Industrial Census Reports.

Nos. 31/1935, 34/1936, 30/1937, 24/1938, 39/1939, 21/1941.

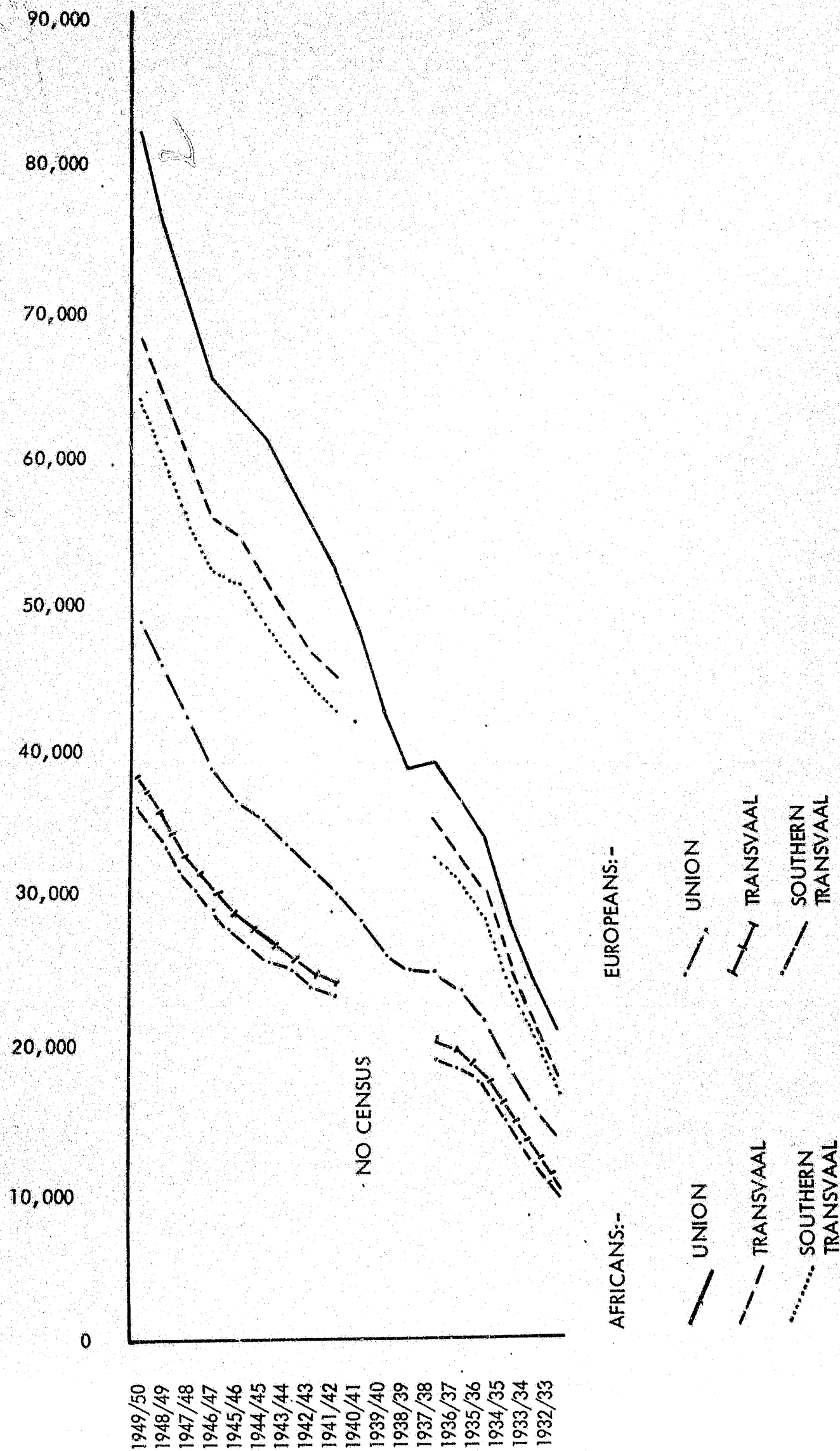


Nearly 40 square miles of land was acquired in this way and not only was a new steelworks planned, but also a complete new town and industrial centre. Because of the war only a plate mill was erected at van der Bijl Park which was so designed to become part of a major integrated works, with semi-continuous mills devoted to rolling flat products. Initially, the plate mill was supplied with steel slabs from Pretoria, but this further increased demands on ISCOR and stimulated further expansion.

A third furnace was provided to increase the output of iron and steel for the plant. Improvements were made and new soaking pits and a combined slabbing and blooming mill were provided to supply slabs as well as to roll blooms for the Pretoria mills. Further improvements resulted in a medium mill with reheating furnace, the light mills were extended and a small sections mill was erected for the production of the smaller bars required by the tool-making industry. In addition an "Emergency Wire Plant" was erected which included a 3 000 ton forge press built in America; this helped to ease the pressing needs of Agriculture.

The increase in production placed greater demands on the sources of raw materials and transport facilities. The expansion also placed heavier burdens upon ISCOR's own engineers and maintenance works. The entire expansion which cost R15 200 000, was raised by the issue of new shares. It is indicative of the potential and sound economic ground upon which ISCOR and the country's metal and engineering industry is based, that all this expansion and increased demands were accomplished without great disruption.

The growth in the total number of metal and engineering establishments in the Union, both private and Government, and the total number of people employed in these establishments continued during the 1940's (Figure 3.1 and 3.2). Although growth during the first half of the decade was substantial, that coming after the war was very much greater. The expected slump did not occur and the number of establishments increased by more than two-thirds from 1945 to 1950. The rate of increase in employment also went up, giving employment opportunities to demobilised forces. From 1946 to 1950, over 45 000 persons were employed in the metal industry. This post-war expansion was the result of developments during the war years. Production during the period 1940 - 1944 included more than 50 000 tons of shell and shell cases, more than 28 000 tons of mortar bombs, grenades and land mines, nearly 20 000 armoured fighting vehicles were delivered in addition to 35 000 military motor vehicles. This fantastic amount of production was not thought possible prior to 1939 and "great technical ingenuity was often required to undertake tasks for which the equipment was not available" (ISCOR 1928 - 1953).



NUMBER OF MALES EMPLOYED IN THE METAL AND ENGINEERING INDUSTRY.

Source:- Government Industrial Census.

South Africa not only managed to produce these articles, but even led the world in design and cheap production in some articles such as mortar sights and rifle barrel lapping machines. It should be realised that before 1939 South Africa had never made a rifle or gun. Trench mortars, mobile artillery for infantry, 3.7 howitzers, 2½ pound and 6 pound anti-tank guns as well as rifles and machine guns were all manufactured in South Africa. In the structural steel field aeroplane hangars and various types of bridges alone consumed 60 000 tons of steel. All this production required ingenuity and tools. The value of machine tools especially imported for war production alone amounted to R2 000 000.

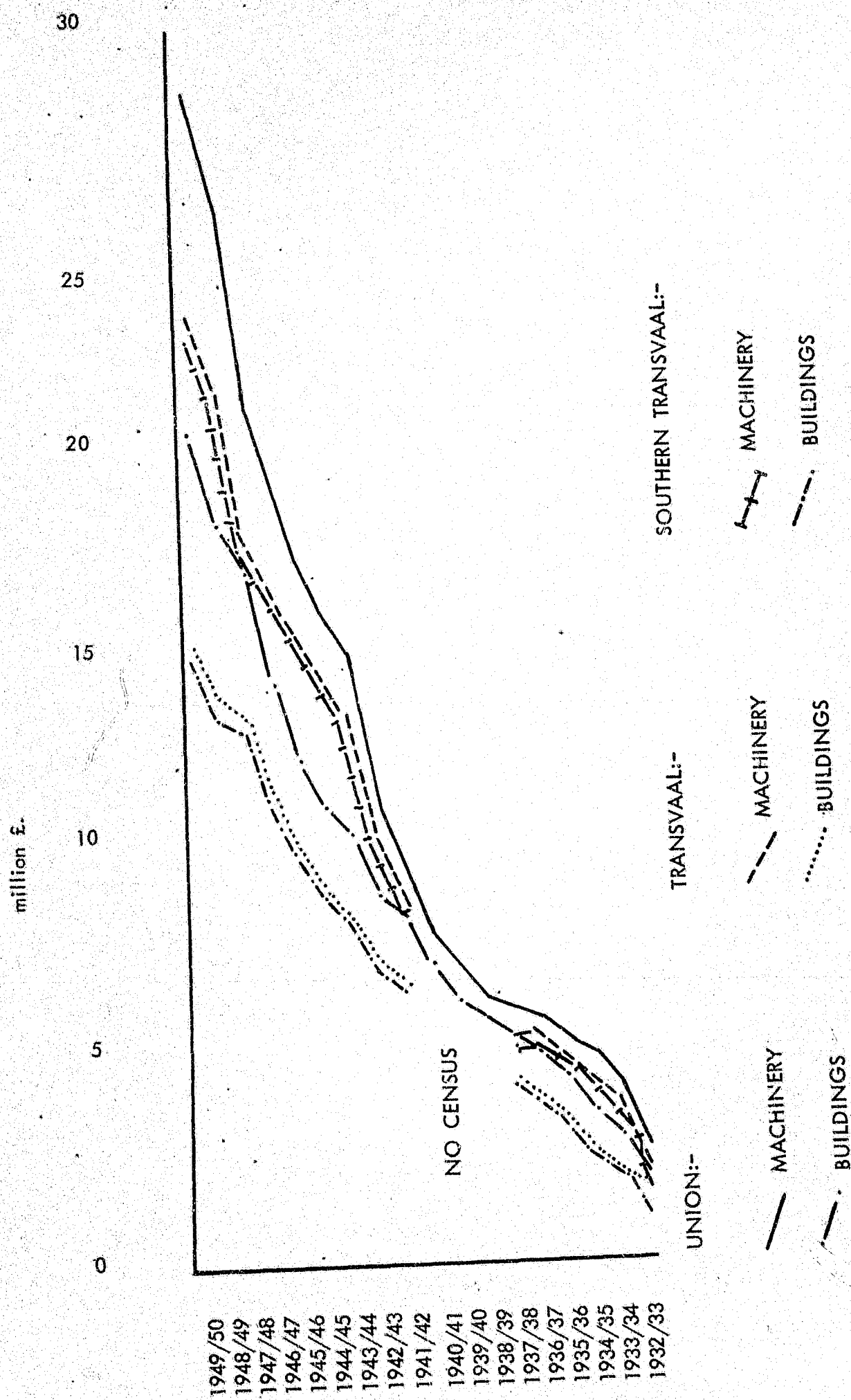
It can be seen from Figure 1.7 that the Union's total number of private establishments increased very little between 1938/39 and 1944/45. In fact 1939 - 40 and 1942 - 43 saw decreases in the total number. Unfortunately figures for the Witwatersrand and Transvaal for 1938/39 and 1941/42 were never published. However, they seem to follow the general trend of the country. The lack of development of new industries during the early part of the war was probably due to the restrictions on imports and the increased priorities given to war materials.

The Witwatersrand always had a lion's share of the metal and engineering industry. It increased from 47.56% in 1937/38 to 51.11% in 1945/46. This meant that by the end of the war more than half of the country's metal and engineering establishments were in the Southern Transvaal. By 1945/50 the Witwatersrand still had 50.31% of all establishments. The percentage increases from 1937 to 1950 were 99.64% and 107.97% for the Union and Southern Transvaal respectively. This means that the rate of development of the industry on the Witwatersrand was 8% higher for the decade than the rest of the country. Although this averages less than 1% per annum it did mean that industry was centralising around the Witwatersrand economic island. It also meant that the rapid growth of towns on the Reef was not sufficiently well-planned or co-ordinated to meet the demands made upon them for housing and transport.

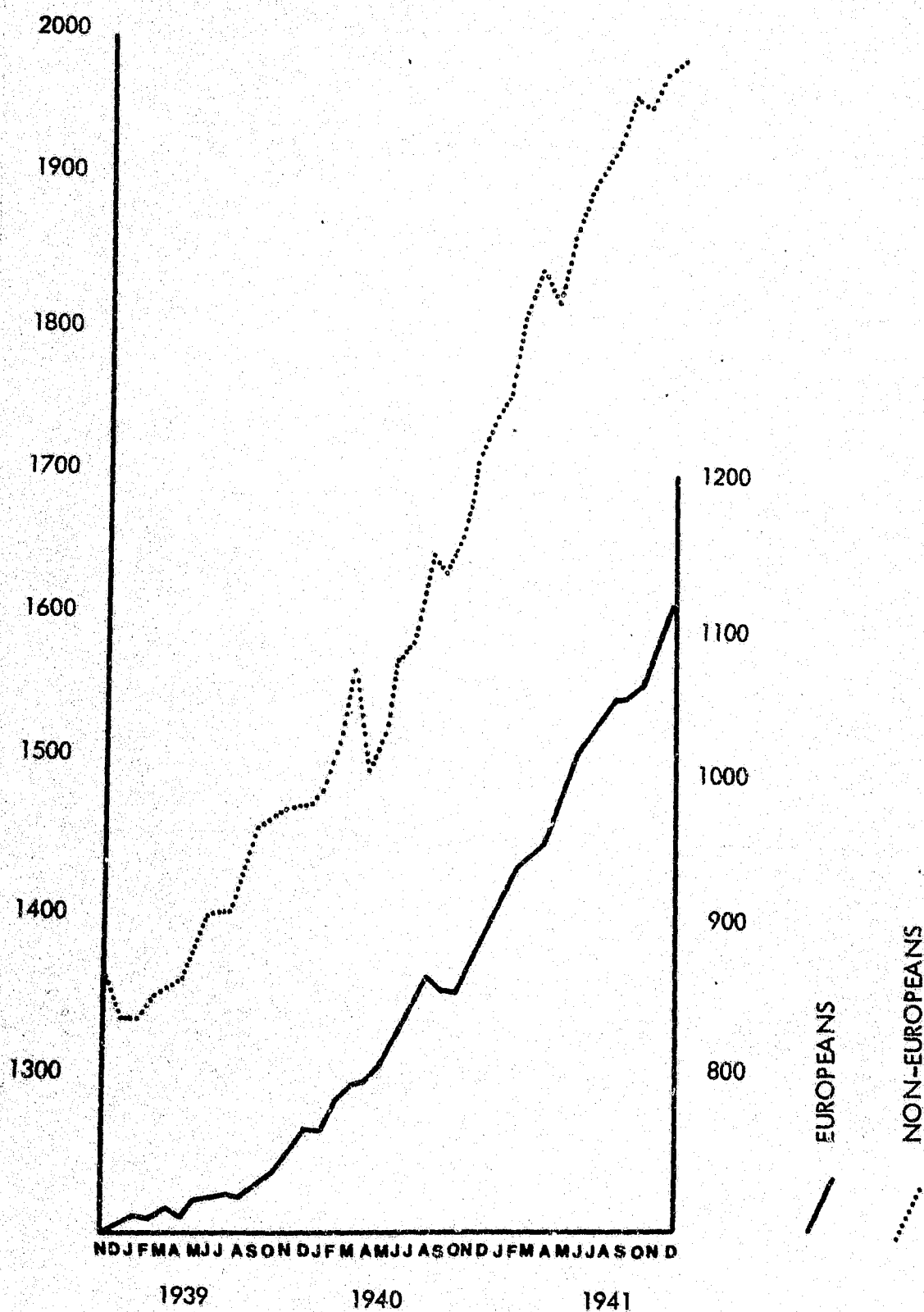
2.0 Wartime Controls:

2.1 Labour:

The economy of the country had to be carefully watched and kept in check by the Government and to do this a Director-General of War Supplies Organisation was appointed. As a body this was responsible for placing of contracts, organising the flow of components and making scheduled deliveries to the military, naval and air force authorities. Generally a policy of decentralisation was followed where possible.



VALUE OF MACHINERY AND LAND AND BUILDINGS OF THE METAL AND ENGINEERING INDUSTRY.
Source:- Government Industrial Census.



NUMBER OF EMPLOYEES IN THE ENGINEERING INDUSTRY IN THE SOUTHERN TRANSVAAL.
Source: - Monthly Bulletin of Statistics. Nov. 1939 through Dec. 1941.

No detailed Census was taken between the years 1938/39 and 1941/42 (Figure 3.2). In an attempt to cover this gap figures were obtained from the Monthly Bulletin of Statistics (Figure 3.4). These figures cover the Engineering Industry alone (as defined by the Bureau) and do not correlate directly with the Industrial Census figures, but they do give an indication of the tremendous expansion which occurred during this period. It should be noted that according to these figures the number of Non-European employees increased by about 6 400 or 47% while European employees increased by about 4 000 or 50%. Thus the ratio of white to non-white workers remained virtually unchanged. However, the rapid expansion of the industry eventually outstripped all labour supplies. The wartime demands put upon the industry resulted in an acute shortage of skilled and semi-skilled manpower. Bidding for labour followed, which often took labour away from essential industries into non-essential production.

To handle this the Government accepted a proposal for the appointment of a Controller of Industrial Manpower whose powers were defined under War Measure Regulations. Consequently the metal industries were brought completely under Government control by proclamation:-

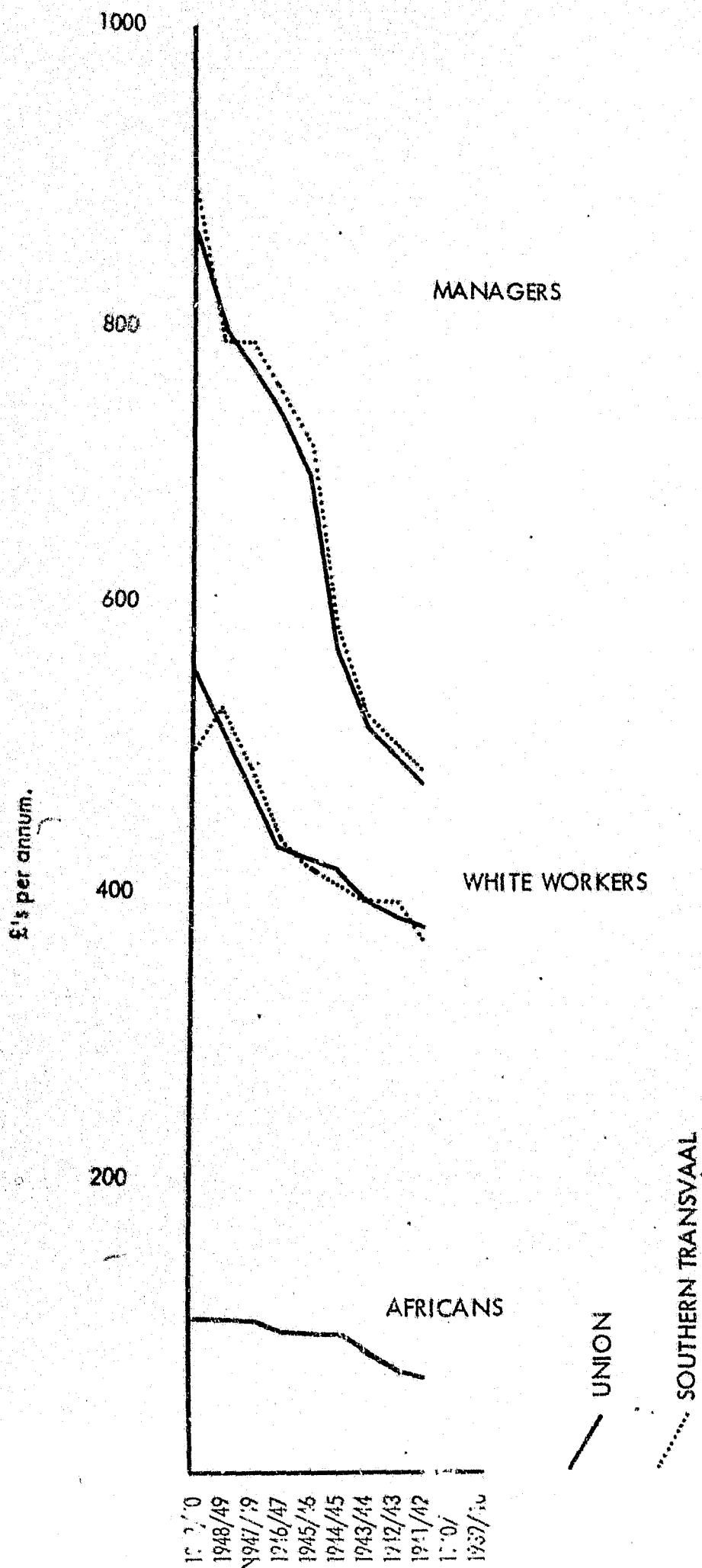
"Subject to any directions given by the Minister, the Controller shall take such action as he deems necessary to ensure that the resources of any controlled industry are used in the manner calculated to yield the best results in the interests of the defence of the Union, of the efficient prosecution of the war or for the maintenance of supplies and services essential to the life of the community".

The very wide powers given to the Controller included the right to determine and regulate the remuneration, hours of work and other conditions of employment in any controlled industry. In collaboration with the Minister of Defence, the Controller of Manpower established a Manpower Control Board, consisting of an equal number of employer and employee representatives. This body soon set up local Advisory Committees to assist the Controller's representatives.

Skilled labour was required to register and could not change its employment without the prior authority of the Controller. The working week was extended by making it obligatory to work a fixed number of overtime hours and an additional 2 000 apprentices were brought into the metal industries. Women emergency workers were introduced in substantial numbers and received intensive training courses. By 1944 over 6 500 emergency female workers were employed in the metal industry.

2.2 Wages:

Wage rates of workers (Figure 3.5) could only be increased with the prior consent of the Controller of Manpower. This was due to the voluntary acceptance of a form of conscription by the metal industry as part of its war effort.



WAGES PAID IN THE METAL AND ENGINEERING INDUSTRY (£ PER ANNUM)
 Source: - Government Industrial Census. 25/1945. 26/1946, 28/1948, 29/1949, 30/1950.

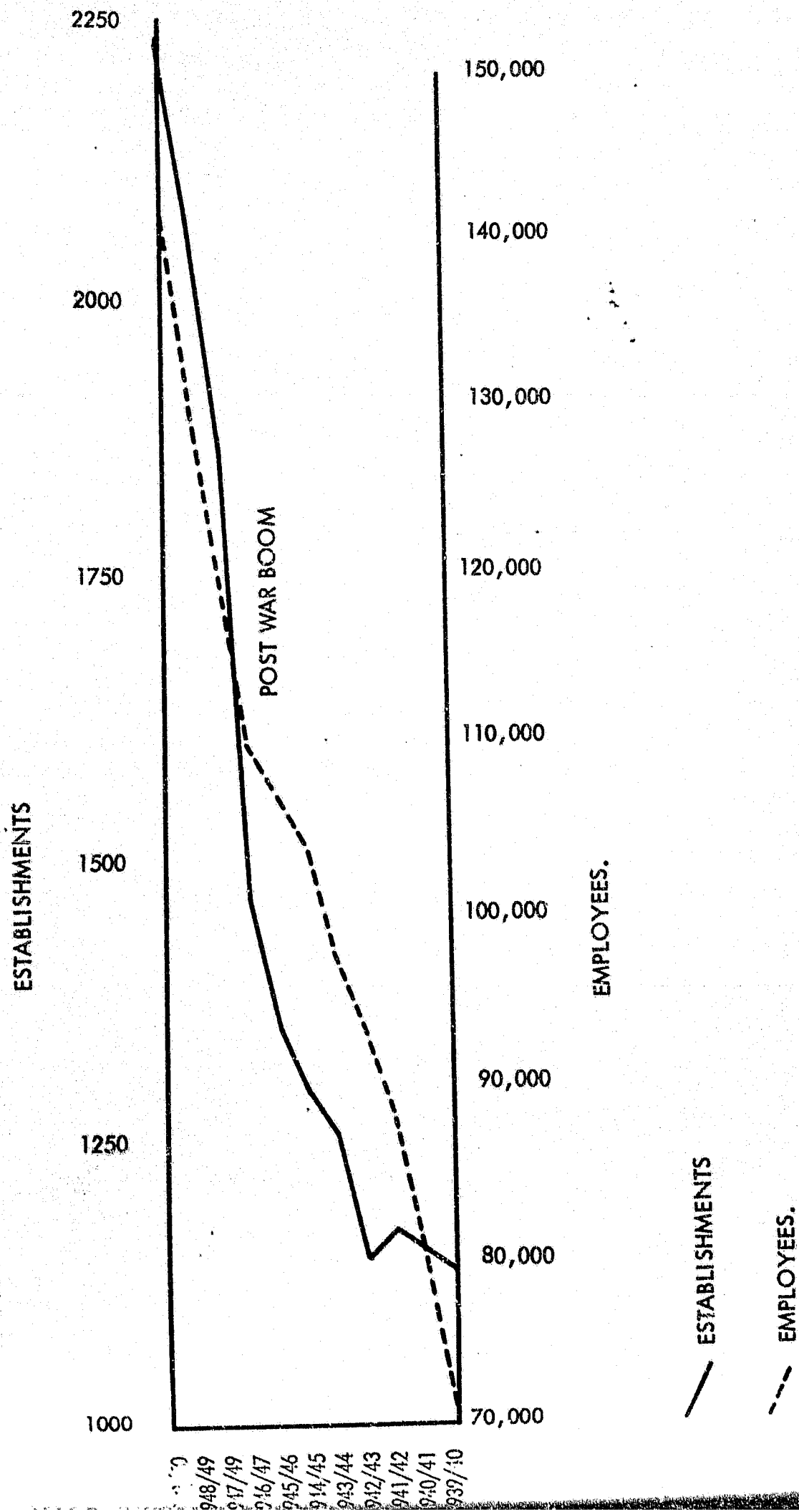
Workers were moved from firm to firm depending on the importance of contracts or were transferred to coastal areas to assist in the ship repair work which was becoming increasingly important. Figure 3.6 shows the increase in the number of private and Government metal and engineering establishments and employees for the whole country during the 1940's. The total number of employees in the industry rose from 94 504 in 1939/40 to 132 577 in 1944/45. In the Southern Transvaal the increase in private employees rose from 50 982 in 1937/38 to 75 783 in 1944/45. During the 1937/38 62% of all private employees had been african; by 1944/45 this rose to 64%, but then remained more or less constant until 1950. This means that throughout the 1940's decade Europeans constituted approximately 36% of the metal and engineering industry's labour force in the Southern Transvaal. The small increase in the percentage of non-white labour employed by the industry did not result in any marked encroachment on skilled and semi-skilled European metal workers. Although skilled labour was in short supply the expansion of the industry's labour force remained remarkably constant in its growth - the gap left by skilled artisans being filled by emergency workers, women and new apprentices. Here the metal and engineering industry differs markedly from manufacturing as a whole where the increase in non-white labour was 74% over the 1938/39 to 1944/45 period and the white labour force increased only 20% for the same period. Not only were wages and workers controlled, but so were raw materials. The Director-General of War Supplies Organisation controlled both ferrous and non-ferrous metal supplies. These were supplied in such a way as to ensure their equitable allocation especially to essential jobs.

Figure 3.5

Title: Average Wages Paid in Metal and Engineering Industries per Annum.

Source: Government Industrial Census Nos. 25/1945, 16/1946, 27/1947, 28/1948, 29/1949, 39/1950.

	<u>EUROPEANS</u>						<u>AFRICANS</u>		
	<u>Managers</u>			<u>Workers</u>					
	<u>Union</u>	<u>Transvaal</u>	<u>Wits</u>	<u>Union</u>	<u>Transvaal</u>	<u>Wits</u>	<u>Union</u>	<u>Transvaal</u>	<u>Wits</u>
1941/42	461	472	471	363	367	367	65	64	65
1942/43	491	501	500	386	380	380	75	73	75
1943/44	512	524	524	386	386	386	84	83	84
1944/45	564	579	579	409	405	405	97	95	97
1945/46	688	705	708	418	422	423	98	97	99
1946/47	734	747	749	429	433	432	100	99	102
1947/48	761	778	779	474	482	484	106	105	108
1948/49	796	820	790	514	522	523	109	108	110
1949/50	849	868	886	548	558	496	109	109	109



TOTAL - GOVERNMENT AND PRIVATE ESTABLISHMENTS AND EMPLOYEES.
 Source: - Government Industrial Census. No. 26/1946, 27/1947, 28/1948, 29/1949, 30/1950.

Figure 3.6

Title: Total Government and Private Establishments

Source: Government Industrial Census Nos. 25/1945, 26/1946, 27/1947, 28/1948, 29/1949, 30/1950.

	<u>Establishments</u>	<u>Employees</u>
1939/40	1143	71 700
1940/41	1161	80 655
1941/42	1182	88 034
1942/43	1153	93 486
1943/44	1257	98 935
1944/45	1291	104 106
1945/46	1356	107 034
1946/47	1468	109 973
1947/48	1859	120 354
1948/49	2078	130 614
1949/50	2228	141 284

A Controller of Machine Tools also allocated equipment on a basis of work priority, firms with important war supply contracts received priorities. To prevent speculation some control on ferrous and non-ferrous materials was imposed and emergency specifications laid down.

Profits were also controlled by the introduction of an Excess Profits Tax which entailed expropriation of profits in excess of those of the 1939 norm.

All these controls meant that private industry became geared towards a wartime economy. Expansion and development were curtailed as was free enterprise. However, the vast amount of material which was needed meant that all firms and workshops were fully occupied. Gun barrels were even turned in mine workshops. The South African Railways and Harbours did maintenance in its workshops for the army, navy and airforce as well as for its own needs.

2.3

Production;

The forced production of a great variety of articles by the Government and private workshops had a profound effect on the outlook of the metal industry as a whole. By 1944 South Africa was producing articles and undertaking work which was believed impossible in 1939.

Some examples of this are the 5 700 armoured cars which were completed from imported chassis and engines in the Union. The 35 000 other motor vehicles of 65 different types which were produced. The 1 500 000 steel helmets which were manufactured from ISCOR steel alloys. In most cases rigid specifications had to be met and the articles produced had to be on a par with those produced anywhere in the world.

The demand for aircraft spares was great and varied. Many special steels and much engineering skill was required in their production. Tens of thousands of cylinder barrels were turned out by South African factories and hundreds of thousands of other parts such as pistons, piston rings, nuts, bolts, washers, strut ends, strut end forks, leg pants, bomb release switches, exhaust manifolds, torsion, tension and compression springs and tail skids were among the smaller articles produced. Large spares were aircraft chairs, bomb racks and gun turrets. Heavy equipment produced included mobile cranes, drum winches, engine stands and battery chargers. Spares for tanks also ranged over hundreds of articles from driving sprockets and track links to delicate springs and gauges.

Many of these endless lists of products had never been manufactured in South Africa before. There was little "know how" and in many cases drawings and specifications were not available. Samples were flown to the Union for drawings to be made, then the metal was analysed and photomicrographed at ISCOR so that its qualities could be determined, after which the steel alloys were produced at ISCOR and the manufacturing contract given out to the various private and Government shops for production. Most of the articles produced were made in the Southern Transvaal. Figures were never published, but it can be safely surmised that this would be the case since:-

1. 50% of all private metal and engineering concerns were in the Southern Transvaal;
2. ISCOR was in the Southern Transvaal and so transport costs on steel would be lower;
3. It was usually cheaper to ship the finished articles to the coast than to have the articles produced there;
4. The coastal engineering firms were inundated with ship repairs and maintenance and over 12 000 ships had been repaired by 1945.

The strict control of labour and production without the same regard to costs and markets as free enterprise, resulted in a good utilisation of resources. The mobility of the labour force, especially skilled labour, resulted in a spreading of techniques and knowledge.

The increased number of apprentices and the emergency training periods increased the expansion rate of the skilled labour force - making more men available for production. Despite this, the demand for skilled and semi-skilled labour far outstripped the supply. Figure 3.6 shows the increases of both employees and the number of establishments engaged in the metal and engineering industry in the Union. It can be seen that during the War the number of establishments did not increase as rapidly as it did afterwards. The rate of increase of employees had been more or less constant at the 6 000 per annum mark during the War, but increasing after 1946. Unfortunately Figures 3.1 and 3.2 are not complete, but with Figure 3.4 it can be seen that the Southern Transvaal expanded at rates comparable with the whole country. The slow rate of growth in the number of establishments during the War is a direct result of the restrictions on capital, the inability to import capital goods, and the lack of sufficient skilled and semi-skilled manpower - which was all being used in the war effort. However, the cessation of hostilities allowed expansion to take place. Whereas during the War establishments in the Southern Transvaal increased from 548 in 1938 to 664 in 1945 - an increase of 116 - by 1950 they totalled 1 121 - an increase of 457. The metal industry had realised its potential; the forced diversification of production during the War now began to pay. Firms which had had to produce articles locally during the War continued to do so afterwards and in many cases were able to compete successfully with the imported article. During the war: " output - taking into account a 50% increase in price level - rose by about 60%". (SEIFSA 1968).

Considering all the problems which had faced the industry prior to the war, this is a remarkable achievement.

3.0 The Immediate Post-War Period (1945 - 1950)

Economists predicted a gloomy future for the South African economy after the war. Bearing in mind the depression and chaos which had followed the end of World War I, people believed that re-adjustment to a peacetime economy would take time, during which a depression was expected. However, it did not materialise. South Africa had been much better prepared for the second World War than she was for the first and the metal and engineering industry continued to expand throughout the country (Figure 3.6).

By 1946 ISCOR was reverting once more to normal peace-time production. Annual output had risen from 330 900 short tons in 1939 to 520 000 short tons in 1944. Fortunately there was a vast backlog to be made up and ISCOR did not lack orders. The Steel industries of the world were facing their own problems and imported steel was in short supply. The ISCOR Board felt that a major expansion programme was needed to meet the increasing local demand for iron and

steel products, but there was strong opposition to any ideas of expansion by people who feared a slump similar to that experienced after World War I. It was thought that the rapid demobilisation of a large number of men would increase unemployment and make the transition back to a peace-time economy difficult. The results would cause retardation of industrial activity and a consequent decrease in the demand for iron and steel. The decision to expand was finally made and Parliament agreed to a £15 000 000 (R30 000 000) increase in ISCOR's share capital.

The major field of expansion could now take place at Vanderbijlpark, a town capable of accommodating a population of 200 000. European and Non-European facilities for housing and recreation had to be built around the new steelworks.

These were to be the most modern of their type and included coke ovens, blast furnaces, steel furnaces, stripping bays and slabbing mills which would serve the original plate mill. Beyond the plate mill, hot and cold strip mills, cleansing lines, continuous galvanising lines, annealing furnaces, temper mills, shearing and slitting lines and tin stacks were provided as well as the necessary service departments. The works were originally planned for an output of 250 000 tons of finished products, but could be expanded to produce 1 000 000 tons.

At Pretoria further expansion was also undertaken. A third coke oven battery, a new Bessemer converter, extensions to the finishing facilities in the mills and a new wire plant were added. At Thabazimbi a new washing beneficiation and ore bedding plant was provided for and the whole scheme was designed to increase ISCOR's ingot production to 1 000 000 tons per annum.

The decision to go ahead with these plans was taken in 1947, which could explain the dramatic increases in the number of engineering establishments and employees in the country (Figure 3.6). By 1952 the plans of 1946 had matured and had grown in magnitude. The town of Vanderbijlpark had 27 000 inhabitants and the works had an ingot capacity of 350 000 tons per annum and a rolling capacity of 240 000 tons. The raw materials used by the Vanderbijlpark works were drawn virtually from the same sources as Pretoria. Ore from Thabazimbi, coal from Witbank and Natal, lime from the North Eastern Cape, fluorspar from South West Africa, dolomite from Pretoria and ferro-alloys from the works of the African Metals Corporation Limited at Vereeniging. Power was provided by the Electricity Supply Commission, water from the Vaal River. For the construction of the works, refractory materials were supplied by the Olifantsfontein and Vereeniging brickworks, heavy engineering supplies from the Vanderbijl Engineering Corporation Limited and other engineering firms.

After the construction of the works, provision had to be made for the storage of raw materials at the site. Coal bunkers and coke ovens had to be constructed. Ore bunkers were built at the blast furnaces, scrap yards and storage bunkers at the steel plant. Water reservoirs and gas holders and many other specialised storage facilities were also constructed.

When the works at Vanderbijlpark were opened on 4th October, 1951, there were 54 top charged coke ovens which carbonised 1 200 tons of dry coal per day to produce 840 tons of coke. Witbank coal was usually mixed in a 72-25 ratio with Natal coal. In fact by 1953 75% of the Union's coking coal came from the two Witbank collieries. Gas from the coke ovens was cleaned and stored in a gas holder for distribution throughout the works as fuel. Further by-products from the coke production included crude tar, ammonia, liquor and crude benzole.

Two blast furnaces of 8 000 to 850 tons per day were in use and the gas given off by them was collected and used in the works as fuel. The hot metal was used for steel production while the excess iron was cast into pig iron.

In addition five open hearth furnaces of 180 tons each were charged with scrap and hot metal for steel production. Soaking pits and a slabbing mill were in production, converting steel ingots into 70 ft. long slabs. The plate mill had been in production since 1943 and was integrated into the new works. The works included a hot strip mill, continuous puddling line, cold reduction mill, continuous galvanising lines and annealing furnaces, temper mills, shearing lines and slitting lines.

The maintenance of the plant was undertaken by the work's own engineering division, which employed a staff of fitters, riggers, millwrights, electricians, boilermakers, carpenters and plumbers.

With the establishment of the ISCOR works at Vanderbijlpark the Vereeniging area was assured of a metal and engineering future. Not only did it allow the existing firms to develop, but a number of subsidiary and related firms were established in the region during this decade. The Vereeniging complex had developed considerably by the beginning of the 1950's.

4.0 The ISCOR Group:

The firms directly or partially linked with ISCOR can be divided into two main categories: those concerned with smelting, alloying and production of metals and those concerned with engineering and maintenance.

4.1 Smelters, Alloyers and Metal Producers:

4.1.1 The Union Steel Corporation (of S.A.) Limited

Although established by Mr. S. Marks in 1912 it merged with ISCOR in 1931 when ISCOR obtained a controlling vote in the Union Steel Corporation (Usco). In co-operation with ISCOR, Usco concentrated on light steel sections and the manufacture and rolling of special and alloy steel. It also produced all types of copper wire. With the demands of war the works had grown and consolidated, so that by the beginning of the 1950's Usco operated at two work sites.

The Vaal Works.

These consisted of three basic open hearth furnaces, one of 40 tons and two of 50 tons, all of which used scrap and cold pig iron. Three Heroult electric furnaces of $4\frac{1}{2}$ tons capacity. A 22" cogging and finishing mill of two 3-high stands, which applied billets to a 15" finishing mill of two 3-high stands and two 12" finishing mills of two and three stands respectively.

Production was primarily of mild steel, carbon steel and a wide range of special analysis irons and steels. The foundries produced 250 tons of iron castings and 500 tons of steel castings per month. The 600 ton forge press was used to produce mild steel, high carbon steel and alloy steel qualities.

The Klip Works

This site had originally been established in 1931, but had only been fully developed after World War II. The works were divided into two sections - one specialising in wire production, the other in special steels.

The special steels section: Six Heroult electric furnaces were in use ranging from $2\frac{1}{2}$ tons to 10 tons capacity. The largest having been built and installed by the Vanderbijl Engineering Corporation Limited. Special steels could be rolled on a two stand 3-high 16" cogging mill and a five stand 3-high 12" finishing mill. This section specialised in medium and high carbon steels, steel alloyed with tungsten, molybdenum, vanadium, nickel and chrome. Forgings were also produced, Usco having become the worlds largest producer of hollow drill steel. The bits were forged from carbon steel in the 22 presses operated in the works. 36 000 000 bits per annum were being produced in 27 different types. This had enabled gold production to continue throughout the War.

4.1.2 South African Bolt and Nut Co. Ltd. (SABAN)

The second establishment in this group was the South African Bolt and Nut company Limited (Saban), which had been formed in 1934. It was originally meant to produce all types of nuts, bolts, rivets, coach screws and railway fastenings, but production had been expanded during the War. By 1950 Saban was producing 8 400 tons of bolts, nuts, screws and rivets per annum, which amounted to about 60 000 pieces or half of the Union's consumption. The remaining 50% was also being produced in the Union, so that the country was then self-sufficient in these products. In addition, wood screws, copper and tinman rivets and metal thread screws and nuts were also being produced at a rate of 600 tons per annum or 144 000 000 pieces. All screws were made to British standard specifications.

4.1.3 The African Metals Corporation Ltd. (AMCOR)

The third of these companies was the African Metals Corporation Limited which was founded in 1937. It first concentrated on ferro-alloys and to prevent wasteful competition, became a subsidiary of ISCOR's by virtue of the 1 800 000 shares which they hold in the company. By 1953 Amcor had extended its interests to include the production of pig iron at Newcastle in Natal, a ferro-alloys plant near Vereeniging, dolomite at Lyttleton near Pretoria, phosphate rock at Langebaan and phosphatic fertiliser at Bellville in the Cape Province. In addition Amcor had obtained the rights over important base mineral deposits in various parts of the Union.

The ferro-alloy works at Vereeniging took over the production of ferro-manganese from the Newcastle blast furnace in 1942. This plant has since supplied the new works at Vanderbijlpark with the ferro-alloys which it requires. Initially the plant had comprised four electric furnaces, but since ferro-manganese alloys have a high carbon content, blast furnaces are best suited to their production. For this reason production has continued at Newcastle. The increased demand for ferro-manganese, both at home and overseas, prompted Amcor to expand. A 150 acre site at Kookfontein, four and a half miles from the original site, was developed and much equipment was transferred from the old Vereeniging site. By 1952 the Kookfontein plant had two 12 500 k.v. and one 7 500 k.v.a. electric furnaces in operation, while the old site maintained two 3 000 k.v. and two 3 ton electrical refining furnaces. This meant that Kookfontein could produce 5 000 lb. castings and break them to a 6" mild steel product. Kookfontein alone produced 35 000 tons of all types of ferro-alloys in 1952 while the old site produced an additional 15 000 tons.

To produce these alloys Amcor had to draw its raw materials from throughout Southern Africa. Manganese came from Postmasburg (Cape Province), chrome from Selukwe (Rhodesia), silicon from Pietersburg (Transvaal), coke from ISCOR Pretoria (Transvaal), phosphates from Langebaan and Bellville (Cape Province) and dolomite from Lyttelton (Transvaal).

4.2 Engineering and Maintenance:

The second group of industries are dependants of the base metal industry. Despite this, however, they are an important link in the production of metals, because without the maintenance and skill of the engineering firms, the larger smelting complex could not operate.

4.2.1 The Vanderbijl Engineering Corporation Ltd. VECOR)

It was Dr. van der Bijl who, with his usual farsightedness, instigated the formation of the Vanderbijl Engineering Corporation in 1945. ISCOR held 2 600 000 ordinary shares and a major part of the 1 250 000 preference shares in the new company. The development of Vecor was unique in that the firm was made fully grown on the bare veld, instead of developing gradually and expanding with the metal industry. This resulted in many problems which were gradually overcome until by 1952 the company was showing a modest profit. Vecor produces iron castings, some as big as 12 tons of steel and 35 tons of iron. It is on Lloyd's register for steel casting, but remains primarily a heavy engineering establishment. By the 1950's it was manufacturing large vessels of up to 90 feet in length out of 1½" plate. Vecor produced ISCOR's billet mill from the Demag (German) designs and then installed it. It also built and installed the 10 ton furnace in Usco's Klipriver works. In addition Vecor produces steam plants, hoists for the mines, pressure vessels, uranium plant equipment, large hydraulic presses and since 1949, chilled iron rolls for the iron and steel industry as well as flour mills, sugar mills and paper mills. These rolls often exceed 12 tons in weight and have to be carefully worked off in the workshops.

The establishment of a heavy engineering division relieved ISCOR of the problem of developing its own engineering workshop for maintenance and service. Vecor can do this work not only for the basic works, but can also contract out, producing equipment for the mines and industry and so benefitting the economy as a whole and operating as a profitable concern.

Apart from these firms which were more or less directly connected with ISCOR and financed by Government capital, Vereeniging developed as an industrial area in its own right. The establishment of Vanderbijl Park with its 26 750 inhabitants was the result of the expansion of the iron and steel industry. It was not only here that development had taken place, but throughout the country as can be seen from Figures 3.1, 3.2, 3.3 and 3.5.

Expansion had also taken place at Pretoria. By 1952 the new Bessemer converter and a new coke oven battery planned in 1946 had been in operation for several years. In addition a further coke oven battery had been added to replace the first which had reached the end of its useful life. A new wire plant came into production in 1952 and a new rod mill was added to the light mills section. Plans were also initiated for a new continuous billet mill to roll billets for the light and small sections mills.

At Thabazimbi the ore washing, beneficiation and bedding plant had come into production. Steps were being taken to increase the ore supplied by the new Sishen mine in the Kuruman district.

By this stage ISCOR was able to boast a capacity of 1 300 000 tons of ingots per annum or nearly 1 000 000 tons of finished products. This was a tremendous achievement. The phenomenal growth in 25 years was indicative of the potential which was being realised in the country.

It can be seen therefore that the Second World War and the immediate post-war period was an era of great expansion in the metal and engineering field in South Africa. The country as a whole had developed extensively, the value of the net output of industry increased from R128 000 000 (£64 000 000) in 1938/9 to R1 064 000 000 (£482 000 000) in 1954/5, an increase of 364% in sixteen years, or 22.75% per annum. The metal and engineering industry in the Southern Transvaal had expanded similarly. In 1937/8 there were 50 982 workers employed in 548 private establishments who produced R50 030 662 (£25 015 331) worth of articles; by 1949/50 101 746 employees in 1 121 private establishments produced R167 390 958 (£83 695 479) worth of articles, an increase of nearly 400% in the value of articles produced in only eleven years. This meant that the Southern Transvaal was now producing 54% of the country's basic metal goods by value, with only 50.3% of its metal, engineering, machinery and cutlery works. (Figure 3.1 and 3.6)

CHAPTER IV

THE PHASE OF RAPID GROWTH, EXPANSION AND DIVERSIFICATION 1950 to 1960

1.0 The Period 1950 to 1960 :

Trends initiated during this decade were perpetuated and developed during the sixties. The greater attention given to the post-war period is justified by the development which has occurred in the industry during this period.

1.1 Data Collection and Classification:

Changes by the Bureau of Statistics in the method of classifying and publishing data have presented complications to the detailed study of this period. The new classification prevents comparison of figures with those of previous phases and so in effect detailed developments can only be studied in chronological isolation. The pattern of location had already been set, primarily by the mines, so no radical changes were likely to occur undetected. The original markets of the iron and steel and engineering industry were the gold mines, consequently early development occurred in close proximity to the Reef, spreading east and west from Johannesburg. Developments since then have reinforced this pattern, so that a lack of practical information was not as marked a handicap as it might have been. The new classification allows the study of the spatial pattern of the industry. However, the available data is not continuous. Detailed figures relating to different areas within the P - W - V have gaps and alterations do occasionally occur. The information is published by a magisterial district on the basis of economic regions and sometimes it is available only for the P - W - V as a whole.

In an attempt to compare the expansion of the metal industry in the P - W - V other problems of data collection manifest themselves. The only extensive source of information available to members of the public are those figures published by the Bureau of Statistics. A number of alterations were made in the method of presenting information during this decade, so that the industrial census of the 1950's are not comparable either among themselves, or with any census from another period. Among the changes made was the alteration of the metal and engineering industries, which had been classified as Group 4 prior to 1950, to five others including Groups 15, 16, 17, 18 and 19.

These categories have remained in use, with minor changes since, however, no detailed regional breakdown is available for any period before the 1959/60 census which was conducted on a magisterial district basis. This means

that for the Southern Transvaal only, the total figures for all 23 groups are available with no detailed breakdown and even then these figures are not available every year, because of the sporadic way in which the census were published.

Despite the lack of statistical information and the continued changes made in both methods of collection and presentation, it is possible to construct a picture of the country's iron and steel industry.

Under the new classification of industry used by the Bureau of Statistics, Group 4, which had included Metal Engineering, Machinery and Cutlery Works was replaced by three new series of industrial groups, i.e. Nos 15, 16 and 17. These major groups were then divided into minor groups which varied from Census to Census and year to year, as follows:-

- Group 15 - 1. Metal Industries
 - 1. Iron and Steel
 - 2. Smelting and refining of non-ferrous metals.
- Group 16 - Metal Products excluding machinery and transport equipment.
 - 1. Metal pipes and pipe fittings
 - 2. Headed and threaded articles.
 - 3. Sheet metal products
 - 4. Tin ware
 - 5. Cables, fencing, wire and wire products
 - 6. Springs for all purposes
 - 7. All other metal products
- Group 17 - Machinery, excluding electrical machinery.
 - 1. Agricultural machinery, implements and parts
 - 2. Industrial mining and construction machinery
 - 3. All other machinery

This sector of industry can therefore be divided into three main categories. To facilitate comparison, data is presented on a magisterial and regional basis. Some magisterial boundaries within the P - W - V have been altered since the Second World War, but this has been minimised by the lack of detailed information.

1.2 Problems of the P - W - V during the Post-War Period:

1.2.1 Population:

The Post-war expansion of industry on the Witwatersrand necessitated careful planning and organisation to solve the problems which had arisen. Large overcrowded slum-locations rose due to the inflow of African workers. Facilities to cope with the expansion were inadequate. The P - W - V complex lacked the roads and housing to deal with this population increase. The non-whites of the Witwatersrand rose from 618 313 in 1936 to 890 639 in 1946 and to 1 091 097 by 1951 (Figure 4.1). Under normal conditions this increase might have been absorbed, but because of wartime priorities, housing and services had been neglected by the authorities and had not been developed to keep pace with the industry's growth and re-adjustment to a peacetime economy. This meant that there was a shortage of housing and a lack of planned townships - both residential and industrial. (Figure 1.8)

Figure 4.1

Title: Population of the Witwatersrand

Source: Metropolitan Johannesburg - Report by the Forward Planning Branch, C.E.D. Johannesburg City Council, November 1966.

Date	Total All Races	Whites	Coloureds	Asiatics	Bantu	Total Non-Whites	Ratio White: Non-White
1921	537 055	233 194	16 027	8 895	278 939	303 861	1 : 1.20
1936	1 024 564	406 251	30 820	14 270	573 223	618 313	1 : 1.52
1946	1 438 475	547 836	40 398	21 147	829 094	890 639	1 : 1.63
1951	1 741 318	650 221	52 888	29 906	1 003 303	1 091 097	1 : 1.68
1960	2 186 914	766 379	78 134	39 915	1 297 486	1 414 535	1 : 1.85
1965	2 442 000	845 000	92 000	46 000	1 459 000	1 597 000	1 : 1.89
1970	2 736 000	947 000	106 000	52 000	1 631 000	1 789 000	1 : 1.89

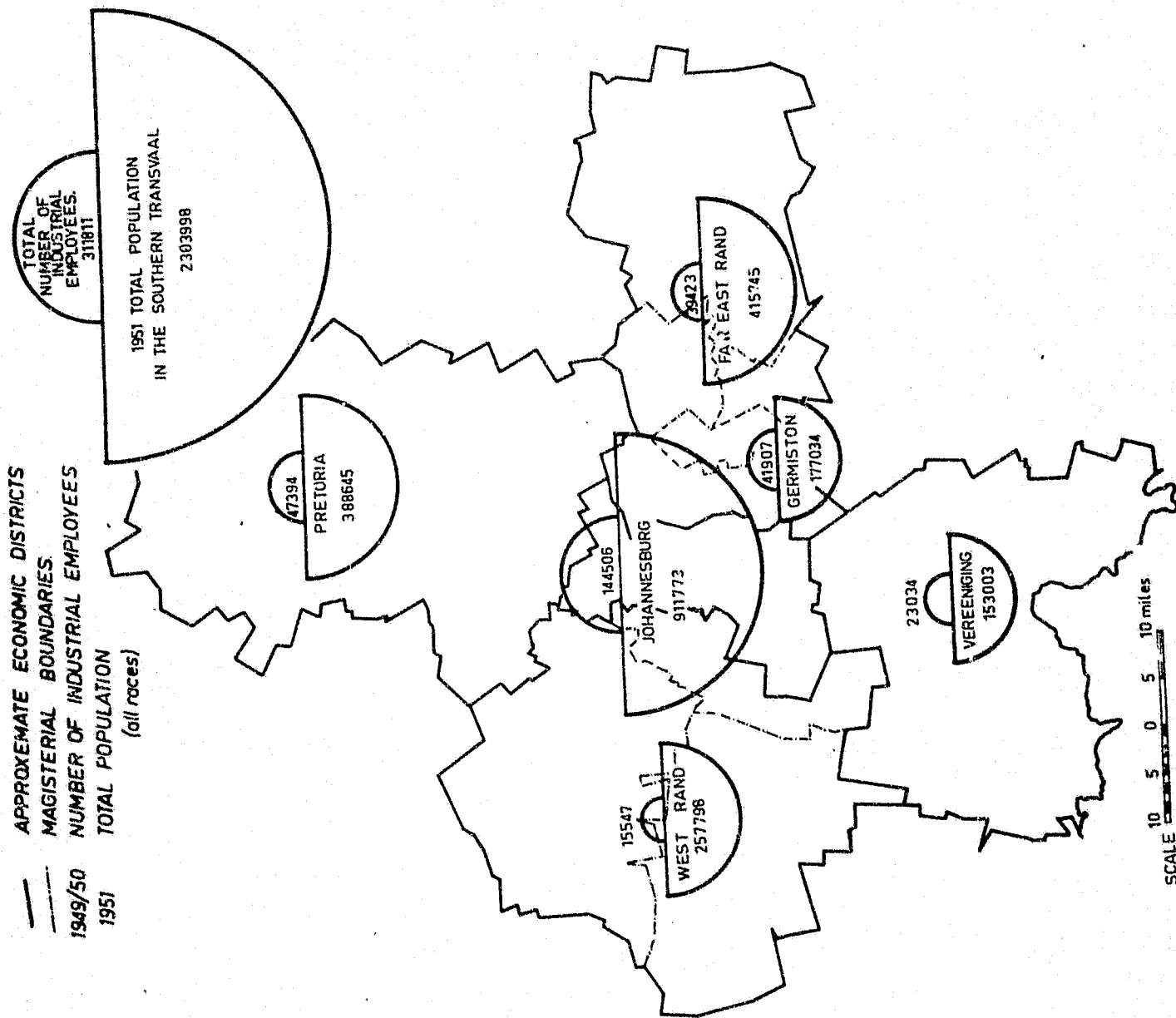
The increase in the white population from 547 836 in 1946 to 650 221 in 1951 (Figure 4.1) on the Witwatersrand had aggravated the problem, although it did create a market for finished goods, both local and imported. The Country's imports increased in value from R433 million in 1946 to R714 million in 1948.

(Houghton 1964). Restrictions had to be placed on imports so that by 1950 only R612 million worth of goods were imported and the balance of payments deficit fell from R314 million in 1948 to R44 million in 1950. This is remarkable when it is remembered that the pound sterling was devalued in 1949. Notwithstanding the closing of some mines (e.g. Robinson Deep, Johannesburg, Simmer and Jack, Germiston and Brakpan mine), the European population of the Witwatersrand increased by 116 158 from 650 221 in 1951 to 766 379 in 1960 and should reach 947 000 by 1970 (511 000 Johannesburg). The Total population for the Witwatersrand increased by 439 596 during the period and should be 2 736 000 by 1970 (Metropolitan, Johannesburg C.E.D., 1966).

The population growth in the P - W - V during this period can be seen from figures 4.2 and 4.3. It should be noted that the total population decreased on the far East Rand from 415 745 in 1951 to 310 354 in 1960 (Figures 4.2 and 4.3)* and this can be seen partially because of the alterations in the area from which the data was collected. The Springs magisterial district was considerably smaller in 1960 than it had been in 1951. The population of the Vereeniging - Vanderbijlpark area also decreased from 153 003 in 1951 to 120 569 in 1960. All the other regions show an increase in population despite alterations in both areas and categories under which the 1960 census was published.

Not only were the magisterial districts altered, but so were the categories according to which the results were plotted e.g. in 1951, the term "industrial employees" was used, while in 1960 the term was "economically active". This means that the 1960 figures must include all persons employed in industry. As a result figures 4.2 and 4.3 are not directly comparable. However, some trends are discernable.

* The 1960 census followed the economic regions of the 1959/60 industrial census and does not give the same regional breakdown as the 1951 census. There is also a discrepancy of 196 178 persons between the Johannesburg Municipal figures for the Witwatersrand and the Bureau of Statistics total of 1 983 936. This may be partially explained by the Municipality's higher figure of 1 296 486 for Africans as compared to the official figure of 772 451 for the whole Witwatersrand.



AFTER R.O.N.H. NR.D.C.

DISTRIBUTION OF THE TOTAL POPULATION AND INDUSTRIAL EMPLOYEES IN THE P.W.V. 1949/1951

Source:- Natural Resources and Development Council Report No. 1:8094/1957/8.

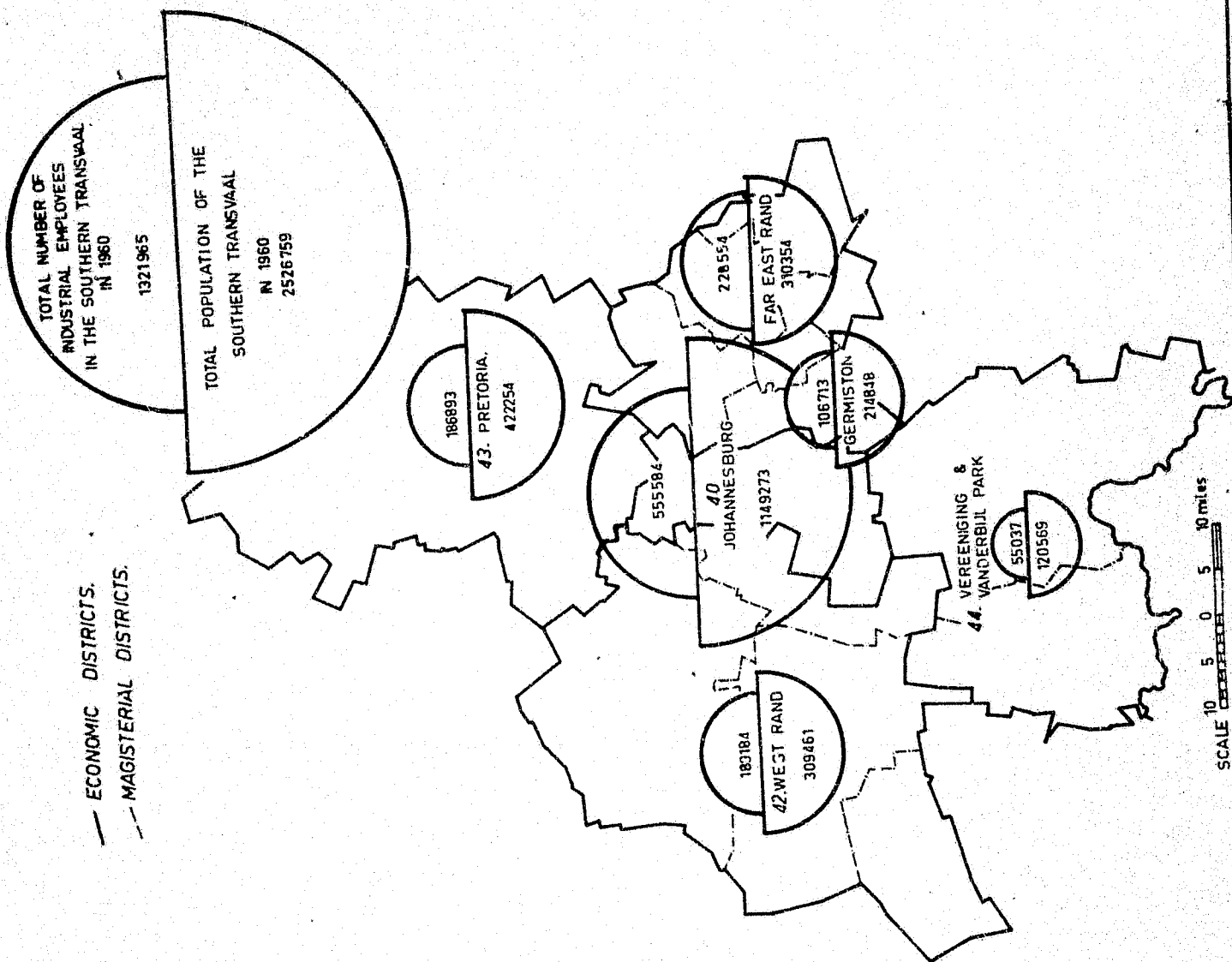
Figure 4.3

Title: Distribution of the Total Population and the Economically Active in the Southern Transvaal, 1960.

Source: Bureau of Statistics, Volume 2, Reports on the Metropolitan areas of Johannesburg, Germiston, East Rand and West Rand 1960.

POPULATION CENSUS - 1960

Johannesburg	total	whites	coloureds	asiatics	africans
Basic Metal Ind.	1,812	806	17	2	987
Metal Products	13,314	5,954	303	16	7,041
Agricultural					
Machinery	3,690	2,412	73	1	1,212
Economic active	555,884	180,635	22,584	8,138	344,427
non-active	593,369	231,060	36,944	20,779	304,626
Total	1,149,273	411,695	59,528	29,017	649,033
Population					
Pretoria					
Basic Metal Ind.	12,718	6,012	3	6	6,703
Metal Products	1,965	800	12	-	1,153
Agricultural					
Machinery	114	84	-	-	30
Economic active	186,893	82,251	2,703	1,987	99,952
non-active	235,361	124,634	4,749	6,000	99,918
Total	422,254	206,885	7,432	8,047	199,870
Population					
Germiston					
Basic Metal Ind.	1,697	527	11	-	1,159
Metal Products	5,603	2,090	59	3	3,451
Agricultural					
Machinery	3,803	1,069	12	-	2,722
Economic active	106,713	33,610	1,659	649	70,795
non-active	108,135	52,638	2,535	1,740	51,222
Total	214,848	86,248	4,194	2,389	122,017
Population					
East Rand					
Basic Metal Ind.	4,007	1,355	8	-	2,644
Metal Products	8,212	2,726	188	15	5,283
Agricultural					
Machinery	3,002	1,488	27	1	1,468
Economic active	288,554	45,895	2,659	1,482	178,518
non-active	8,800	34,457	2,077	1,849	43,447
Total	310,354	80,352	4,736	3,301	221,965
Population					
West Rand					
Basic Metal Ind.	859	339	5	1	514
Metal Products	2,656	1,189	58	1	1,408
Agricultural					
Machinery	583	335	1	-	247
Economic active	189,184	39,419	2,056	547	147,162
non-active	120,277	68,261	3,069	1,451	47,496
Total	309,461	107,680	5,125	1,998	194,658
Population					
Vereeniging and Vanderbijlpark					
Basic Metal Ind.	14,302	6,617	4	-	7,681
Metal Products	6,403	2,069	20	-	4,314
Agricultural					
Machinery	885	274	5	-	606
Economic active	55,032	17,187	474	257	37,119
non-active	68,532	29,293	729	652	34,859
Total	120,569	46,480	1,202	909	71,978
Population					



DISTRIBUTION OF THE TOTAL POPULATION AND THE ECONOMICALLY ACTIVE IN THE SOUTHERN TRANSSVAAL 1960.

Source:- Bureau of Statistics Vol 2 Reports on the Metropolitan areas of Johannesburg, Germiston, East Rand and West Rand, 1960.

The East Rand has at all times proportionally fewer economically inactive persons than the West Rand, which indicates that this area is not a dormitory area similar to the West Rand. This fact together with the decrease in total population seems to indicate that the decrease in mining activity of the 20 vulnerable mines (Figure 4.4) had not been taken over by industry in 1960.

Figure 4.4

Title: The Witwatersrand White Population and Employment 1949/50/51

Source: Natural Resources and Development Council Report No. 168094/1957/8

Districts	A White Population 1951	B White Emp. 1949/50	C White Mine Employees 1951	D Ratio B:A	E Ratio C:A	F Number of Vulnerable Mines
Central Rand						
Johannesburg	363 587	52 894	6 061	1:6.9	1:60.0	2
Germiston	74 384	13 834	2 839	1:5.4	1:26.0	2
East Rand						
Boksburg	25 049	2 690	2 242	1:9.3	1:11.2	10
Benoni	37 040	4 389	1 981	1:8.4	1:18.7	10
Brakpan	29 703	1 489	4 852	1:20.0	1: 6.1	
Springs	33 013	3 786	7 131	1:8.7	1: 4.6	
Nigel	10 560	522	1 727	1:20.2	1: 6.1	
West Rand						
Rodepoort	35 215	1 632	4 500	1:21.6	1: 7.8	2
Krugersdorp	32 296	1 839	2 684	1:17.6	1:12	
Randfontein	19 397	1073	4 149	1:18.1	1: 4.7	

Another category used in the 1960 census which may appropriate more accurately to the 1951 term of "industrial employees" is "manufacturing population" (Figure 4.5). A comparison of these two terms (Figures 4.2 and 4.5) show that there was an increase in the number of persons engaged in these economic activities throughout the Witwatersrand, but especially on the East and Central Rands and in the Vereeniging areas. This means that the efficiency of industry as an employer increased during this period. It is also significant that these areas are the major iron and steel and engineering regions, of the P. - W. - V.

By 1960 total economically active population was fast approaching the total population of 1951. The 1951 population of Johannesburg was 911 773 (all races) and in 1960 the economically active population was 555 584 or more than half of the total population of 1951. It can be seen that Johannesburg dominated the area followed by the East Rand, with the West Rand forming a much smaller industrial complex.

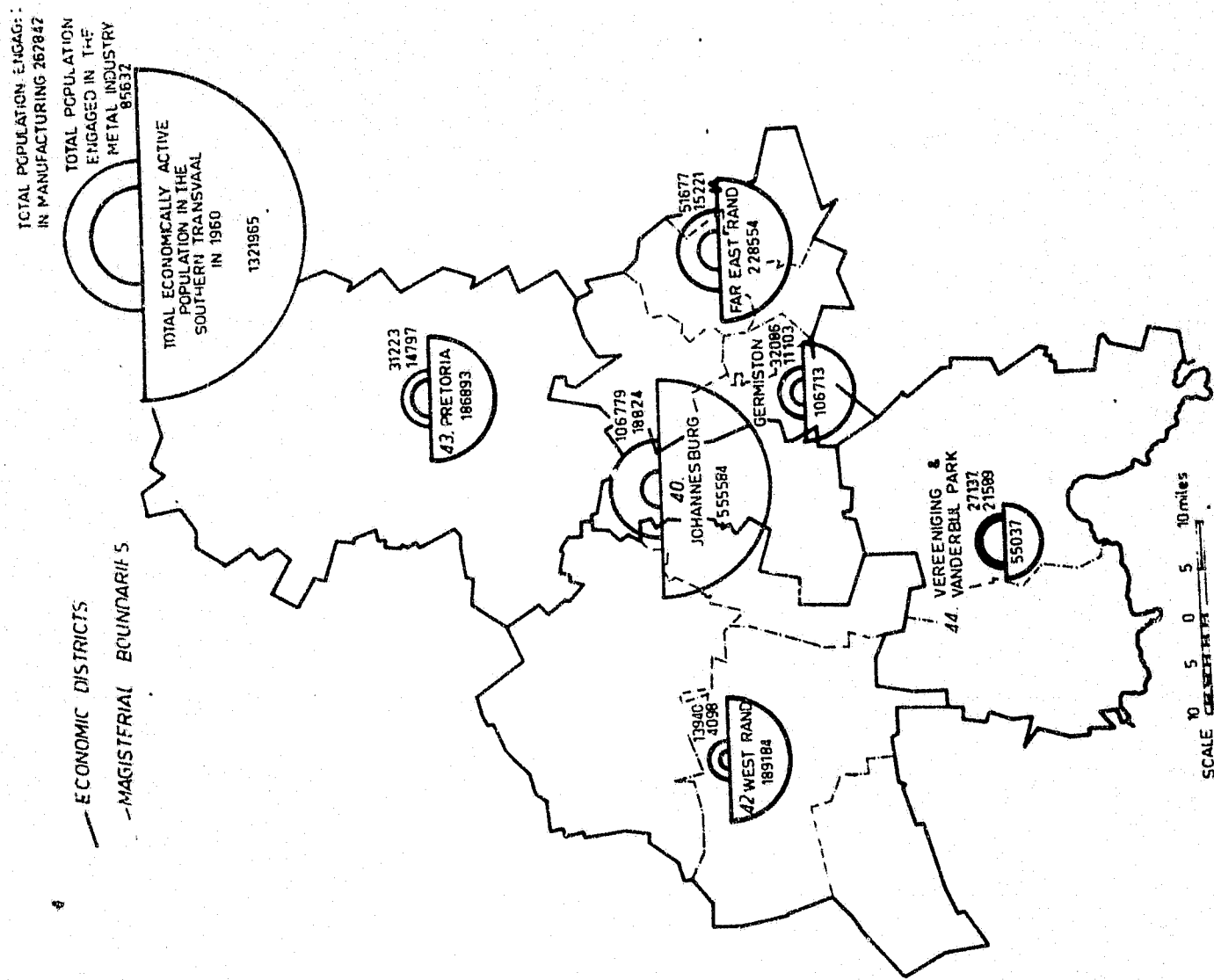
A degree of specialisation is apparent in Figure 4.5. The Vereeniging-Vanderbijlpark region and the Pretoria area had the majority of their employees engaged in the Basic Metal Products and Agricultural Machinery industry in 1960. Of the 27 137 people engaged in manufacturing in the Vereeniging area, 21 589 were employed in this category. Pretoria was in a similar position being dependant upon the metal industry for the employment of 14 797 workers out of a total manufacturing work force of 31 112 (Figure 4.5). The specialisation of the Vereeniging-Vanderbijlpark area is better illustrated by the fact that of the 55 037 persons engaged in economic activity, 21 589 are employed in the metal industry. Johannesburg is shown as the commercial centre with the greatest proportion of its economically active population engaged outside the manufacturing sphere. Germiston and the far East Rand have a large proportion of their economically active population engaged in manufacturing, while the West Rand has a very small proportion of its workers in the metal industry (4 098 out of a total of 13 940 Figure 4.5). However, its position can be explained by the great number of workers who commute into Johannesburg daily.

"Over 11 000 people travel daily from Rodepoort to work in Johannesburg. Only 1 500 travel from Johannesburg to work in Rodepoort". (Metropolitan Johannesburg, Forward Planning, C.E.D.)

The West Rand is therefore a dormitory suburb of Johannesburg.

1.2.2 Dependency upon the Gold Mines:

It is apparent (Figure 4.5) that the Central and Eastern Witwatersrand has a balance between its metal industries, manufacturing as a whole and the commercial activities of the remainder of the economically active population. While the peripheral areas of Pretoria and Vereeniging-Vanderbijlpark are dependent upon the metal industries for employment, they are dependent upon the rest of the Witwatersrand for a market for their metal goods. The West Rand has a deficit of metal industries and manufacturing industries and therefore is dependent upon Johannesburg and the Central Rand for the employment of its workers. In 1951 only one person in eight worked on the mines in Rodepoort, while in Springs one person in five was a mine employee. (Figure 4.4)



This meant that at the beginning of the 50's the far East Rand was more dependent upon mining than the West Rand which had become a dormitory area. There were a number of weaknesses in the distribution pattern of industry in the P - W - V area. Briefly they can be summarised as follows:-

- A. Much of the industrial land was fragmented, due to a lack of planning and the fact that the urban belt had followed the irregular mining belt. This lack of co-ordination meant that all types of industry, were scattered throughout the region, more or less without regard to specialised site requirements or linkage with other secondary or tertiary industries.
- B. There was a lack of guidance for industries wishing to shift from one area to another for those needing specialised site facilities. In some areas from which larger firms had moved the sites were subdivided according to the old railway facilities and sold.
- C. This period saw a great demand for industrial sites in Germiston, but proclaimed mining ground, railway yards and urban development, hindered this industrial expansion. Consequently ribbon development took place along the railway lines to the north and south and intruded upon adjacent areas.
- D. There was still a general lack of housing for African workers and the fragmented industrial pattern made the location of townships difficult.
- E. The unco-ordinated planning resulted in speculation so that in some areas available land exceeded demand, while in other areas more suitable for industry, no development had occurred.
- F. Due to a lack of planning, some vacant industrial land was unsuitable for industries or was unusable due to fragmentation and a lack of services. Boksburg, Benoni and Brakpan also suffered from a shortage of proclaimed industrial sites (Figure 1.8).

During the fifties the effects of a decline in gold mining activities began to interest planners. Although the output of gold continued to rise, mines along the reef were coming to the end of their viable productive lives. They had formed an important market for the metal and engineering firms from their inception. In 1939 the country's mines consumed R63 million worth of stores, of which R21 million was imported. (Government Mining Eng. 1940). By 1945, when the mines consumed R62 million worth of goods only R9 million was imported. The consumption of metals and machinery by the Witwatersrand mines for 1955 and 1965 is shown in Figure 4.6. Unfortunately due to the methods of presentation of Government Mining Engineers reports,

Figure 4.6

Title: Consumption of Iron and Steel by the Witwatersrand Gold Mines - Both Local and Imported

Source: Government Mining Engineers Reports 1955, 1959, 1959/60 and 1965.

<u>1955</u>	<u>Local (R)</u>	<u>Imported (R)</u>
Iron and Steel	11 910 886	632 306
Machinery	24 974 678	9 868 652
Pipes	5 656 704	870 372
Locks and Bolts	76 192	57 320
Total	<u>42 618 460</u>	<u>11 428 650</u>

1959

The major Witwatersrand mines consumed R192 786 972 worth of stores. The larger mines used R77 242 340 worth of local products and R12 105 060 of imported metal goods.

1959/60 (all large mines in the country)

Iron and Steel	22 776 236	389 006
Machinery	42 951 628	11 040 688
Pipes	11 375 730	597 562
Locks and Bolts	104 762	43 182
Total	<u>77 208 356</u>	<u>12 070 438</u>

1965 (The Witwatersrand Mines)

Iron and Steel	17 158 371	988 856
Machinery	30 545 864	3 534 393
Pipes	7 731 131	187 767
Locks and Bolts	86 756	22 219
Total	<u>55 522 122</u>	<u>4 733 235</u>

a sequence of figures showing the consumption of iron and steel goods and machinery by the Witwatersrand gold mines is not available. As can be seen from the table, the increase in South African manufactured goods had been R13 million during the 10 year period. No figures for the output of the metal and engineering industry in the Southern Transvaal were published during the mid-fifties, but the gross output of iron and steel manufacturers in the Transvaal during 1956/57 amounted to R124 471 000. (I.C. 45) In 1953/54

(I.C. 45) the gross output of the metal and engineering industry for the country amounted to R398 172 000 of which R148 000 was produced by the mine workshops and R62 268 000 worth of machinery was manufactured for the mines, construction and industrial concerns.

This indicates that the R42 million worth of iron and steel goods consumed by the Witwatersrand gold mines in the mid-fifties. The mines total consumption of iron and steel amounted to R54 million in 1955, while during 1956/7 the iron and steel producing firms in the Transvaal had a gross output of only R124 million. However, comparatively little of this went directly to the mine workshops (only R148 000 in 1953/4). Most of it was processed by the metal and engineering industry into a gross output of approximately R400 million of which the mines consumed about one tenth.

Since the dependence upon the gold mines for a direct market for the metal and engineering industries' output is no longer as marked as it was, the question of a decline in gold production need not be seen as an economic medusa. The employment of the mines and industry at the beginning of the fifties decade, is illustrated in Figure 4.4. As can be seen, Johannesburg had only 1:60 of its European population employed in mining and 1:6.9 in industry. The East Rand with its more highly developed industrial areas and large metal and engineering establishments tended to have a better industrial employment ratio than the West Rand, with the exception of Brakpan and Nigel, which had only one European in twenty employed in industry and 1:6 working on the mines. It should be remembered that:-

- A. the mines are not likely to cease production suddenly, but that a gradual decline will occur - this will still affect areas like the West Rand more than the East Rand;
- . in the overall economy of the country, any decline in production on the Witwatersrand should be more than offset by the development of the Orange Free State gold mines;
- C. the growth and development of the metal and engineering industry should continue in the Southern Transvaal where it is so well established. It is unlikely that an industry with such great inertia and requiring large amounts of capital would migrate to the ports or the Orange Free State goldfields. Relocation in the Transvaal is difficult since the industry's main market is itself and other manufacturing and building industries.

Since 1955 a number of mines on the Witwatersrand have ceased production. Others are being worked at a greatly reduced scale by private firms or even individuals. There were vulnerable mines on the East Rand in 1951 (Figure 4.4) however, there has occurred a gradual transfer of the economic base from gold mining to industry. By 1958 there was a shortage of industrial land on the East Rand - the continued growth and expansion of industry resulted in an increased demand for industrial land which in turn resulted in the development of new industrial townships during the 1960's.

2.0

New Government Policies - Decentralization

As a result of the problems which had developed in the P - W - V during the early post war period and in accordance with the policy of apartheid, a new governmental policy towards the region was evolved.

The new National Government had come to power in 1948, introduced a political policy, which was to have an effect on all industry in South Africa. Policy statements were made by the Government on the restriction of an uncontrolled flow of African Labour to the Witwatersrand and to urban areas in general. A commission was appointed by the Government to:-

"conduct an exhaustive enquiry into and to report on a comprehensive scheme for the rehabilitation of the Native Areas with a view to developing within them a social structure in keeping with the culture of the Native and based on effective socio-economic planning." (U.G. 61, 1955).

This report was first presented to the government on 1st October, 1954 and suggested that as an alternative to the migratory labour system, industries should be established in or near the existing African areas. The Government rejected the Tomlinson Commission's recommendations to establish industries within the Reserve areas because:-

"Bantu enterprise, unimpeded by European competition, should be enabled to develop its own industries." (W.P.F. 1956).

Instead it was proposed that industries should be established in white areas on the periphery of the African Reserves. This policy became known as the Border Industries policy, which has a bearing on the Witwatersrand because it meant that officially industry was being encouraged to decentralize and so the expansion of the urban industrial areas should be slowed down.

The policy led to arguments both for and against the development of industry on the Witwatersrand. Briefly, arguments for decentralization can be summarised:-

- A. The ports of South Africa were becoming alarmed at the disproportionate growth and economic power of the Witwatersrand.
- B. It was argued that there are hidden social costs in expanding an already overcrowded conurbation like the Witwatersrand. Transport, water, sanitation, health and housing would all become expensive problems.
- C. It was pointed out by H.R. Raikes (1949) that the availability of water on the Witwatersrand could be an inhibiting factor in industrial expansion.
- D. Many people felt that some action must be taken to avoid any crisis that might result from the expansion of the Witwatersrand before it was too late to effectively do anything about it.
- E. From a military point of view it was strategically unwise to concentrate half the country's industry and a quarter of its population in 472 000 square miles.

In opposition to this it was argued that:-

- A. There was a great need in South Africa for rapid industrial expansion to absorb the growing population.
- B. It was feared that State intervention in the Southern Transvaal may have checked the economic growth rate of not only the Transvaal, but the country as a whole.
- C. Some economists felt that Border Industries would remain a tax burden on the country indefinitely and never become a viable proposition.
- D. The concentration of commerce and industry in the Southern Transvaal may be large in comparison to the rest of South Africa, but relatively small when looked at on a world-wide basis.
- E. With the gold mines closing down, it was argued that industrial expansion was a necessity to replace them and so prevent the development of "ghost towns" along the reef.

These arguments underscore the importance of co-ordinated planning on a scale which had never been applied to the Witwatersrand. Planners had to decide whether the current trends in industrial growth in the Southern Transvaal should be maintained or changed. They had to keep in mind the decline in gold mining as a source of income and employment and what effect this would have on land-use population distribution and growth of towns. Related to this is the question of the degree to which manufacturing should be introduced to replace the declining gold mines. Further assuming that industrial growth would continue on the Witwatersrand - notwithstanding policy - planners had to decide on the question of how much land should be reserved for this expansion. Finally there was the question of limited resources, both natural - in this case mainly water - and human, due to non-white influx control and a shortage of qualified skilled European workers.

Figure 4.7

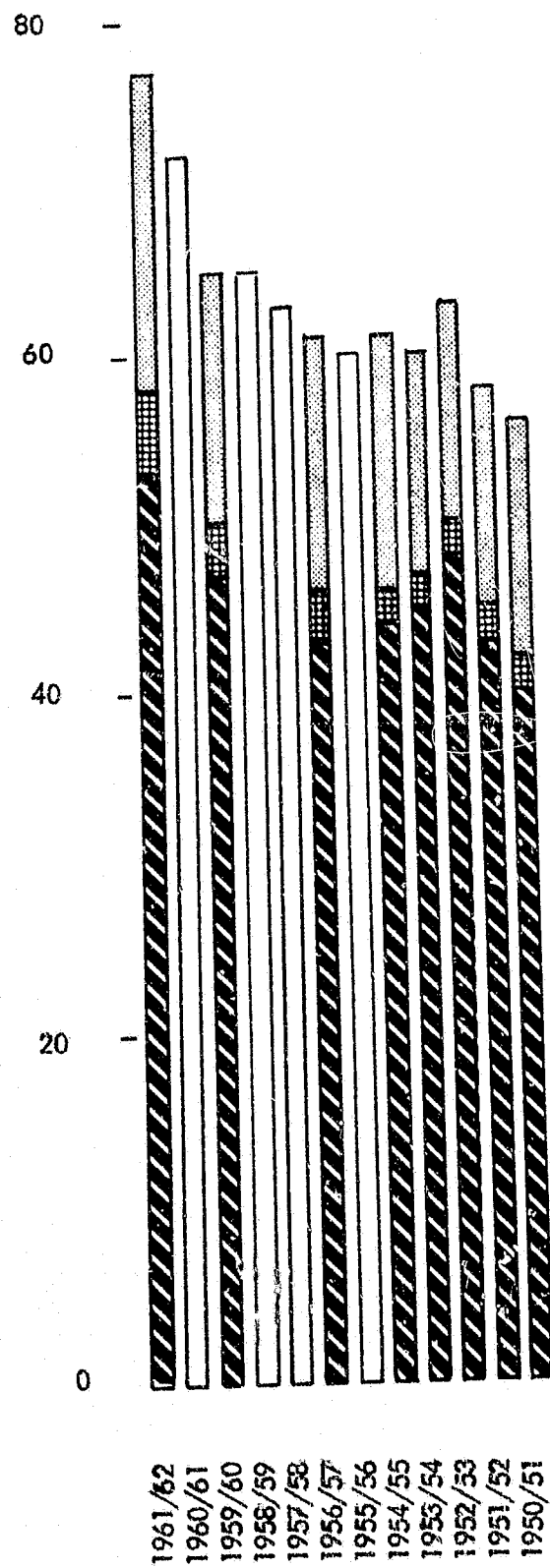
Title: Number of Establishments and Employees in the Union and Transvaal 1919/1953

Source: 1952/3 Industrial Census Report Number 208/1955

	1919/20			1949/50			1952/53			Increase 1919/ 20 to 1952/3	
	Union	Tvl	Tvl % Union	Union	Tvl	Tvl % Union	Union	Tvl	Tvl % Union	Union	Tvl
Number of Establishments	6 890	1 746	25%	14 809	4 890	33%	16 064	5 518	34%	2.3	3.2
Total employees	175 520	53 427	30%	773 151	313 435	44%	819 658	366 728	45%	4.7	6.9

The general trend towards the growth of the economic island continued, (Figure 4.7). The Southern Transvaal had increased its percentage of the total industrial establishments in the country from 25% in 1919/20 to 34% in 1952/3. In fact there had been a threefold increase in the Southern Transvaal over this period as compared to a twofold increase in the country as a whole.

The total number of employees in industry increased 4.7 fold in the Union and 6.9 fold in the Southern Transvaal, over the same period, which meant that by 1952/3 there were 366 728 industrial workers in the area



PRETORIA - WITWATERSRAND - VEREENIGING REGION.

TRANSVAAL.

SOUTH AFRICA.

DATA NOT AVAILABLE.

DISTRIBUTION OF ESTABLISHMENTS ENGAGED IN IRON AND STEEL PRODUCTION.
Source:- Government Industrial Census I.C. 45 (1950/51 to 1960/61) (List D₁ and D₂)

or 45% of the country's total employed. From this it can be seen that the trends towards the concentration of industry in the Southern Transvaal were very strong and it is not surprising that against this background the iron and steel industry exhibits a similar trend (Figure 1.8).

3.0

Sectors of the Metal Industry and their position within the Country's economy and significance to the P - W - V.

The 1950 decade saw four crises in South Africa's balance of payments. These occurred in 1948/9, 1953/4, 1957/8 and 1960/1. The first two resulted from an excess of importation, over exportation, while the other two resulted from substantial net outflows of private capital. From 1955 the rate of economic expansion slowed down considerably as a result of anti-inflationary measures. Although by 1956 there appeared to be an upward tendency in the monetary value of economic activity, the physical volume tended to remain stable. This resulted in a net outflow of private capital amounting to R61 million in 1957 which precipitated the balance of payments crisis. The 1960/1 crisis resulted from a loss of confidence in the country as a result of the Sharpeville incident. Again a massive outflow of capital amounting to R12 million per month reached R159 million before restrictions and foreign exchange controls restored some confidence in the country.

Despite these crises the metal products and engineering industry was able to continue a general expansion throughout the country. The physical volume of output more than doubled between 1945 and 1955 and by 1959 it produced a net output of R299 million and employed 172 100 workers making it the most important industry in the manufacturing sector. The importance of the P - W - V as an iron and steel producing area can be gauged from Figure 4.8.

Figure 4.8 refers only to the iron and steel industry and excludes establishments smelting, refining and other metals or engaged in any aspect of engineering. Compiled from various sources (I.C. 45, N.R.D.C., 168094/1957), it does give an idea of the distribution of the establishments. The P - W - V complex completely dominates the country's iron and steel industry. During the early 1950's it can be seen that 40 of the 56 establishments in the country engaged in iron and steel production were to be found in the Southern Transvaal. By 1952/3 the number had actually increased to 48, while in the rest of the country, they decreased from 14 in 1950/1 to 13 in 1952/3. In the rest of the Transvaal the figure remained constant at 2. This means that during the year 1952/3, 76.2% of all iron and steel fabrication concerns in South Africa were situated in the P - W - V complex. The trend towards the concentration and centralization of this industry had continued

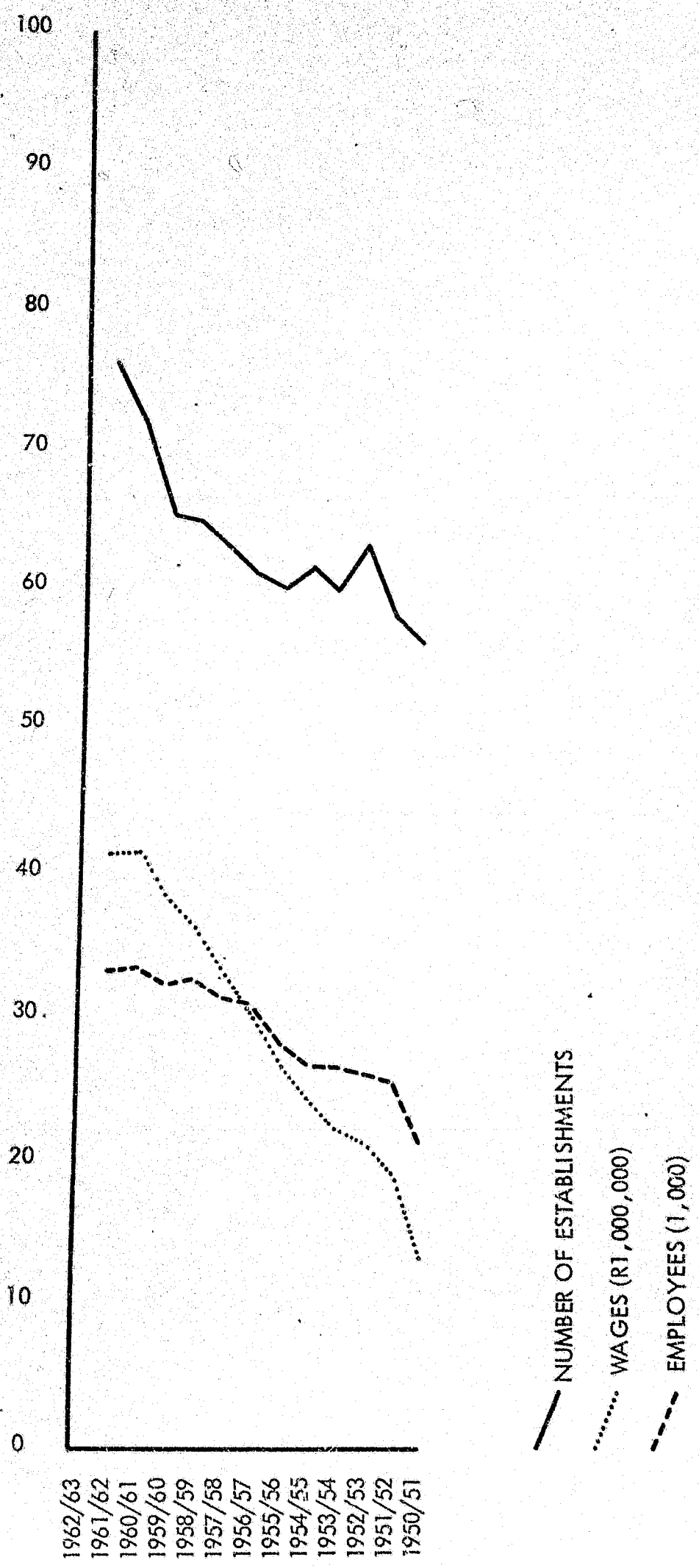
until 1952/3 when it reached a maximum. At this stage the domination of the industry, by the P - W - V was at its greatest. This was partly a result of the government's policy of encouraging the decentralization of industry and partly as a result of a general economic recession. The 1953/4 balance of payments crisis was similar to that of 1948/9, in that it was caused by excessive importation in relation to export earnings and it occurred in spite of a considerable capital inflow.

By 1954/5 other establishments were being developed elsewhere in the country. The Witwatersrand area's growth rate declined in comparison to the rest of the country (Figure 4.8). Unfortunately, detailed information for the years 1955/6, 1957/8, 1958/9 and 1960/1, is not available, but by 1956/7 there were only 43 establishments in the P - W - V complex, out of a total of 61 for the country as a whole. The rest of the Transvaal had also begun to grow in importance, although there were only three establishments outside of the P - W - V. This marked the beginning of the trend in decentralization, which continued so that by 1961/2 there were five establishments operating in the Transvaal.

4.0 Sectors of the Base Metals and Engineering Industry within the P - W - V

4.1 The Iron and Steel Industry (Base Metals Group 15)

From 1950 to 1953 the number of establishments producing iron and steel goods in the P - W - V rose from 56 to 63 (Figure 4.9). This was followed by a decline until 1957/8 when it again reached 63. However, the number of employees did not follow the same trend, but increased steadily throughout the decade from 20 915 to 33 276. (Figure 4.9) This means that after 1953 the industry must have undergone a period of consolidation and improvement. The net output per employee rose from R1 372 in 1950/1 to R2 433 in 1953/4, then fell to R2 268 in 1954/5, but rose again to R2 907 in 1960/1 (I.C. 45). The decrease in the number of establishments and the fall of productivity during 1954/5 can be ascribed to the second of four crises in the country's post war balance of payments. The inflationary pressures caused by the rapid expansion of the economy and in particular by a high rate of investment in both the private and public sectors caused a strain on foreign exchange. Monetary and fiscal restraints were imposed (Houghton 1964). The 1957/8 foreign exchange crises



NUMBER OF IRON AND STEEL PRODUCING ESTABLISHMENTS, WAGES AND EMPLOYEES.
Source:- Industrial Census 45/1967.

Figure 4.9

Title: Number of Iron and Steel Producing Establishments, Wages and Employees.

Source: Industrial Census 1950/51 to 1960/61 Report No. I.C. 45 (1968) List D₁ and D₂.

	Number of Establishments	Employees (All races)	Salaries and Wages (R1 000)
1950/51	56	20 915	13 735
1951/52	58	25 362	19 822
1952/53	63	25 575	21 599
1953/54	60	25 870	22 967
1954/55	61	26 673	24 950
1955/56	60	28 113	26 328
1956/57	61	30 908	30 844
1957/58	63	31 932	33 848
1958/59	65	32 542	36 048
1959/60	65	32 363	38 161
1960/61	72	33 276	41 744
1961/62	76	32 964	41 558

which resulted from a net outflow of private capital of R61 million and a fall in the value of exports of R129 million is reflected in the levelling off of the increase in employees. (Figure 4.9). The 1960/1 crisis years resulted in a net outflow of capital of over R12 million per month (Houghton 1964.) The number of employees actually fell from 33 276 in 1960/1 to 32 964 in 1961/2 (I.C. 45). Wages also followed this trend, increasing by R28 million between 1950/1 and 1960/1, but then declining from R41 744 000 to R41 558 000. The fact that wages rose more rapidly during the decade than the total number of employees, points to an inflationary tendency which had been set off by the increased output and demands put upon this sector.

The fact that the base metal industry reflects the country's overall economic position so clearly is indicative of its importance to industry. It has high forward and backward economic linkages, i.e. it relies upon a number of primary industries, such as mining, electrical power production and transport,

while in its turn supporting many more manufacturing, construction and communication industries. This means that not only is the base metal industry a basic prerequisite for modern industrial development, but it is an excellent barometer of the country's economic position and by determining basic trends within the industry, one can predict general industrial developments. The location of the industry can often determine industrial development. When situated with other sectors of the metal and engineering industry it forms a powerful stimulant for industrial growth.

The gross output of the base metal industry increased rapidly during the decade (Figure 4.10) only slowing slightly during 1952/3 and 1957/8. The relative percentage of net output to gross output decreased in value.

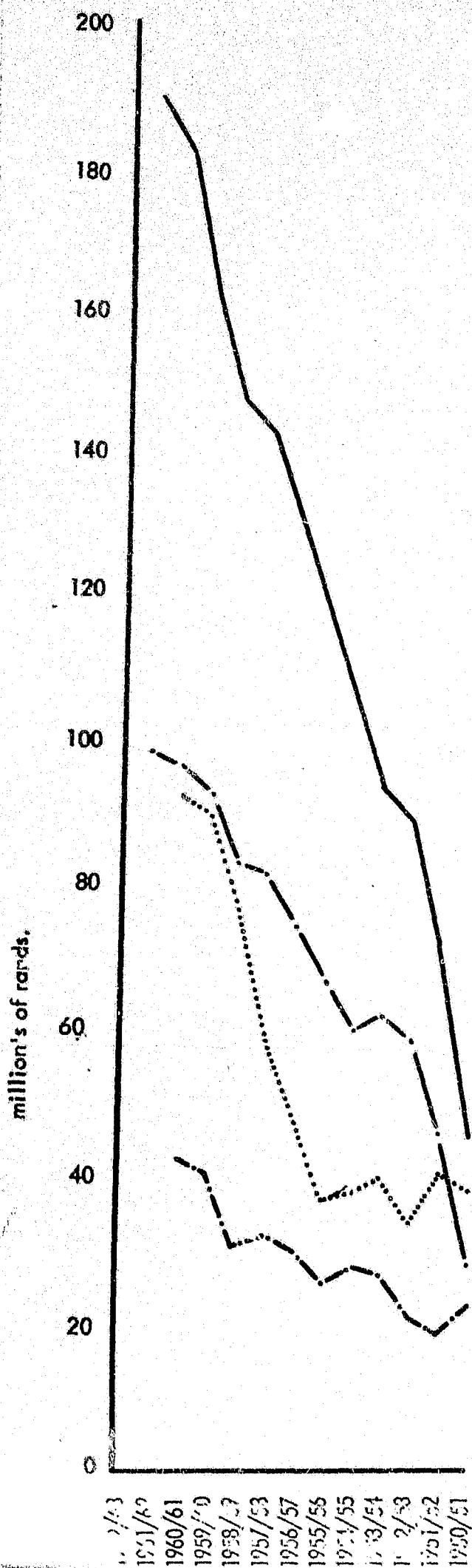
Figure 4.10

Title: Productivity and capital value of iron and Steel Producing Establishments. (R000's)

Source: Industrial Census 1950/51 to 1960/61 Report No. I.C. 45 (1968)

	Gross Output	Net Output	Land and Buildings	Plant, machinery, transport, etc.
1950/51	46 832	28 698	23 481	38 966
1951/52	72 046	45 824	19 278	41 503
1952/53	89 228	58 998	21 605	34 531
1953/54	93 028	62 932	27 272	39 419
1954/55	108 922	60 493	28 470	38 356
1955/56	119 570	65 810	26 853	36 909
1956/57	129 924	76 281	30 365	46 372
1957/58	143 020	81 802	32 669	57 048
1958/59	147 361	83 254	31 978	76 104
1959/60	162 657	93 951	40 833	89 309
1960/61	182 406	96 744	42 056	93 501
1961/62	190 618	98 096	n/a	n/a

This is indicative of the increase in the costs of iron and steel production during the decade and can be partially explained by the increase in wages. It should also be noted that from 1955/6 there was



— GROSS OUTPUT
 - - - NET OUTPUT
 - - - LAND VALUE
 MACHINERY

PRODUCTIVITY AND CAPITAL VALUE OF IRON AND STEEL PRODUCING ESTABLISHMENTS.

Source: - Industrial Census Report I.C. 45, 1959/51 to 1960/61)

(List D₁ and D₂)

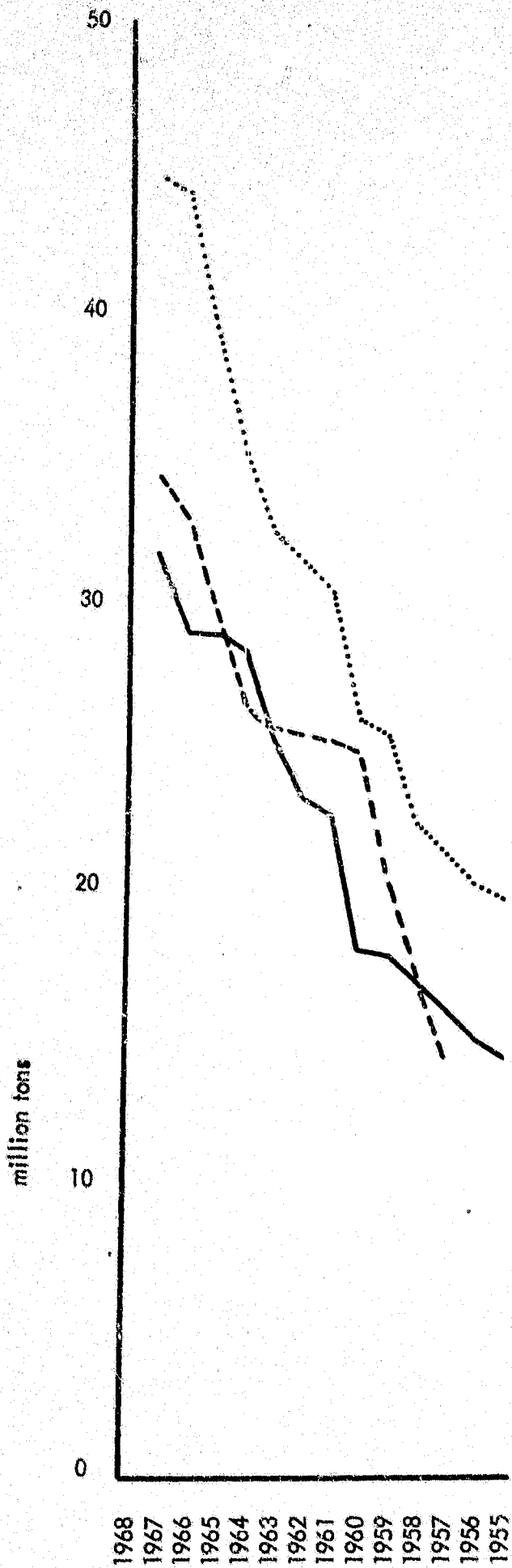
a rapid increase in the value of machinery which was being used in the industry. This could explain the relatively slow increase in employees. It could also indicate that firms are moving towards automation to off-set the spiralling costs and wage increases. This capital investment in machinery and equipment would also explain the smaller percentage of net output to gross output.

Unfortunately, these figures apply to the country as a whole, but with the majority of firms being found in line P - W - V (Figure 4.8) it does give an indication as to trends within the area. The iron and steel industry has managed to maintain a good growth rate in gross output, but has been forced towards automation in an attempt to combat increased labour costs. As a result the value of the net output of iron and steel products no longer forms as great a percentage of the gross output as it did at the end of the 1940's. South Africa is not a country of cheap labour and as new iron and steel producing establishments are established they are employing fewer people. In 1961/2 four new foundries came into production in the country, but total employment in the industry fell by 312.

The 1950's were a time of expansion for the iron and steel industry, notwithstanding the decreases in the number of establishments in the P-W-V in the mid-fifties. A brief summary of ISCOR's development gives an indication of the size and importance of the corporation to the P-W-V.

- 1950: Several production units started up at Vanderbijlpark.
- 1952: Iscor's total annual production, for the first time exceeded one million ingot tons of steel.
- 1953: Operations started at the Sishen iron ore mine.
- 1954: Durban Navigation Collieries taken over by Iscor.
- 1956: R112 million expansion scheme, designed to increase Iscor's annual production capacity to 2 350 000 ingot tons announced.
- 1957: Operations started at the Mooiplaas dolomite quarry.
- 1959: The Uis Mine purchased by Iscor.
- 1959: Operations started at the Glen Douglas dolomite quarry.
- 1960: R560 million expansion scheme designed to increase the annual production capacity to about 4 500 000 ingot tons announced (ISCOR 1965)

The 1956 R112 million expansion scheme was completed by the beginning of the sixties and had increased the corporation's annual steel production capacity to 2 350 000 ingot tons, of which the Pretoria works supplied 1 100 000 and the Vanderbijlpark works 1 250 000 ingot tons.



..... IRON ORE CONSUMED.

-- COKE CONSUMED.

— INGOT STEEL PRODUCED.

ISCOR'S ANNUAL CONSUMPTION AND PRODUCTION.
Sources:— Annual Reports 1955 to 1968.

The iron ore and coke consumption of Iscor and its ingot output in tons are shown in Figure 4.11. The steady rise in ingot production was to meet the growing demand for iron and steel goods. By 1957 the country's total consumption amounted to R178 million's worth of which R48 million was imported. During that year Iscor's net sales revenue amounted to R89.5 million. This meant that Iscor alone was supplying approximately 70 percent of the country's iron and steel requirements. Iscor's position of dominance continued during 1965, when the country's iron and steel consumption exceeded 3 million tons (Figure 4.12).

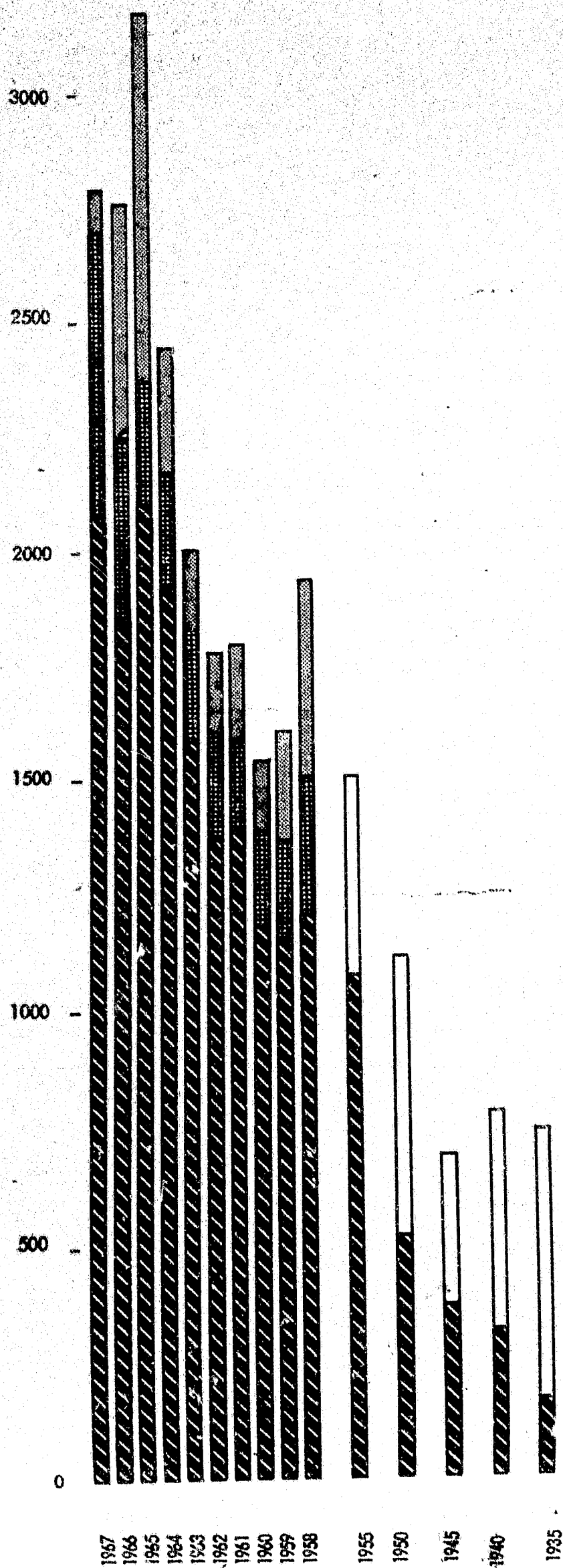
In so far as the distribution of establishments in the Southern Transvaal are concerned, Iscor's fast increasing output of iron and steel and its dominance of the market is likely to negate any effect which the slight decentralisation of the iron and steel foundries may have. If more than 70% (Figure 4.12) of the country's iron and steel is produced within the relatively small P-W-V area the expansion of the industry in other centres is going to be slow and a much less attractive economic proposition to the industrialist. This would apply even more strongly to the Engineering and Machinery manufacturing industries which are dependant upon semi-processed metal goods. The industrial inertia of the iron and steel industry affects allied industries so that they are unable to survive, economically, far from the foundry. To overcome this inertia requires the juggling of transport rates and the manipulation of the country's economy, so that the costs of sustaining works is borne by other sectors of the economy.

What in effect is needed, is not the decentralisation of establishments, but the divergence of production, so that one area no longer dominates the entire country, by producing nearly 75% of its iron and steel. However, this divergence is not economically practical when such small quantities of iron and steel are being produced.

Specimen Achievement:

In the United States in 1959, an area, South of Lake Erie, 275 000 square miles in extent, produced 60 million tons of steel. During the same year, Chicago and its suburbs produced 26 970 000 tons of steel.

The three million tons produced in the 472 000 square miles P-W-V complex is by comparison small, but planning precedents must exist so that future development within the region is feasible.



ISCOR
 IMPORTS
 OTHER SOUTH AFRICAN PRODUCERS
 DATA NOT AVAILABLE

SOUTH AFRICAN IRON AND STEEL CONSUMPTION - ROLLED, DRAWN AND FORGED STEEL PRODUCTS.

Source: - ISCOR Annual Reports.

Heavy Engineering (Group 16)

Heavy engineering firms are more closely linked to the production of iron and steel than perhaps any other sector of the economy. It has been seen that the development of USCO and ISCOR resulted in a greater need for heavy engineering in the P-W-V. Initially the only large engineering jobs were directly related to the mines.

After the expansion of the iron and steel industry during the 1940's heavy engineering firms were able to develop, being no longer dependent upon the mines and their piece-meal demands, for survival. VECOR which had been initiated by the Government and the Iron and Steel Industry in 1947, continued to expand. Today it is the largest comprehensive engineering works in South Africa and the giant of the manufacturing concerns in the heavy engineering sector. It manufactures equipment which includes winding equipment for the mines, cement plants, crushing and grinding plants, condensing plants, paper and paper pulp mill equipment, refinery equipment, iron and steel industrial equipment, boiler plant equipment, cranes and other heavy equipment. The firm pioneered the manufacture of welded pressure vessels in South Africa. In conjunction with David Brown Precision Equipment (Pty.) Ltd, Vecor has full gear cutting facilities.

The work undertaken by Vecor is usually the manufacture of heavy equipment for other sectors of industry. For example, among other things, Vecor produced, during the 1950's:-

- Mill stands for a continuous rod mill, weighing 8 tons.
- A class ONE all welded pressure vessel of 2 inch cladding stainless steel plate, weighing 120 tons.
- A cement kiln, 350 ft. x 10 ft.
- A 60 megawatt condensor.
- A steel frame for an 8 inch bloom shear for Risco, weighing 60 tons.
- A 48 inch x 42 inch jaw crusher weighing 60 tons.
- A 16 ft. dia. hoist double helical gear, faced with 36 inch, fabricated construction runs in high manganese steel.
- Medium mill rolls in spheroidal graphite iron.

(VECOR 1958)

It should be noted that much of the equipment required by the iron and steel industry can be manufactured and installed by Vecor. In fact, as has been stated, the establishment of Vecor relieved Iscor of having to develop and maintain its own engineering section. The importance of Vecor to Iscor is emphasised by Dr. Meyer's annual report in 1964 when he stated that:-

"The Corporation's trade investments are vested in the following public companies, whose interests are closely allied to its own: African Metals Corporation Limited, the Union Steel Corporation (of South Africa) Ltd., Vanderbijl Engineering Corporation Ltd." (ISCOR 1964)

Without the engineering and the maintenance of Vecor, Iscor could not function long, nor undertake its present R560 million expansion. Vecor is not solely concerned with industry in the P-W-V although its works at Vanderbijlpark have been expanded and are well suited to serve large iron and steel corporations plus the mines.

4.3

Metal Products (Group 16)

Figure 4.13 shows the total number of establishments in the Union for the base metals, metal products and machine industry (Groups 15, 16 and 17). In some cases the base metals industry (Group 15) includes non-ferrous metal foundries and the iron and steel industry, but these have been excluded so that the bar graph shows only iron and steel works. In the case of metal products (Group 16) tinware was excluded and in some years "springs for all purposes" were not listed as a separate category. After 1954/5 a different method of collecting information and processing was employed as all that year's figures are consistently lower than the previous year, despite the fact that there are only two minor changes in the subsections of the major groups. The figures from 1954/5 to 1957/8 were published in the 1957/8 industrial census report and detailed figures for the years prior to 1956/7 are available. Also during this period no distinction was made between private and government industrial establishments as had been the case. This together with the marked inconsistency of figures from 1953/4 to 1954/5 tend to throw doubt on the validity of the graph. The reports published after 1957/8 seem to follow the earlier reports consistently, using the same

categories as a basis for the industrial divisions, however, the 1959/60 and 1961/2 reports are on a geographical basis. The major categories are basically the same, but the information has been published firstly according to economic regions and magisterial districts and in the 1961/2 report, according to economic districts. Unfortunately, these two reports cannot be compared to earlier industrial census based on pattern of distribution because figures for the Southern Transvaal in respect of the various industrial groups were not published. Therefore Figure 4.13 has had to be compiled for the country as a whole.

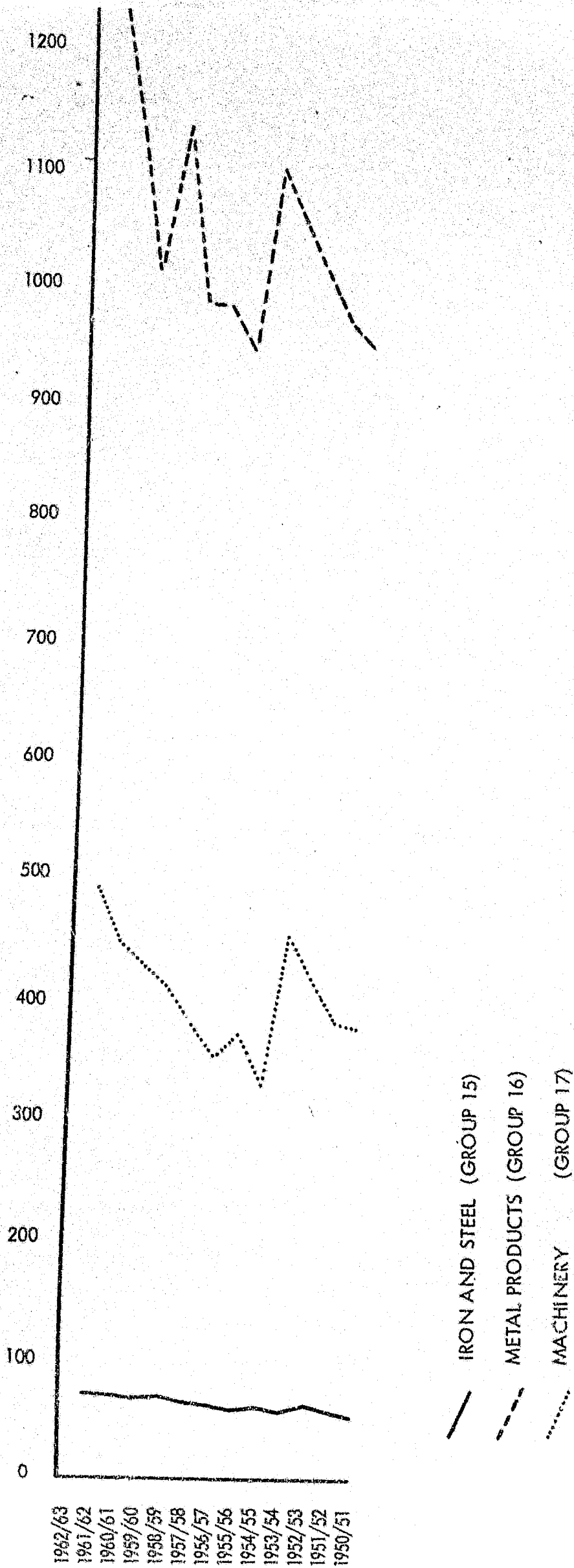
Figure 4.13

Title: Number of Establishments in the Iron and Steel (Group 15) Metal Products (Group 16) and Machine (Group 17) Industries in South Africa.

Source: Government Industrial Census. I.C. 45 1950/51 to 1960/61, 283 (1959/60 I.C.) pub. 1966 and 304 (1961/2 I.C.) pub. 1968

	Base Metal (Group 15)	Metal Products (Group 16)	Machinery (Group 17)
1950/1	56	951	370
1951/2	58	970	378
1952/3	63	1 018	406
1953/4	60	1 101	446
1954/5	61	942	324
1955/6	60	979	366
1956/7	61	980	348
1957/8	63	1 133	378
1958/9	65	1 015	408
1959/60	65	1 108	425
1960/1	72	1 138	447
1961/2	76	1 250	489

However, we do know that in the year 1949/50, 101 745 employees in 1 121 metal, engineering, machinery and cutlery works in the P-W-V area produced R167 390 954 worth of articles. By 1961/2 the basic metal, metal products and machinery industry had 1 588 establishments in the P-W-V which



NUMBER OF ESTABLISHMENTS IN THE IRON AND STEEL, METAL PRODUCTS AND MACHINE INDUSTRIES IN SOUTH AFRICA.

Source: - Government Industrial Census I.C. 45 1950/51 to 1960/61 283 (I.C. 1959/60) 1966 and 304 (I.C. 1961/62) 1968.

employed 130 408 people and had a gross output of R627 196 000. It can be surmised that apparent growth in the number of establishments engaged in the three groups of industry was more or less constant and that the metal products industry (Group 16) constitutes by far the largest proportion of these establishments (Figure 4.13).

4.4 Machinery (Group 17)

The development of the manufacturing of machinery can be seen despite the difficulty in obtaining figures which allow comparison and the alternating methods of collecting data employed by the Bureau of Statistics (Figure 4.14). It is apparent that a continued growth of this group occurred during the fifties and early sixties. The discontinuity between the years 1953/4 and 1954/5 cannot be adequately explained by any marked recessions in the economy, but more likely is due to the different methods of classifying industry, by the Bureau of Statistics from 1954 onwards. Hobart Houghton notes that:-

"Since 1954 manufacturing has continued to expand, but no comparable statistics are available other than those published in the national income statistics. These indicate a continued upward movement to 1957, but less rapid after that date."

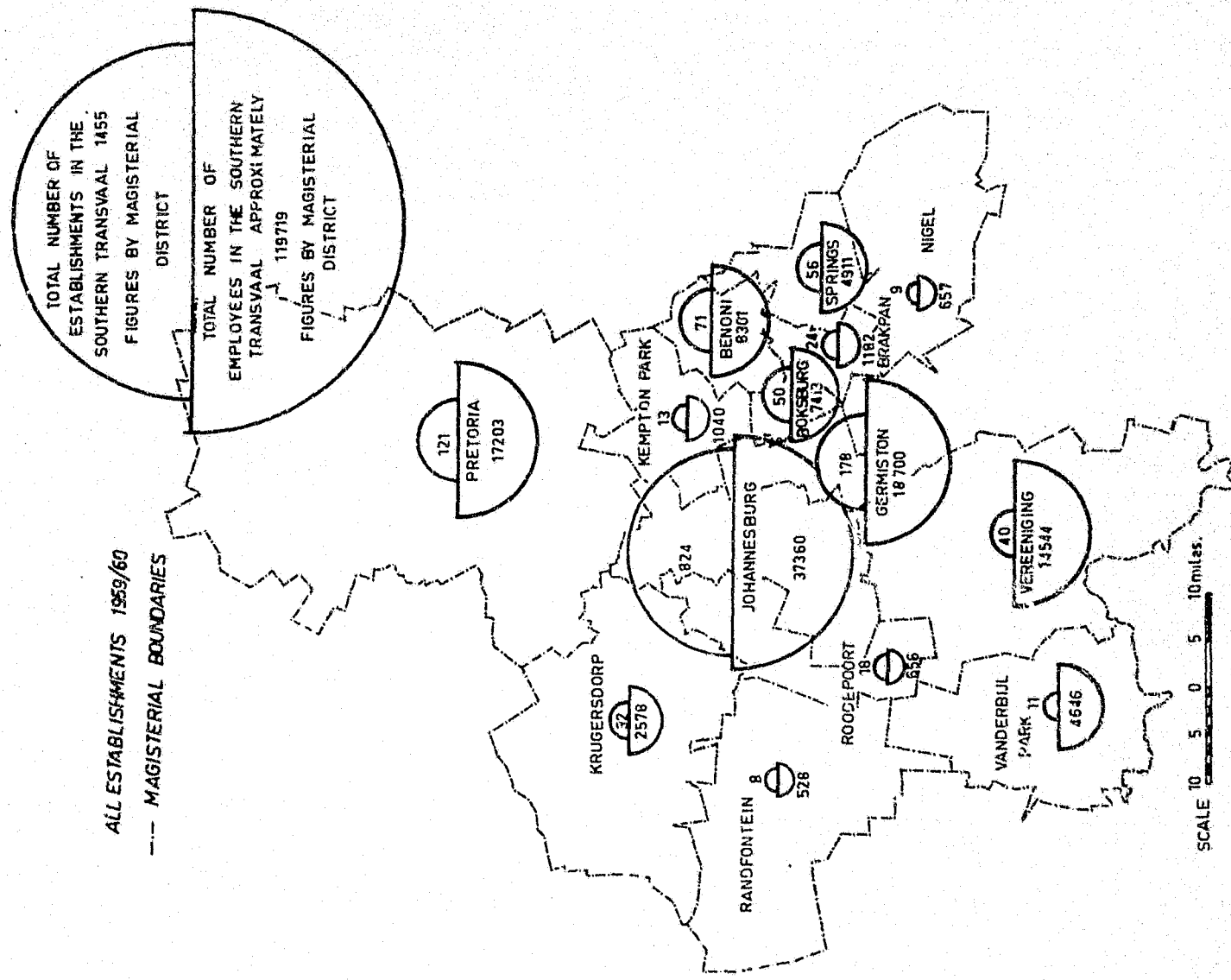
(HOUGHTON 1964)

Notwithstanding the difference, the largest sub-category of group 17 - industrial, mining and construction machinery shows a steady increase in gross output of R60 848 000 from 220 establishments in 1953/4 to R83 652 000 in 1956/7 from 222 establishments. One may therefore conclude that expansion in this group continued throughout the country as a whole and consequently on the Witwatersrand as well.

5.0

DISTRIBUTION OF THE METAL AND ENGINEERING INDUSTRY IN THE P-W-V: (Figures 1.8 and 4.5)

The early 1950's saw a continued growth of light engineering and the manufacture of metal goods in the Southern Transvaal and particularly on the Witwatersrand. By 1954, 67% of the 10 604 morgen (NRDC 1957/8) of land zoned for industrial purposes in the Southern Transvaal, lay within the Witwatersrand complex. Of this, 3 883 morgen or 55% was actually occupied by industrial firms (Figure 1.8).



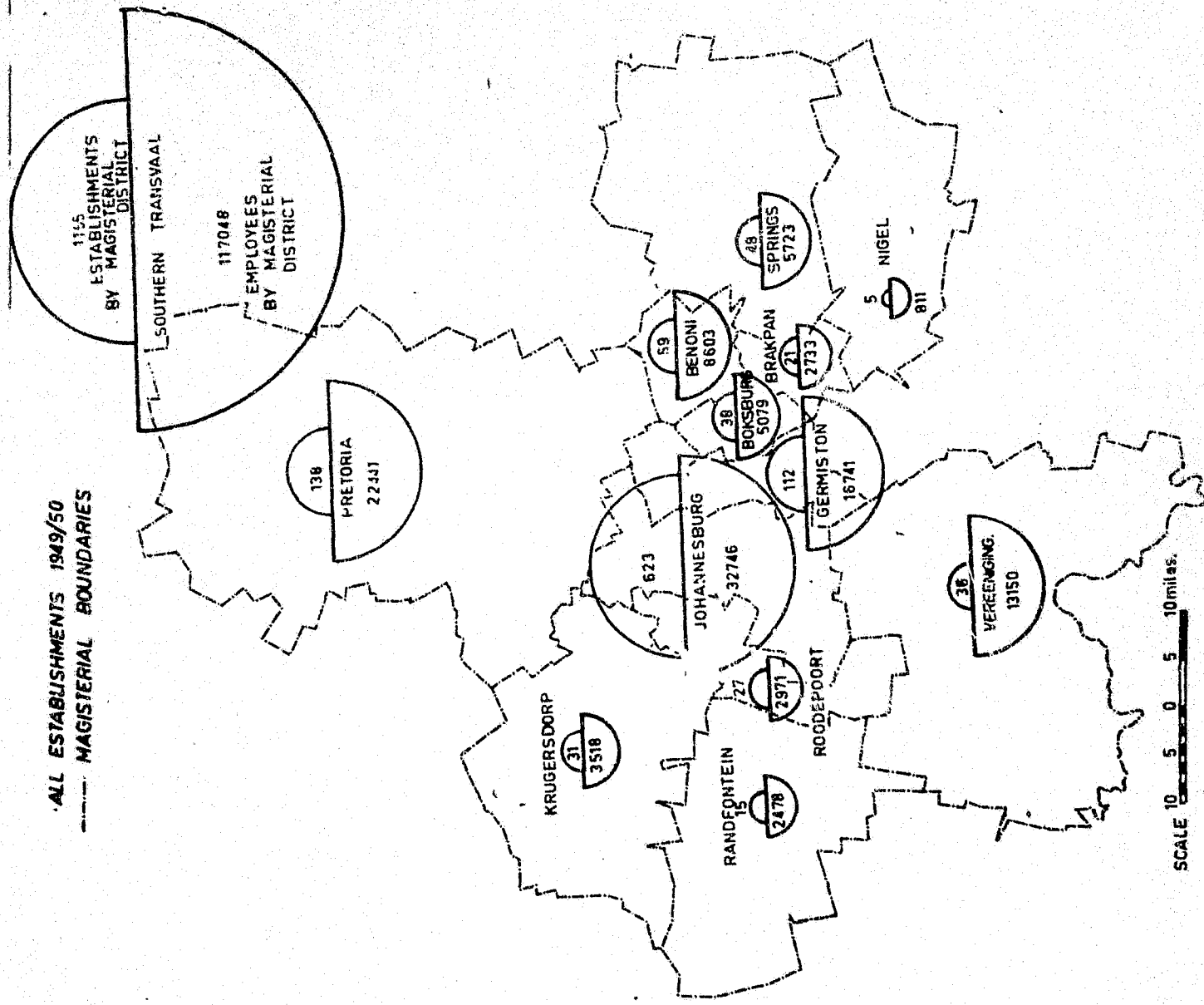
DISTRIBUTION OF THE METAL, MACHINERY AND TRANSPORT EQUIPMENT INDUSTRIES 1959/60.
Source:- Industrial Census 1959/60 Report No. 283 G.P.S. 9911230/1965/6 - 625.

This growth in secondary industry and engineering has resulted in the dominance of the Witwatersrand over the whole Pretoria - Witwatersrand - Vereeniging complex. Despite the establishment of heavy engineering concerns near the iron and steel works in the Vereeniging area, the region has remained peripheral in importance as far as industry is concerned. The same can be said of Pretoria where, although the establishment of Iscor has definitely attracted secondary and tertiary industry, it has not given the area a great enough volume in either production or turnover to rival the Witwatersrand industries.

Johannesburg leads the region with 623 establishments employing 32 746 people, followed by Pretoria with 138 establishments employing 22 441 and Germiston with 112 establishments employing 16 741 (Figure 4.15)*. Vereeniging is in a unique position having only 38 establishments, the same number as Boksburg and less than Benoni or Springs, but employing 13 150 persons in these few establishments, which is twice as many as Benoni, which has 59 establishments. This means that Vereeniging's establishments were large, that they employed a great many people per establishment and that they would therefore tend towards heavy engineering and smelting, while the East Rand was developing smaller establishments, employing fewer people and hence producing lighter goods. It can also be seen that even at this stage Benoni was beginning to take the lead as the metal and engineering centre of the far East Rand. Also Pretoria with its 138 establishments and 22 000 employees was apparently not as specialist in heavy industries as was Vereeniging. Nigel and the West Rand as a whole appear to have been the least important area for the metal and engineering industry in 1949/50.

* In figure 4.15 the data covers the period 1949/50 and is on a magisterial basis. Published by the N.R.D.C. these are the only figures available on a regional basis for that period. In attempting to make this data comparable to the 1959/60 information in Figure 4.14, industrial census groups 15, 16, 17, 18 and 19 have been combined and the economic districts which were first used during that year (1959/60) have been ignored. (Economic districts 40, 41, 42, 43 and 44 which are based on magisterial districts). The changes in the magisterial districts and the difference in the industrial categories make direct comparison difficult, but trends are apparent.

ALL ESTABLISHMENTS 1949/50
 --- MAGISTERIAL BOUNDARIES



SCALE 10 5 0 5 10 miles.

AFTER R.O.N.H. NR.D.C.

DISTRIBUTION OF THE METAL AND ENGINEERING INDUSTRY IN THE P.W.V.

Source:- N.R.D.C. Report No. 168094/1957/B.

The overall picture of the Witwatersrand (Figure 4.14) has remained much the same. Kempton Park has been formed as a separate magisterial district from Germiston and Vereeniging and now consists of two magisterial districts - Vanderbijlpark being a separate region. This indicates that expansion has occurred in all spheres of the town's development. In the case of Kempton Park a great deal of land, especially to the South West of the town had been zoned industrial. Primarily this area produced goods for the consumer market, which is indicated by the relatively small number of metal and engineering establishments - only 13 in 1960 - despite the relatively large industrial areas.

In the Vereeniging-Vanderbijlpark area their dependence upon heavy engineering and the iron and steel industry is clearly apparent. The 11 establishments in Vanderbijlpark employed 4 546 as compared to the 13 in Kempton Park which employed 1 040. This indicates the development of large concerns and the continuation of the Vereeniging trend towards specialisation in heavy industry. Again Pretoria remains the least prone of the two basic metal producing areas, to large establishments, employing on an average only 142 people per establishment, as compared with Vereeniging - 364 - and Vanderbijlpark - 422 - (Figure 4.16).

Figure 4.16

Title: Growth of various industries - 1959/60 = 100

Source: Industrial census 1961/2 Report No. 304 and Bureau of Statistics.

Growth of various Industries

<u>Economic Areas</u>	<u>Group 15</u>		<u>Group 16</u>		<u>Group 17</u>	
	1961/2	1962/3	1961/2	1962/3	1961/2	1962/3
40. Johannesburg	100	103.2	109.0	115.6	111.9	121
41. East Rand	110.2	123	112.8	135.6	128.1	161
42. West Rand	200	250	167.1	160.7	175	175
43. Pretoria	133.3	166.7	112.3	124	166.7	188.9
44. Vereeniging	122.2	122.2	130	195	75	150

(Computed from the Industrial Census Figures)

This degree of specialisation could have resulted in a movement of the population away from the area because it lacked opportunities for the employment of other skills and interests which could be more profitably employed elsewhere on the Witwatersrand. The fact that there is a limited amount of light manufacturing industries in the Vereeniging region, means that in its relationship with the rest of the P.W.V. it is a "depressed area", in so far as there is a limitation on the type of employment available. The heavy industry has not attracted the secondary and tertiary industries which it might have, or could have, in other parts of the world. This has meant less employment opportunity for the population as a whole. Secondary and tertiary industry has been drawn to the Witwatersrand where conditions are more favourable for them and the population has possibly followed the developing manufacturing industries. This may also explain to a slight degree the decrease in population on the Far East Rand, but not to the same extent as in the case of Vereeniging - Vanderbijlpark.

6.0 Regional Breakdown of the P - W - V

Some regional specialisation within the iron and steel and engineering industry in the P-W-V has occurred. Base metal working has developed peripherally to a marketing centre of smaller metal producing concerns. The heavier production engineering with some smelting and private base metal working has tended to locate on the East Rand. This makes a regional study of the P-W-V necessary.

The 1957/8 report on the P-W-V by the Natural Resources Development Council, divided the Witwatersrand into three main areas:-

1. The Central Rand being the Johannesburg and Germiston magisterial districts.
2. The East Rand being Boksburg, Benoni, Brakpan, Springs and Nigel.
3. The West Rand being Roodepoort + Maraisburg, Krugersdorp and Randfontein.

Developments since then have accentuated a trend which was already apparent at that time namely the growth and expansion of the Germiston area. This town, together with Kempton Park and Alberton has shown tremendous growth. This can be explained by the fact that it is a nodal point between both North/South and East/West lines of communication.

Germiston forms the geographical centre of the P-W-V. Good road and rail linkages and a large junction resulted in the mining town becoming a communications centre. The rapid post-war industrial growth made manufacturers aware of the area's potential, together with its nodal qualities. This marks the city as a regional centre. For the sake of comparison, further distinctions must be made to the NRDC's division, and in addition, two peripheral areas must be included, so a total of six regions can be distinguished. They are:-

- A. The Central Rand - which would approximate to the Johannesburg magisterial district, (economic region No. 40 in the 1961/2 Industrial Census),
- B. the Near East Rand - this area included Kempton Park, Germiston and Alberton and forms part of economic region 41,
- C. the Far East Rand - which is the remainder of economic region 41 and includes Boksburg, Brakpan and Springs magisterial districts,
- D. the West Rand - which covers Roodepoort - Maraisburg, Krugersdorp and Randfontein magisterial districts. It closely approximates economic region 42, which includes Oberholzer magisterial district,
- E. the Pretoria area which is economic region 43 and the Pretoria magisterial district,
- F. the Vereeniging and Vanderbijlpark area which is economic region 44 and incorporates both magisterial districts (Figure 4.5).

6.1 The Central Rand.

Figure 4.17

Title: The distribution of industry on the Witwatersrand.

Source: NRDC report on the Pretoria, Witwatersrand, Vereeniging complex 168094/ 1957/8

<u>The distribution of industry on the Witwatersrand</u>				
<u>Area</u>	<u>Industrial employees.</u>		<u>Land used by industry.</u>	
	<u>1949/50</u>	<u>%</u>	<u>1954 (morgen)</u>	<u>%</u>
Central Rand	186,413	76.71	2,556	66
(Johannesburg)	144,506	-	851	-
East Rand	41,047	16.89	1,047	27
West Rand	15,547	6.40	280	7
TOTALS:	<u>243,007</u>	<u>100.00</u>	<u>3,883</u>	<u>100</u>

From the distribution of industry and employees during the early 1950's (figure 4.17) it is clear that the Central Rand dominated the region. 77% of the industrial workers employed on the Witwatersrand in 1949/50 worked here while 66% of all industrial land was here. There were 144,506 industrial workers in Johannesburg alone, three and a half times as many in Germiston. As yet Germiston had not developed as a market of any significance, and growth, as a result of its unique position, was in its infancy. Germiston could only develop as a result of Johannesburg's expansion. Johannesburg had to reach a size which generated enough business, commerce and demand to support industry in Germiston. Consequently as Germiston has grown, it has developed an inter-dependency with Johannesburg.

'Nearly 9,500 people travel daily to Johannesburg from Germiston to work and about 5,300 travel from Johannesburg to work in Germiston. Johannesburg and Germiston are very interdependent.'

(Metropolitan Report C.E.D.
Johannesburg 1966)

During the early 1950's the importance of the mines decreased as a market for the metal industry, while the industry itself began to form its own market. Metal fabrication forms an important part of any developed country's economy because of its economic integration with the manufacturing and industrial sector. The metal industry is an important generator of goods, employment and a market for other manufactured goods including metal products. In the U.S.A. In 1958 there were 25,000 metal fabricating concerns employing over a million people (U.S. Census of Manufac. Bul. MC 58 (1) 1958). In Johannesburg the metal and engineering industry employ 22.7% of the area's workers, by far the largest single sector of industry. It was followed by clothing and textiles 16.9%, building and construction 16.9% and food and drink and tobacco 9.17%. The metal and engineering industry: thus provided a major portion of Johannesburg's industrial turnover. (NRDC, 1958 Report 160094/1957/8).

By 1959/60 there were 2,683 manufacturing establishments in the Johannesburg Magisterial district which employed 119,905 workers and had a gross output valued at R468,519,000.

During the same year Germiston had only 373 manufacturing establishments which employed a total of 32,451 workers and produced R122,347 worth of goods in gross output. (I.C. 1959/60 U.G. No. 283). This comparison illustrates the fact that Johannesburg far outstrips Germiston as a manufacturing centre despite Germiston's comparatively higher percentage of heavy industry and is

indicative of the inter-dependency of the areas, Germiston being a more primary industrial region supplying Johannesburg's manufacturers with basic materials.

6.2

The Near East Rand.

In Germiston nearly 40% of the industrial employees were in the metal and engineering industry. Its establishments were the largest on the Rand, employing 118.4 workers per firm as compared to 50.8 for Johannesburg. Its metal industries employed an average of 149.5 workers as compared to 52.6 for Johannesburg. This means that the larger and heavier engineering firms which employ more workers have established themselves in Germiston.

This could be due to a number of reasons:-

A. Cost of Land.

Of the 1,682 morgen of industrial land in Johannesburg, 51% was developed as compared to 70% of the 1,9?? morgen in Germiston. The movement of industry and particularly the heavier engineering firms into Germiston could be due to the lower cost of land and services.

B. Better location.

Land being released by the mines is already being used by industry particularly to the south of the railway lines. Germiston offers a better location for industry. Not only was it cheaper but it was well connected by road and rail to the rest of the P-W-V and the country. The main junction of the east-west and north-south lines of communication (both road and rail) occurred here. It is also closer to the industrial East Rand than Johannesburg: yet it is not far from the latter.

C. Proximity to established heavy industries.

According to figures published by the Germiston City Engineers Department in 1963 (Planning for Traffic 2nd. ed.) the city had been developed as follows:-

Figure 4.18

Title: Land use of Germiston in acres.

Source: Planning for traffic C.E.D. Germiston 1963.

<u>Function</u>	<u>Total area occupied in acres</u>	<u>% of total</u>
Residential	4,912	52.5
City centre	55	0.59
Heavy industry	1,198	12.8
Light industry	228	2.4
Small holdings	651	6.9
Agriculture	2,308	24.7
TOTAL:	<u>9,353</u>	<u>100.0%</u>

There was a further 1,800 acres of unused land which could become available for industry. This means that the total industrial land available amounts to 3,226 acres or approximately 1,536 morgen which is 386 morgen less than that accredited to the city by the National Resources Development Council in its 1957/8 Report. The table does show that heavy industry dominated Germiston, occupying 12.8% of its total area and nearly 2/3 of the city's industrial land (NDRC 168094 1957/8)

During the mid-fifties Kempton Park and Alberton appeared as industrial areas although only 36% and 18% of their total available industrial land was occupied by 1955 (Jhb. City Engineer 1966). At that time the main development in Alberton was along the railway line towards Vereeniging in an area adjacent to the Natalspruit location. More recent figures of a comparable nature are unavailable. However, development to both the north and south of this area did continue especially after 1960, a fact which is illustrated in the next section. What is important is that this trend was already discernible during the mid-fifties. By the end of the decade industrial development in the Alberton area was significant. It should be remembered that much of the Alberton Industrial area was included in the Germiston magisterial district.

It can be seen that the industrial areas of Wadeville and Alberton form an almost continuous belt south of the European areas (figure 1.8). The new African township of Natalpruit, and Vosloorus have been developed south of the industrial areas to supply labour. By 1959/60 Germiston had 178 firms engaged in the metal, machinery and transport industries, which employed 18,700 persons or an average of 105.1 persons per establishment as compared to 45.43 in Johannesburg. This means that despite the fact that Johannesburg employed nearly twice as many metal workers as Germiston (37,360 to 18,700) Germiston's metal, machinery and transport equipment firms tended to be bigger. It can therefore be concluded that the earlier trend towards development of a heavier metal industry in Germiston continued, however these industries remained smaller on an average than those of both the Vereeniging area and Pretoria.

6.3 The Far East Rand (Part of region 41)

The main Far East Rand industrial areas are Boksburg and Benoni which are contiguous with Springs. The first two together employ 9.4% of the Rand's industrial employees and the degree of specialisation is greater than in Germiston. In Boksburg metal and engineering works employ 65.9% of all industrial workers and in Benoni 57.2%. These two towns had 89% and 98% of their industrial land developed. This full utilization created a demand in this category. (figure 4.19).

Figure 4.19

Title: Industrial land on the Witwatersrand in 1954

Sources: N.R.D.C. Report No. 168094, 1957/8.

<u>Central Rand</u>	<u>(area of industrial land in morgen)</u>			
	<u>Developed</u>	<u>Undeveloped</u>	<u>Total</u>	<u>Percentage developed</u>
Johannesburg	851	831	1,682	51
Germiston	1,351	571	1,922	70
Alberton	117	548	665	18
Kempton Park	228	406	634	36
Edenvale	9	35	44	20

<u>East Rand</u>	<u>Developed</u>	<u>Undeveloped</u>	<u>Total</u>	<u>Percentage developed</u>
Boksburg	318	41	359	89
Benoni	286	6	292	98
Brakpan	101	-	101	100
Springs	328	220	548	60
Nigel	14	29	43	33

By 1954 Brakpan had fully developed its 101 morgen of land (figure 4.19) but had only 21 industrial establishments. It was therefore of relatively little importance to the East Rand, employing a total of 3966 workers, but was highly dependent upon the metal and engineering industry.

Springs was already becoming an important industrial centre during the mid-fifties as it had 5.2% of the Rand's industrial workers and it had 220 morgen of land available for industrial expansion (NRDC 168094, 1957/8). There was not the same high dependence upon metal and engineering industries as was the case in Benoni and Brakpan. Only 45% of all workers were engaged in this industry in Springs. The establishments also tended to be smaller than those in the previous two towns.

All the Far East Rand towns are of lesser importance in size and employment than the Central Rand (figure 4.14). Benoni remains the most important of these towns, with 71 establishments employing 8,301 persons or an average of 116.9 persons per establishment. It should be noted (figure 4.19) that Boksburg, although it has only 50 establishments it employs an average of 148.3 persons per establishment. It can therefore be concluded that both Benoni and Brakpan were dependent upon large metal and machinery producing firms to an even greater extent than Germiston. This again follows the trend of the earlier part of the decade. Brakpan and Springs both employed considerably fewer persons per establishment than the other two towns. Of the Far East Rand it may be said therefore that it has tended to specialise in heavier industry than Johannesburg or the West Rand, but has not developed a dependency upon the metal industry as Vereeniging and Vanderbijlpark.

6.4

The West Rand (Region 42).

The fifties saw no concentrated development of industry on the West Rand. The Roodepoort-Maraisburg area employed only slightly fewer workers than Boksburg having only 2.7% of the Rand's total. Again the metal and engineering industry employed the majority of workers i.e. 45.67% (NDRC 168094, 1957/8). Krugersdorp had only 2.2% of the Rand's industrial workers, but like Boksburg, Brakpan and Randfontein, it was one of the four Witwatersrand districts most dependent upon the metal and engineering industries, with 64.7% of its employees engaged in this sector. Roodepoort and Krugersdorp used only 41% and 29% respectively of their available industrial land.

The industrial development followed an east-west line from Randfontein to Springs (figure 1.8) with Johannesburg as the largest and most sought after area for industrial sites in general, but with Germiston and the East Rand forming important metal and engineering centres. The preference of the East Rand has been ascribed to its better rail links with the ports and with the sources of iron and steel in Pretoria and Vereeniging.

By the end of the decade the West Rand had remained relatively underdeveloped and of less importance to the metal and machinery industry than any region in the P.W.V., having a total of 68 establishments employing 3,762 people or an average of only 55.3 persons per firm.

6.5

Pretoria and Vereeniging (Regions 43 and 44)

These two areas are basic metal producing regions peripheral to the Witwatersrand and have been covered in some detail previously. Because of the dominating importance of the Iscor works, Usco and Vecor-concerns which are closely related - these two regions have been combined in this instance.

At this time Pretoria and Vereeniging formed peripheral centres engaged in the production of iron and steel. Pretoria had a total of 47,394 industrial employees of which 22,441 or 47% were engaged by 138 metal and engineering establishments (figure 4.2 and 4.15). In Vereeniging 13,150 workers or 57% of the total number were engaged by 138 metal and engineering establishments (figure 4.15). The importance of these two centres does not become immediately apparent from this.

It was because of the dominance of the metal and engineering industry in these centres that they were important to the Witwatersrand. Heavy engineering in the Vereeniging/Vanderbijlpark area and the production of iron and steel by Iscor allowed smaller engineering works to establish themselves, but the prime market for both these centres remains in the Witwatersrand.

Figures published by the NRDC and the Bureau of Statistics do not correlate with those published under the new classification of the Industrial Census. However they do allow comparison of areas within the fifties decade.

Similar developments can be discerned in both sets of figures. These inconsistencies can be attributed to the new methods of the classification of industry after 1950. This also means that comparison with figures relating to the decade of the sixties is not always possible, providing that such figures are available.

In conclusion it may be noted that the population of the far East Rand and the Vereeniging area decreased during the 1950's decade and both these areas tended to specialise in heavier metal and engineering works. The development of the Kempton Park/Germiston/Alberton areas became marked. There was also a growing interdependence between these areas and Johannesburg. Planned development began to manifest itself in the establishment of non-European townships and industrial areas. The importance of the Central Rand as a market for the light metal industry is apparent from the predominance of smaller establishments in this area, especially in Johannesburg where the average number of people employed per establishment (45.34) was the lowest in the whole of the P-W-V. The tendency towards specialisation in heavy industry in Pretoria was not nearly as marked as in the Vereeniging - Vanderbijlpark region. In fact establishments in Boksburg employed on the average more people per establishment than those in Pretoria.

Despite the official policy towards the decentralisation of industry, Johannesburg's population increased by 237,000* during the decade and the ratio of White to Non-white fell from 1 : 1.52 to 1 : 1.82. . While the population for the whole of the Witwatersrand increased by 439,596 and the ratio of White to Non-white from 1 : 1.68 to 1 : 1.85.**

* Figures after the official census - a discrepancy exists between these figures and those published by the Johannesburg planning department.

** Figures from the Department for Planning City Engineer's Department. Johannesburg City Council.

CHAPTER V.

THE EARLY SIXTIES (1960 - 1965)

In response to poor statistical data, this period has been divided into two main sections, which correspond to the sources. These are:-

A. The early sixties. (Chapter V)

This part deals with the period 1959/60 to 1965 and is covered by figures published in the latest Industrial Census (reports 283 (1966) and 304 (1968)). The Natural Resources Development Council's Survey (unpublished) and the Board of Trade and Industry's report (No. 6, 1968).

B. The late sixties. (Chapter VI) 1965 to 1970.

No official figures are available. The 1968 Survey and Information from SIEFSA, ISCOR, USCO, city councils, newspapers and journals are used. From such sources may be gleaned to allow the projection of present and future trends within the P-W-V.

1.1 Sources of Information.

Apart from the official census of 1959/60 (report No. 283, 1966) and 1961/2 (report No. 304, 1968) no detailed information of the P-W-V has been published. The Natural Resources Development Council surveyed all industry in the P-W-V in 1961, but the results were never published. The Board of Trade and Industry conducted a survey of the iron and steel industry, metallurgical and engineering industries in 1965 which was published in two parts in 1968. For the purposes of comparison, a survey of the iron and steel, metal products and machine industry was conducted in 1968.

Some clarification of the 1961 NRDC survey is required to facilitate an understanding of its limitations.

1.2 The N.R.D.C. Survey.

1.2.1 Aim.

The aim of the survey was to gather information for a physical development plan 'which should guide development within the region for the next twenty years'.

The Director of the Department of Planning, Professor C.J. Viljoen, stated in the explanatory note on the questionnaire that due to the rapid growth of towns and cities, land for residential, industrial, recreational and other purposes must be reserved many years in advance of urbanisation. With the closing of the gold mines, industries would be of vital importance in the present and future development of the region. The structure of the existing industrial complex must be studied in detail in order to make preparations for the future'.

The questionnaire received a 40.48 per cent return. In metallurgical and engineering industries a response of 52.2 per cent was noted which meant that of the three industrial groups (15, 16 and 17 *) 593 out of 1,136 answered (report No. 304, 1966) Johannesburg and the East Rand gave the best response (figure 5.1).

Figure 5.1

Title: Comparison of the 1961 NDRC returns and the 1961/2 Industrial Census.

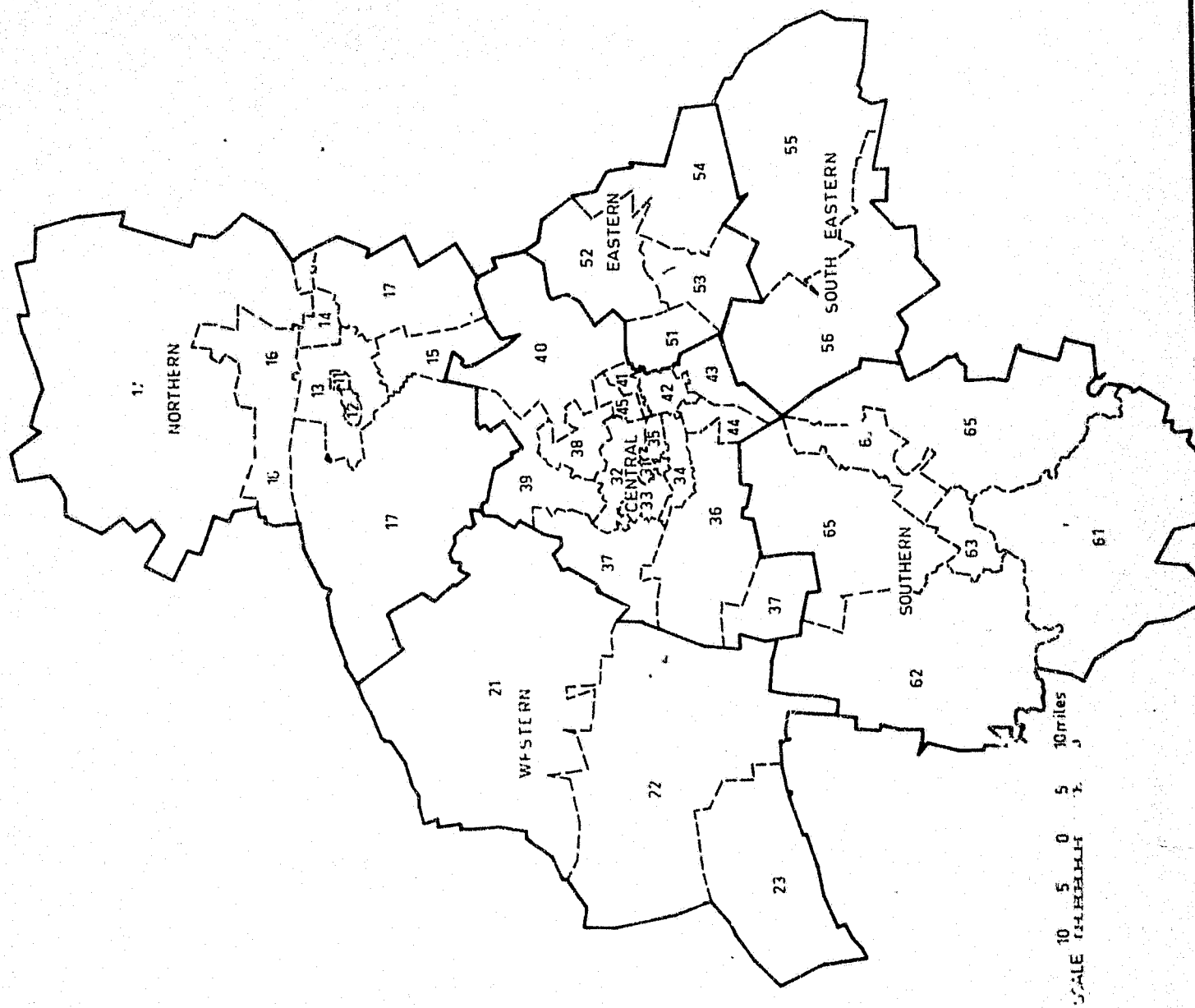
Source: Report No. 304, 1968 and Department of Planning.

Economic Region	Base Metal (group 15) NDRC 1961/2		Metal Products (group 16) NDRC 1961/2		Machinery (group 17) NDRC 1961/2	
40. Johannesburg	19	31	202	405	69	169
41. East Rand	23	43	119	215	52	91
42. West Rand	1	8	25	30	4	14
43. Pretoria	3	8	38	64	4	15
44. Verzeniging	6	11	19	21	4	6
TOTAL:	52	101	403	740	137	295

1.2.2 Areas.

The P-W-V was divided into six major areas corresponding approximately to the economic regions of the Industrial Census. Each major region was then broken down into a number of smaller areas (figure 5.2 and 4.5). The major regions follow the magisterial district boundaries and as with the Industrial Census some magisterial districts have been consolidated. To compare this survey with the Industrial Census' economic regions necessitates minor adjustments.

- A. Area 40 of the Industrial Census conforms to the magisterial district of Johannesburg (figure 4.5), but would exclude area 37 and part of area 36 from the NDRC's central region which has very little industry (figure 5.2). A comparison of figure 5.2 with figure 5.15 shows this as land lying



SCALE 10 5 0 5 10 miles

AREAS USED BY THE DEPARTMENT OF PLANNING FOR THE COLLECTION OF DATA. 1961.

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

south of the industrial areas. On the eastern side the boundary between area 40 and 41 is coincidental with the boundary between the 30's and the 40's which means that the West Rand includes area 37 with areas 21, 22 and 23, while the East Rand comprises numbers 40 to 45 and 51 to 54, leaving the central area with 31 to 39 excluding 37. In this way a regional comparison can be made with the areas of the industrial census.

- B. The southern region of the NRDC's delimitation approximates to economic region 44 of the Industrial Census except in the case of area 61 - which is Sasolburg's magisterial district. There were no returns from any of the relevant industrial groups in this region - so area 61 is ignored for comparative purposes.
- C. The south-eastern area is included because it forms part of the P-W-V although no equivalent is found in the industrial census. Returns from this region were small.

So the NRDC's regions can be reduced to six areas (fig. 5.3) which compare with the industrial census' area for which figures are available. These areas were also used for the above 1968 survey.

Because of the detailed information available on a geographical basis, the NRDC survey's data has been mapped. It is therefore comparable to the Industrial Census of the same year (1961) and the 1968 survey.

1.3 The Industrial Census.

The Industrial Census information is collected every year from all industrial establishments^{*} but is published erratically and in various forms. However it is the most extensive data available and can be used to determine growth rates.

2.0 Characteristics of the P-W-V.

2.1 Growth.

Despite the economic set back of the 1960/61 period when reserves of gold and foreign exchange fell from R312 million to R153 million (D.H. Houghton 1964) much development occurred in the iron and steel and engineering industries of the P-W-V. The actual number of establishments in the base metal (group 15) metal products (group 16) and machinery industry (group 17) increased steadily (fig. 5.4).

- * 15. Base metal industry
- 16. Metal Products industry
- 17. Machine industry

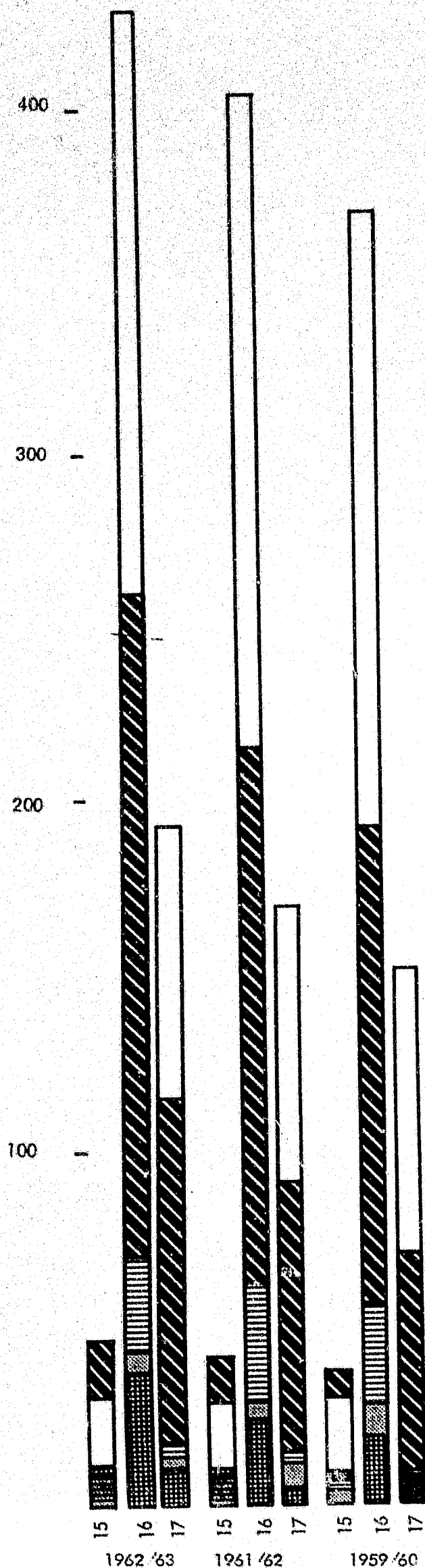
Figure 5.4

Title: Number of base metal products and machinery establishments in the P-W-V from 1959/60 to 1962/3.

Source: Reports No. 283 (1966) and 304 (1968) and the Bureau of Statistics unpublished data.

Economic regions &
Magisterial districts.

	Group 15			Group 16			Group 17		
	'59/60	'61/2	'62/3	'59/60	'61/2	'62/3	'59/60	'61/2	'62/3
Central Rand									
40. Johannesburg	31	31	32	371	405	429	151	169	192
East Rand									
41. Albertyn	-	-	3	-	-	17	-	-	5
Benoni	11	-	14	24	-	21	17	-	17
Boksburg	7	-	7	35	-	42	9	-	11
Brakpan	4	-	6	5	-	10	10	-	10
Germiston	11	-	11	93	-	122	32	-	47
Kemptonpark	1	-	3	8	-	18	2	-	6
Springs	5	-	4	26	-	29	11	-	19
TOTAL:	39	43	48	191	215	259	71	91	115
West Rand									
42. Krugersdorp	-	-	4	20	-	27	4	-	6
Oberholzer	-	-	-	-	-	2	-	-	2
Randfontein	2	-	2	3	-	5	-	-	1
Roodepoort	2	-	4	5	-	11	4	-	5
TOTAL:	4	8	10	28	30	45	8	14	14
43. Pretoria	6	8	10	57	64	71	9	15	17
44. Vereeniging									
Vanderbijlpark	3	-	3	4	-	10	2	-	1
Vereeniging	6	-	8	16	-	29	6	-	11
TOTAL:	9	11	11	20	26	39	8	6	12
GRAND TOTAL:	89	101	111	667	740	843	247	295	350



- JOHANNESBURG (AREA 40)
- EAST RAND (AREA 41)
- WEST RAND (AREA 42)
- PRETORIA (AREA 43)
- VEREENIGING (AREA 44)

NUMBER OF ESTABLISHMENTS IN THE BASE METAL (GROUP 15) METAL PRODUCTS (GROUP 16) AND MACHINE (GROUP 17) INDUSTRIES
IN EACH OF THE ECONOMIC AREAS OF THE PRETORIA - WITWATERSRAND REGION.
Source:- Government Industrial Census. I.C. 1959/60 (283/1966), 1961/62 (304/1968).

1000

800

600

400

200

0

1962/63

1961/62

1959/60

BASE METAL (GROUP 15)

MACHINERY (GROUP 17)

METAL PRODUCTS (GROUP 16)

TOTAL NUMBER OF ESTABLISHMENTS IN THE PRETORIA - WITWATERSRAND - VEREENIGING REGION.
Source: - Government Industrial Census Report No. 283/1966 and 304/1968.

The growth rates in the numbers of establishments are highest in the least developed areas of the P-W-V indicating that there is some pressure within the P-W-V for a degree of decentralised development.

Figure 5.5:

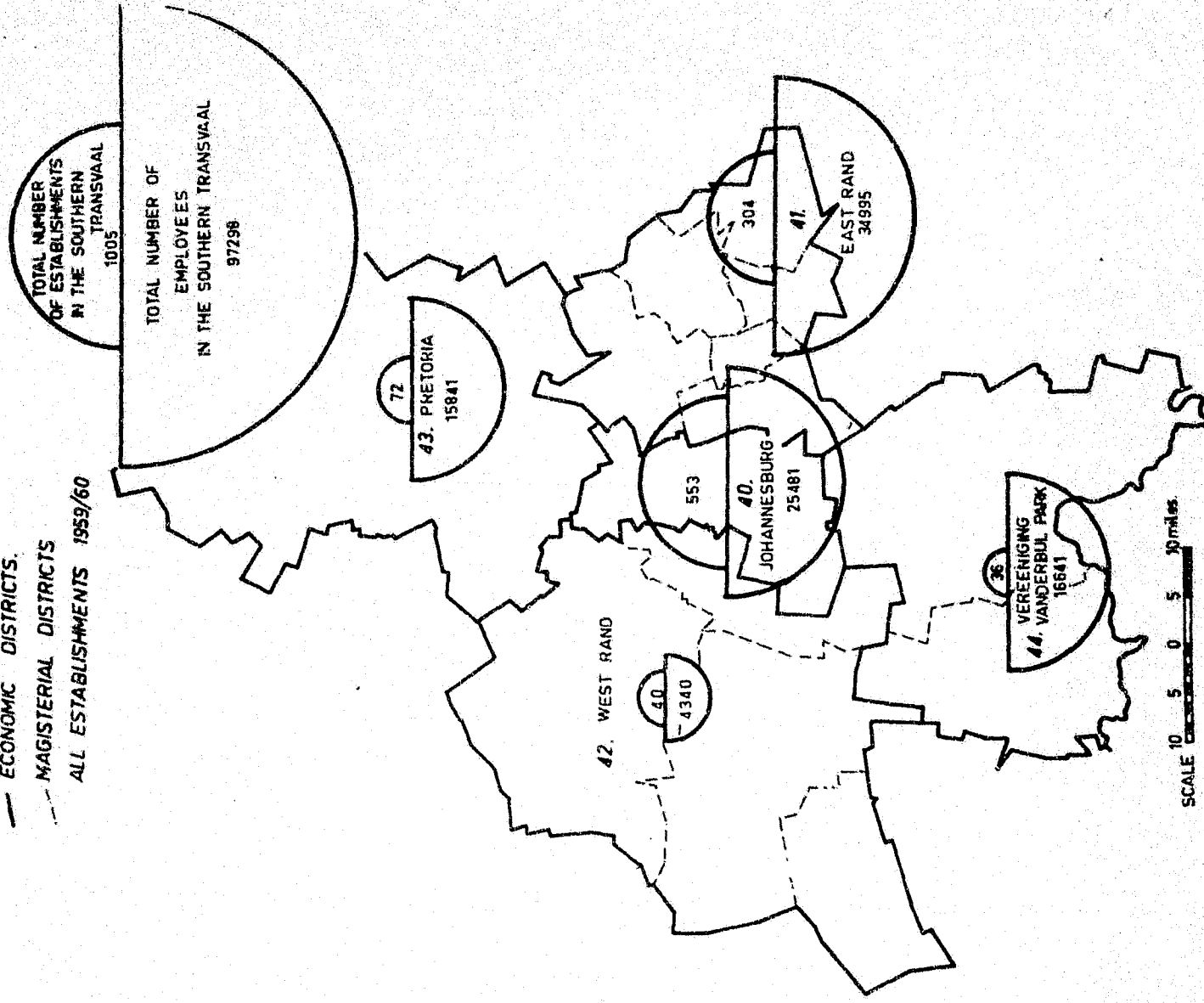
Title: The numerical growth of establishments in the three categories of industry.

Source: Report No. 283, 1966 (I.C. 1959/60), report 304, 1968 (I.C. 1961/2) Bureau of Statistics unpublished information.

<u>Economic region</u>	<u>1959/60 = 100</u>					
	<u>Base metals</u>		<u>Metal products</u>		<u>Machinery.</u>	
	(group 15)		(group 16)		(group 17)	
	1961/2	1962/3	1961/2	1962/3	1961/2	1962/3
40. Johannesburg	100	103.2	109	115.6	111.9	121
41. East Rand	110.2	123	112.8	135.6	128.1	161
42. West Rand	200	250	107.1	160.7	175	175
43. Pretoria	133.3	166.7	112.3	124	166	188.9
44. Vereeniging	122.2	122.2	130	195	75	150

In terms of percentages the growth rates are impressive particularly in regions such as the West Rand and Pretoria (Figure 5.5). However, this is misleading since the most significant growth occurred on the East Rand, where the number of employees rose to 37,071 (Rep. No. 304), more than twice that of Pretoria and 10,000 more than the Central Rand which was second with 27,168 (Figure 5.6 and 5.7 reports 304 and 283). The net output of all industries throughout the P-W-V increased with the sole exception of the base metal industry of Vereeniging and Vanderbijlpark (figure 5.8).

— ECONOMIC DISTRICTS.
 --- MAGISTERIAL DISTRICTS
 ALL ESTABLISHMENTS 1959/60

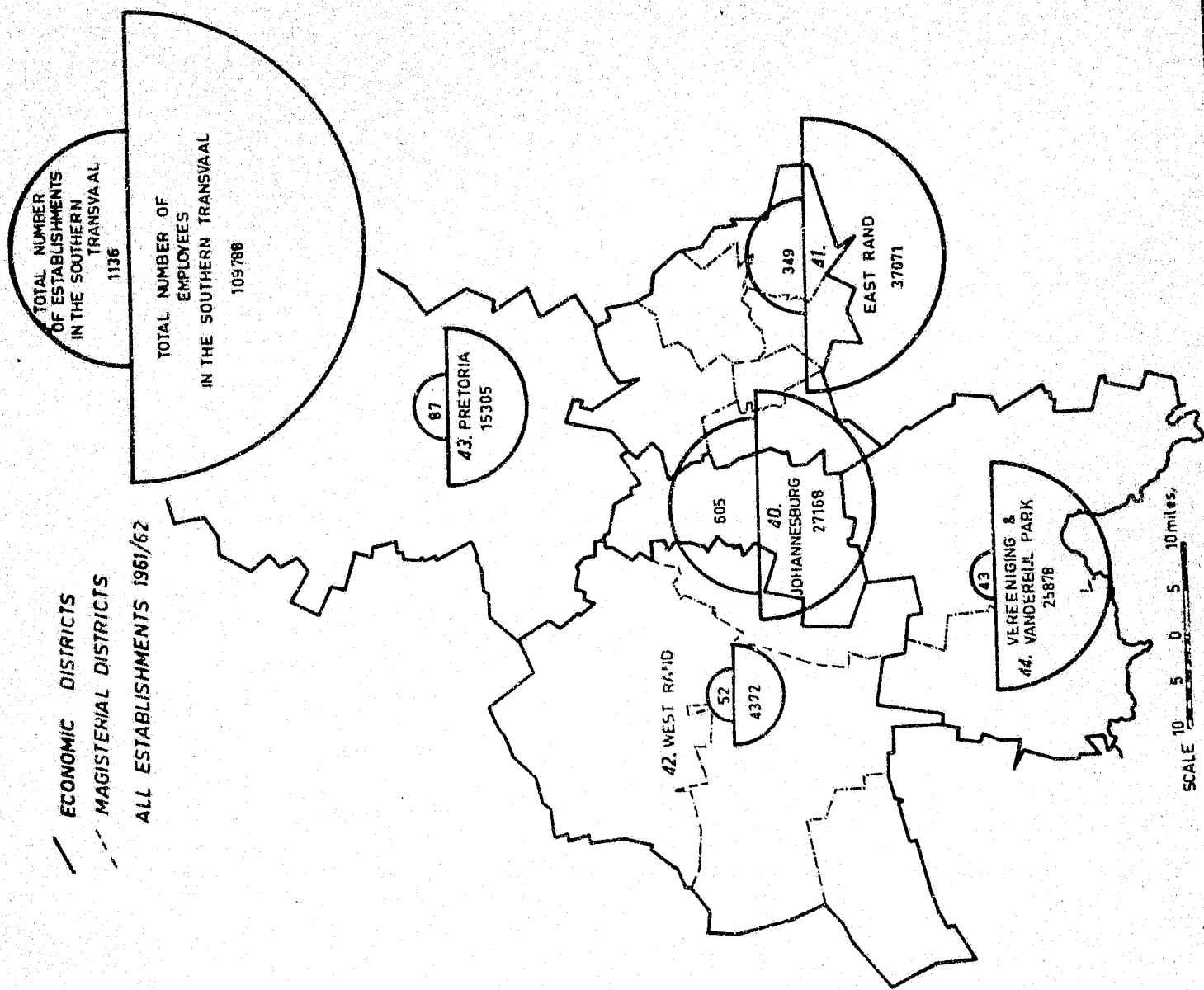


DISTRIBUTION OF THE BASE METAL (GROUP 15) METAL PRODUCTS (GROUP 16) AND MACHINE INDUSTRIES (GROUP 17)
 1959/60.

Source:- Industrial Census Report No. 283 (1966) I.C. 1959/60.

/ ECONOMIC DISTRICTS
 - - - MAGISTERIAL DISTRICTS

ALL ESTABLISHMENTS 1961/62



SCALE 10 5 0 5 10 miles.

Figure 5.8.

Title: The net output of the base metal, metal products and machine industry of the P-W-V 1959/60 and 1961/2 in R000's.

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

Economic region	Base metals (group 15)		Metal products (group 16)		Machinery (group 17)	
	1959	1961	1959	1961	1959	1961
40. Johannesburg	1985	2415	25466	31274	16590	22485
41. East Rand	9736*	10605	27739	34596	21989*	25669
42. West Rand	2000*	2688	3628	3886	1641	3277
43. Pretoria	33741	35496	3516	3529	270	364
44. Vereeniging	52255*	49594	10010	14016	6926*	9973
TOTAL:	99717	100798	70533	87301	47416	61768
Percentages						
40. Johannesburg	1.98	2.39	36.20	95.70	35.00	36.40
41. East Rand	9.77*	10.50	39.35	39.52	46.40*	41.55
42. West Rand	2.01*	2.66	5.15	4.34	3.43	5.35
43. Pretoria	33.82	35.15	4.95	4.04	0.57	0.59
44. Vereeniging	52.42*	49.20	14.35	16.40	14.6*	16.11
TOTAL:	100%	100%	100%	100%	100%	100%

*Estimates

The general pattern followed that set earlier, Vereeniging and Pretoria dominated base metal production followed by the East Rand which exhibited steady growth (figure 5.5). Johannesburg and the East Rand remained the leading metal products and machinery manufacturing areas followed by Vereeniging (figure 5.8).

2.2

Small Establishments:

The distribution of small establishments in the metal and engineering industry is often an indication of some degree of specialisation, since by its nature, metal working tends to be a heavy industrial activity. This is borne out by the fact that very few base metal working establishments can function economically with a small staff unless special high value alloys or precision castings are being produced (figure 5.9).

Figure 5.9:

Title: Number of establishments in the base metal (group 15). Metal products (group 16) and Machine Industries (group 17) after the NDRC 1961 survey.

Source: NDRC Survey 1961.

Economic Region	Number of est. less than 10 workers.			Total workers			Number of estab.			Total est.
	15	16	17	15	16	17	15	16	17	
Industrial Groups										
40. Johannesburg	3	64	17	1138	9377	5026	19	202	68	289
41. East Rand	3	23	9	2612	13134	9736	23	119	52	194
42. West Rand	0	6	1	194	2055	878	1	25	4	30
43. Pretoria	0	7	1	277	2151	135	3	38	4	45
44. Vereeniging	0	4	0	431	8596	1648	6	19	4	29
TOTAL:	6	104	28	4653	35313	17423	52	403	132	593

The Central Rand (Johannesburg) has the largest number of metal products (group 16) and machine (group 17) industries in the P-W-V. It also has the largest number of concerns employing under 10 workers per establishment (table 5.9). The highest number of these are found in the metal products industry where 64 out of 202 or 31.68% employ less than 10 persons as compared to 19.32% on the East Rand, 18.42% in Pretoria, 24% on the West Rand and 21.05% in the Vereeniging Vanderbijlpark area. A similar pattern is observed with the machine industry where 17 out of 68 manufacturers or 25% employ less than ten as compared to none in the Vereeniging Vanderbijlpark region. The East Rand follows closest to the Johannesburg trend with 17.3% of its machine industry employing less than ten workers (figure 5.9).

This trend indicates a degree of sophistication and specialisation of industry in these two areas. They form a marketing core for the metal products and machine industry, with the majority of the establishments located in them (fig. 5.3). The areas with most establishments support the greatest degree of specialisation. This means that people requiring specialised iron, steel or alloyed products will go to Johannesburg or the East Rand for them,

and this will hamper the development of competition in other areas of the P-W-V. This pattern is also indicative of the strength of the market in the location of small industry and the trend towards the centralisation of these industries. The importance of the market in the location of the industry has been stressed by modern economists." Many students of the subject consider the attractions of the market to be so great that they regard the market location now as the 'norm' for modern industry. Locations other than market locations would then need to be explained by cost of moving the product to its consumer. (Estall & Buchanan 1966).

The market area will differ for each concern depending upon competition, transportation, salesmanship and quality of product, but the best market will be where the concentration of potential sales is the highest per unit area i. e. where the most intensive industrial and commercial development is. In the P-W-V this is in the Central and the East Rand.

2.3

Reasons for location of industry.

The industrialist always considers the market when locating any concern. Other considerations will depend upon the type of manufacturing to be done. In the case of the base metal industry, the market is most important followed by nearness to raw materials; the metal products industry listed the market followed by availability of skilled labour. The machine industry lists availability of skilled labour as a prime reason for location, followed by proximity to market (figure 5.10).

Figure 5.10:

Title: Principle reasons for factory location.

Source: NRDC Survey 1961.

<u>Reasons</u>	<u>Base metal</u> (group 15)	<u>Metal products</u> (group 16)	<u>Machine</u> (group 17)
1. Close to main road	0	27	5
2. Close to rail link	3	36	14
3. Availability of skilled labour	8	69	41
4. Availability of unskilled labour	2	30	2
5. Nearness to raw materials	11	43	7
6. Nearness to market	14	101	27
7. Nearness to similar industries	3	11	7
8. Suitable site available	2	39	7
9. Suitable buildings available	1	22	3
TOTAL:	52	407	134

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