

JOHANNESBURG'S

SPHERE

OF

INFLUENCE

BY

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J O H A N N E S B U R G ' S

S P H E R E

O F

I N F L U E N C E

by

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"Geographers are concerned with the study of cities because urban centres constitute distinctive areas. They are the foci of the general patterns of settlement; they are populated to a density rarely encountered in rural areas; they are the portals through which the spatial interchange of goods and ideas connects region with region; they dominate the patterns of economic life. Cities are economically, socially and politically important out of all proportion to the areas they occupy".

Harold M. Mayer.

C O N T E N T S.

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CHAPTER I.

INTRODUCTION.

Urban studies have become an essential part of geographical investigation since the village, town, city and metropolitan complex are all spatial phenomena of varying economic, administrative and social character and activities. Furthermore, the urban centre is such a conspicuous part of the landscape that the geographer with his special way of viewing the environment, should not overlook this man-made feature in its entirety.

Before proceeding to the study with which this work is concerned, namely the city and its interrelationships with its surrounding country-side, it is essential for the sake of completeness and understanding to trace briefly the beginnings and development of urbanism, since these interrelationships originated in the past.

A. BRIEF HISTORY OF URBANISM.

In historical times, dating as far back as the sixth millennium¹ B.C., the origin and development of the town had a direct relationship with the human occupation of the surrounding countryside. Urban communities, since not able to provide sufficient food for themselves, could only exist if the food required to feed their inhabitants could be brought to them from beyond the limits of the settlement. This meant that the producers of the food had to produce above their own needs and the needs of their families.

Once founded², the town had to satisfy the requirements of

1. After K. Davis (1955), but A.E. Smailes (1958) puts the date down as the Fourth Millennium.

2. "Between 6000 and 4000 B.C. certain inventions - such as the ox-drawn plow and wheeled cart, the sailboat, metallurgy, irrigation, and the domestication of new plants - facilitated when taken together, a more intensive and more productive use of the Neolithic elements themselves. When this enriched technology was utilized in certain unusual regions where climate, soil, water, and topography were favourable, the result was a sufficiently productive economy to make possible the sine qua non of urban existence, the concentration in one place of people who do not grow their own food (Davis 1955 p430).

the surrounding country-side. The town became the meeting place of the rural folk, and the market for the farm produce of the neighbouring districts.

The land was in many cases unable to produce far above the requirements of its occupants because agriculture was so unproductive and labour-intensive that it took 50 to 90 cultivators to support one man in the city (Davis 1955). The number of people in the nearby settlement was therefore restricted and furthermore, since these people could not obtain their supplies from distant places owing to the lack of suitable transport. It was for this reason in ancient times that trade amongst places far apart was largely limited to ones which could be reached by ship. The influence was, therefore basically one-sided; the countryside limited the activity and progress of the town in its midst. The town was part of and belonged to the neighbouring rural land.

With the increase in population, the development in technology and man's increasing ability to control his environment, notably in the eighteenth century, and the advent of the Industrial Revolution in Britain, this close relationship between rural area and town began to change in an ever-increasing degree. The land could now produce far above the food requirements of its occupants, and the development of transport both on land and sea, especially the railway, made possible the provision of surplus foods to towns and cities far afield. Fewer people were required on the land to produce the crops; so the towns absorbed the resulting excess manpower.

Cities and towns which had developed at a greater rate than others, owing to historical and geographical factors, developed at an ever-increasing rate and became important centres of transport and industry, e.g., London and Paris. Because of their

size and the services they provided, these towns and cities developed into important central places or urban foci. In many cases the less endowed towns continued their role as market centres for local products and they and their neighbourhoods were included within the large areas supplying the central places. The foci, therefore, no longer dependent on their immediate locality for food developed into important centres providing special services for the surrounding locality.

The modern urban centre is, therefore, not a response to rural activity, but is the result of a force within itself, leading to rapid progress. Industries and services have their origin in it and are there, not only to serve itself and the adjacent countryside, but to serve places farther afield including countries overseas, with which it has some economic bond. Towns and cities have become the hubs around which centres the activities of the surrounding area, both near and far. These areas, the tributary areas, have to satisfy to a greater or lesser extent the needs of the urban settlements in their midst and their progress is linked to the welfare of the urban hub.

At the present time the process of modern urbanisation, which started about 1800, continues at an alarming rate, and there is as yet no indication of a slackening of the rate. It is predicted that by the year 2000, one quarter of the earth's people will be living in cities of 100,000 or more, and that in the year 2050 the portion would be more than half (Davis). Further, the giant city of up to 15 million people has evolved, especially in highly industrialised countries, and it is obvious that its presence has very far reaching effects on its hinterland which does not only comprise its local surroundings, but its influence is felt over a very great part of the earth. Surely, as Philbrick (1957 p299)

.../states..

states, "Such dramatic development of human occupance of the world now more than ever challenges geographic analysis and regional interpretation".

E. OBJECTIVES AND SCOPE OF THE INVESTIGATION.

"Geography, as the study of areal or regional association, is concerned with the areal differences of human activity and their imprint upon the earth's surface" (Dickinson 1961 p2). The urban settlement, being man-made and the seat of human activity, poses four main problems to geographical interpretation according to Blanchard (Dickinson 1961)¹:

- i. The origin of the nucleus of the settlement.
- ii. The reactions of the nucleus to history.
- iii. The present settlement's life and organisation in space.
- iv. The settlement's interrelationships with its surroundings.

This study of Johannesburg is concerned mainly with the role of the contemporary city in the spatial organisation of the larger area it serves and with the area which serves it. Thus, the study calls for a geographical analysis of Johannesburg's sphere of influence, and its significance as a regional focus.

Why study Johannesburg? When considering the urban settlements and cities of countries where civilisation has had a long standing, and urban occupance dates back many hundreds of years and even milleniums, then the almost eighty years of Johannesburg's existence should appear insignificant. In this short span of years however, has sprung up a major city of more than 1,000,000 inhabitants, the focus of a rapidly expanding metropolitan region and the heart of economic activity in the Republic of South Africa. It is apparent that such a man-made phenomena has had far reaching effects, and still has, on human activity and spatial organisation

1. See also H.M. Mayer - 1954 p143.

of its surrounding territory and its effects are noticeable throughout the country.

A reasonable amount of research, not all geographic in nature, has been done on Johannesburg, its environs and the Southern Transvaal as a whole, although not nearly enough, but very little has appeared on the lines of the present investigation and it is therefore, essential that the city's interrelationships with its surroundings be examined from the geographer's standpoint.

Subject terminology makes for various terms, with overlapping meanings, which are used in respect of the tributary and supporting areas,

City Region: ".....area that is functionally dependent on the city " (Dickinson 1956 pl65).

Urban Field: A town "....becomes the focusing point for a district, the seat of central services which draw to it the population of the surrounding area." Smailes (1947 pl51) calls this area in preference to "sphere of influence" and "umland" the "urban field".

Umland: "The area contiguous to the centre (extending to and including its suburbs or 'urblets') whose total economic and cultural activities are essentially one with those of the primary centre - (Van Cleef 1941).

Hinterland: "The area adjacent to the trade centre (extending to and including its satellites) within which economic and some cultural activities are focused largely on the primary centre" (Van Cleef 1941).

Complementary Region: "The region for which a central place is the centre...; it includes relationships in both directions - town to country and country to town " (Berry & Pred 1965 pl5).

/...The

The reason for selecting the term "sphere of influence" instead of those defined above, is because the term is more inclusive than the others and is therefore better suited to the purpose of the study. The other regions appear to be dependent to a greater or lesser extent on the urban settlement on which they are focused, and in so doing their areal extents are limited, whereas the area of the sphere of influence is greater or at least of similar coverage than the others. The sphere delimited is not only dependent on the focus, but is influenced to a major or minor degree, depending on the criteria used to delimit the boundary, by the focus. Thus, the sphere of influence will of necessity include the regions as defined by the other terms.

What is "influence?" According to the Oxford dictionary it is the exertion of action of which the operation is unseen, except in its effect, by one person or thing on another, and this effect is noticeable on the condition, the development, the modification and determination of the agents involved. The sphere of influence is, therefore, that area (sphere) which is effected (influenced) by the urban focus, in this case Johannesburg, and which in turn effects the focus.

What, within the field of investigation, is capable of exerting influence? This question will be answered later when the criteria used to delimit the sphere of influence are discussed, but it may be stated here that there are two major groups of factors, namely (i) those factors which influence the focus and (ii) those which are influenced by the focus. Further, we must not lose sight of the fact that we are interested mainly in the factors and their effects rather than in the factors themselves.

The definition and delimitation of the sphere of influence of Johannesburg by using certain carefully selected criteria, are not

.../merely

merely an attempt to establish a multiple-feature region for the sake of the region itself¹, but is designed to cast light on the characters and functions of both city and surrounding rural environment, thereby explaining some of the more important areal organisational aspects resulting from these urban-rural interrelationships. Since Johannesburg is the largest of the South African cities, it is obvious that it will have a large sphere of influence, and that in its sphere will be included many smaller urban centres each with its own tributary and supporting areas.

A large choice of criteria exists from which a selection is to be made for delimiting the sphere of influence. Those selected will be evaluated, as well as their application in the light of similar studies carried out elsewhere.

C. METHOD OF INVESTIGATION.

1. The gathering of data pertaining to urban and rural population, activities and functions from official publications, other reliable sources and interviews;
2. A study of maps appearing in the various sources and the compilation of original maps and diagrams;
3. Mapping and analysis of the criteria employed in delimiting the sphere of influence;
4. Identification of zones of decreasing intensity for each criterion, and where possible, zones based on combinations of related criteria, e.g. administrative criteria.
5. In conclusion, when all criteria are examined, a synthesis of the findings, resulting in the identification of a series of zones in which

.../the

1. The region is "a device for selecting and studying areal groupings of the complex phenomena found on the earth So defined, a region is not an object, either self-determined or nature-given " (D. Whittlesey 1954 p30).

the influence of Johannesburg decreases in intensity outward. These zones are indicative of the nodal significance of Johannesburg around which economic, social and administrative functions are organised.

D. PROBLEMS ENCOUNTERED.

1. This study deals with Johannesburg, but owing to the nature of the Witwatersrand urban complex, Johannesburg can seldom be isolated from its regional context, thus a measure of only its influence is not always possible.
2. The major problem is the total lack of suitable statistics in some instances or where statistics are available they are often unprocessed or of insufficient detail, thereby handicapping sound quantification and analysis.
3. In certain instances, e.g., newspaper sales, data are available only for areas larger than Johannesburg itself, making it impossible to gauge Johannesburg's particular position in terms of such data.

C H A P T E R I I .PHYSICAL BACKGROUND.A. GEOLOGY.

The sole reason for the Witwatersrand and specifically Johannesburg's siting and initial development was the presence of the gold bearing reefs of the Witwatersrand System, since the geology determined the positioning of the shafts and surface works, thereby locating the urban centres. The gold occurs primarily in the Main Reef series of which the Main Reef group, notably the Main Reef and Main Reef Leader, is the most important. The reefs dip steeply to the south, from more than 70° at or near the surface to about 20° at great depths. Technically, mining is difficult since the bands of payable ore are generally narrow. Further, the angle of dip results in mining at deep levels causing problems of heat and ventilation control as well as in the handling of ore, thus increasing the costs of production. 'Pressure bursts' also increase with depth. The southward dip of the reefs led to mining shifting in that direction resulting in permanent problems created for the expansion of townships which have developed to the south of the mining belt.

B. TOPOGRAPHY (FIG. I).

Typical of urban development on the Witwatersrand, Johannesburg straddles the Vaal-Limpopo watershed which in this area consists primarily of two discontinuous parallel ridges frequently attaining heights exceeding 5800 feet. Altitudes within the Johannesburg municipal area and the surrounding areas seldom fall below 5000 feet. Apart from local influences such as the ridges not allowing for residential and other developments and the effect of climate north of the ridges, the topography has not influenced the role of Johannesburg as a regional focus in any major .../way.

way. The ridges protect the area to the north from the cold south winds in winter, "which bring both lower temperatures and dust from the mine dumps.... giving it an almost subtropical climate which is ideal for garden cultivation" (N.R.D.C. 1958 p6). An additional effect is that the Vereeniging - Pretoria railway line skirts the eastern edge of the ridges which allow for an easy passage thus laying the foundations of Germiston as the largest railway junction in South Africa. The fact that land with slopes of less than 1:50 is rare in the Johannesburg area has resulted in industries which require large sites tending to establish on the East Rand where, due to the absence of the ridges, the land is gently sloping.

C. DRAINAGE (FIG. 1).

The drainage pattern around Johannesburg is economically significant. Firstly, the Klip river gathers the water in the area south-west of Johannesburg but then turns eastwards to join the Natalspruit, consequently depriving the south-western area of surface drainage and limiting agricultural potentials. Secondly, the abundance of small perennial streams to the north and north-east of the city favour market gardening and fruit productions (Cole 1957).

Initially the dolomites south of the Rand supplied water for the rapidly developing towns, but soon after 1900 more water was required and the attention was turned to the Vaal river which still supplies the water needs of an area very much larger than Johannesburg, including Pretoria and the O.F.S. goldfields.

D. CLIMATE.

Because agricultural pursuits are followed in and near to Johannesburg, a brief description of the climate is necessary. A typical continental climate is experienced with cold and dry winters and due to the altitude warm summers, with 85 - 90% of the rain falling during the latter season (TABLE I).

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.../TABLE I.

TABLE 1: Temperature and Rainfall Data for Johannesburg
(5752 feet) (N.R.D.C. 1957 p5).

Mean Monthly ($^{\circ}$ F).				Rainfall p.a. (inches)
January	July	Max. Jan.	Min. July	
68.5	50.5	88.2	29.5	30.3

E. VELD AND SOIL TYPES.

The natural vegetation consists of grassland (Bankenveld), but due to the "poor, acid and either stony or sandy" soil, "the grass cover is sour and wiry and virtually ungrazable in winter" (N.R.D.C. 1956 p5). The soils are also regarded as inferior for crop cultivation.

It is apparent that the area described above, if an economic stimulus in the initial form of gold were not present, the physical environment has very little to offer its inhabitants.

F. CONCLUSION.

The Johannesburg area presented an unpromising landscape of ridges, cold winters and poor soils and veld, and in the absence of economic stimuli, suitable only for extensive grazing. Although fuel and raw materials were not available in its immediate locality, these were available once gold was discovered; coal from the East Rand and Witbank, iron at Pretoria and dolomite at Lyttleton.

C H A P T E R I I I .

HISTORICAL AND ECONOMIC BACKGROUND

A. HISTORY.

Although gold was found as early as 1853 in the vicinity of the Witwatersrand, a sparsely settled area, it was only in March 1886 that the Main Reef was discovered on the farm Langlaagte, two and a half miles south-west from Johannesburg's present city centre. This was the beginning of this mining and industrial hub of South Africa. It was in this year that the township of Johannesburg was proclaimed, which according to J.X. Merriman (Jan. 19, 1887) was "the centre of the Wit Waters Randt mining district, though really it ought to be called the 'speculating district for of mining proper there is little or nothing'¹ It is a collection of shanties with a corrugated iron house or two, perched some 6,000 feet above sea level" (Lowson 1960 p234). Even at this almost insignificant beginning of the gold mining industry Johannesburg proved to be the regional focus. Only a few months later (Sept. 27, 1887) Merriman wrote: "The place has grown indescribably, and is now quite a large collection of iron shanties, with rich houses here and there"(Lowson 1960 p283-4), with a population of about 3,000 whites.

The occurrence of the gold bearing strata led not only to the siting of Johannesburg, but also to the establishment of a number of other towns on the Rand, some being of relatively recent origin. To serve the gold mining belt and to link the Rand to the coalfields discovered in 1887 at Brakpan and Springs, a railwayline was completed in 1889 from Springs to Randfontein. During the

.../following

1. Gold production commenced in May 1887.

following four years Johannesburg became linked with the ports of Cape Town, Lorenzo Marques and Durban as well as with Pretoria.

B. ECONOMIC DEVELOPMENT.

Gold proved to be the key to the development of the Rand, not only from the mining activities associated with it but also resulted in the establishment of metal and engineering industries, but "after the First World War manufacturing industry as a whole had increased the range of its products and developed new markets to such an extent that it was able to free itself from its former heavy dependence on gold mining" (Fair & Mallows 1959 pl31-2). Industry in South Africa expanded rapidly so that by 1960 the position of Johannesburg in relation to the rest of the country was as follows:

TABLE 2: Industries, 1959-60 (Pureau of Statistics 1965).

	Industrial ⁺ Establish- ments Total	Manufacturing Establish- ments Total	Industrial Employment Total	Manufacturing Employment Total
South Africa	14,185	10,192	745,855	619,011
S. Transvaal	5,723	4,190	349,289	283,933
(% S.A. Tot.)	(40)	(41)	(47)	(46)
Johannesburg	3,364	2,683	153,914	119,905
(% S.A. Tot.)	(24)	(26)	(24)	(19)

⁺ Includes Manufacturing, Construction, Laundries, Dyeing and Dry Cleaning.

Not only did Johannesburg, the focus of the Witwatersrand, expand industrially, but rapid development of other typical urban functions took place so that the focus today is essentially metropolitan in character as is seen from the high degree of employment concentration (Whites only) in commerce (30.3%) and services (21.4%) as compared to most of its other functions (TABLE 3).

/ Although....

Although Johannesburg's importance in its regional context will be dealt with later, it may be indicated here that 56% of the Whites, 73% of the Coloureds and 75% of the Asiatics that are gainfully employed on the Witwatersrand are employed in the magisterial district of Johannesburg.

"Johannesburg occupies an economic position far more important than the size of its population suggests" (Van Waasdijk 1965 p47). With about 13% of the total Whites and about 7% of the total South African population Johannesburg is responsible for 30% of the wholesale business, 18% of the retail trade, 40% of the turnover of municipal produce markets and 35% of the financial and banking business in South Africa (Van Waasdijk 1965).

The East-West axis of the Southern Transvaal, that is, from Springs to Randfontein was established by the occurrence of gold bearing strata. The eastern arm possessed certain advantages, namely, an undulating topography more suited to large industrial plants, all the important railway lines converged at Germiston, proximity to the coal fields further to the east, and larger gold mining developments. These advantages led to an imbalance in the structure of the East-West axis in that the industrial section of the axis developed from Johannesburg eastwards. With the role which Johannesburg assumed as focus the eastern and western arms became commuting zones as will later be indicated in greater detail.

The North-West axis is far less developed than the East-West axis since its development is based on the communications linking Pretoria and Vereeniging to the Rand. "The two mid-sections of the axis between the centres are still relatively undeveloped but recognizable filling in of these gaps is proceeding by the growth of small industrial nuclei and non-white residential areas along the main roads" (Fair & Mallow 1959 p134).

/Functions...

Functions of a governmental nature predominate in Pretoria (TABLE 3) although the development of the Iron and Steel Corporation has contributed greatly in making for industrial activity. In the south coal and water allowed for power generation, which resulted in the establishment of heavy industry, iron and steel (Isacor) and an oil-from-coal plant (Sasol) in the Vereeniging - Vanderbijlpark - Sasolburg area (TABLE 3).

"These factors of power and water, roads and railways, and the growing infilling of the settled area have increased the interdependence of the nuclei and so have bonded together more securely the various components of the metropolitan structure of the Southern Transvaal. Furthermore, Johannesburg and Germiston, at the crossing of the North-South and the East-West road and rail axes are strategically placed in relation to the whole Southern Transvaal region" (Fair & Mallows 1959 p134).

TABLE 3: Percentage Employment in the Major Functions in the P.W.V. Region, 1960 (Whites only).

Functions	Johannesburg.	Pretoria	Vereeniging	Sasolburg.
Commerce	30.3%	16.8%	10.9%	55.8%
Manufacturing	24.8%	20.3%	58.2%	51.1%
Services	21.4%	41.3%	12.4%	8.6%

+ Computed from Population Census, 1960 (Bureau of Census 1962a).

C. CONCLUSION.

The presence of gold and the longevity of mining operations allowed for the establishment of the Witwatersrand and its continued expansion. Up to the late 1930's goldmining was the chief activity, but the Second World War accelerated the shift to industrial activities. Today, in the light of a declining mining industry, manufacturing and commerce are of the utmost importance, and together they assure Johannesburg's exceptional position and supremacy in the South African economy.

C H A P T E R I V .

JOHANNESBURG'S NATIONAL AND FUNCTIONAL SIGNIFICANCE.

A. ECONOMIC BASE.

An urban centre does not live unto itself. It has an area which it serves, the market or trade area. In turn it has an area which supplies its needs. Combined, we may call these areas the "sphere of influence" of the centre. Thus, an urban centre has an economic base. "A portion of the economic effort in a city is supported by the non-local demands. But these city people in turn have need for local services, and thus a second urban function is discernible - that which caters to the needs of the local inhabitants" (Alexander 1954 p246). The first is the centre's economic foundation and earns money for the city and is regarded as "basic". "Non-basic" functions do not form part of the export trade "but sell their produce or capital to local basic undertakings, basic employees, other non-basic activities and their employees, and to members of the community who are not gainfully employed (L. Green - 1957b p8). Alexander recognises some of the shortcomings of the basic-nonbasic concept but notices the value the concept has for urban geographers, that it "provides a view of economic ties which bind a city to other areas it permits the most satisfactory classification of cities in terms of regional functions provides a new ratio which may have significance in differentiating types of cities (and).... also enables a new classification for individual economic endeavours" (Alexander 1954). Criticisms have been lodged: " ... That the economic base concept is simply a descriptive tool; ... merely a description of certain limited aspects of the economic functioning of a city ..." (Roterus & Calef 1955 p17) and by C.M. Tiebout (1956). Alexandersson draws the distinction between "production for the .../city's

city's own inhabitants ... (that is) city serving production (and) the *raison d'être* of the city city forming industries. They (the latter) bring money to the city, which is used to pay for the imports of such goods and services in which the city is deficient" (Alexandersson 1956 p15). He notes that certain industries are partly city serving and partly city forming, and that "most ubiquitous industries are both city forming and serving. Our problem is to determine the ratios of the two components" (1956 p17). He attempts a solution by determining what ratios in different industries are a necessary minimum to supply a city's own population with goods and services and the type which are produced in every normal city (1956 p17). Similar to the latter concept, though conceived independently, is the "minimum requirements" method of Ullman and Dacey, ".... a quantitative statement which closely approximates the minimum percentage of a labour force required in various sectors of its economy to maintain the viability of an urban area " (1960 p122). The method is difficult to apply to South Africa since sufficiently detailed statistics are not available for individual centres to enable the determination of average values against which Johannesburg's characteristics can be interpreted.

Green employs the "index of 'surplus' workers" which is an attempt "to indicate the importance of an industry to a locality relative to the importance of the industry to the nation.... For if the importance of an industry to a locality is greater than its importance to the nation, it is almost certain to be a local exporting industry that produces more than can be consumed locally. The amount exported can most easily be measured in terms of employees 'surplus' to local requirements (assuming that national and local patterns of consumption are identical " (L. Green - 1957b p8). Such an index will indicate the significance of the centre in a particular industry to the rest of the country.

/The

The two forms of the index¹ are as follows:

Index of "surplus" workers

Total employment index of
"surplus" workers:

$$S = \frac{ei - \frac{et}{Et} Ei}{et}$$

$$S = \frac{ei}{et} - \frac{Ei}{Et}$$

Where S = "surplus" workers

ei = the regional employment in the industry concerned;

et = the total regional employment in all industries and economic activities;

Ei = the national employment in the industry concerned; and

Et = the total national employment in all industries and economic activities.

"If the denominator et is removed from the first form of the index, the result gives the absolute number of 'surplus' employees locally engaged in the industry concerned, i.e. the net export workers. It is important to note that both indices yield net export workers in the industry concerned, thus making allowance for imports into the locality or region in that industry, and providing a means of measuring the relative net earning capacity of the industry in terms of employment" (L. Green 1957 p9).

Employing the indices to measure the difference between basic and non-basic economic activities the following results emerge:

/ TABLE 4..

1. See L. Green (1957b p8) for merits and implications of the index.

TABLE 4: The Economic Base of the Witwatersrand Metropolitan Region¹ (W.M.R.), and the Inner Metropolitan Zone (I.M.Z), c.1951 (L. Green 1957 p10 & 13).

Economic Activity	Actual Employment		Absolute No. of Net "Surplus Workers"	Total Employment Index of Net "Surplus" Workers		
	No.	%		No.	%	
Gold Mining	290,772	39.96	226,545	25.68	54.43	W.M.R.
	123,532	19.27	76,871	11.99	26.14	I.M.Z.
Secondary Industry	241,383	27.36	119,057	13.49	28.59	W.M.R.
	215,658	33.65	126,788	19.78	43.11	I.M.Z.
Commerce & Administration	192,241	21.79	70,634	8.01	16.98	W.M.R.
	172,604	26.93	84,256	13.15	28.66	I.M.Z.
Other ⁺	121,444	18.95	6,146	.96	2.09	I.M.Z.
Totals	724,396	82.11	416,236	47.18	100.00	W.M.R.
	633,238	98.80	294,061	45.88	100.00	I.M.Z.
Agriculture	10,314	1.17	-405,084	-45.92	- 97.33	W.M.R.
	7,727	1.20	-294,061	-45.88	-100.00	I.M.Z.
Other ⁺	147,551	16.72	- 11,152	- 1.26	- 2.67	W.M.R.
Totals	157,865	17.89	-416,236	-47.18	-100.00	W.M.R.
Grand Totals	882,261	100.00	-	-	-	W.M.R.
	640,965	100.00	-	-	-	I.M.Z.

⁺Including government, educational, domestic and other service activities.

Considering employment in 1951 in the Witwatersrand metropolitan region, Green's findings indicate that gold mining was twice as basic as secondary industry and three times as basic as commerce and administration to the regional economy and accounted for more than 54% of the region's income capacity measured in terms of employment. The other two groups combined contributed nearly 46% though they employed 10% more workers.

Comparing the above to values in the inner metropolitan zone a remarkable change was found. Secondary industry and commerce

1. See FIG. 22' p 109

and administration surpassed gold mining in basicness to the regional economy, the total employment index of the "surplus" workers being 43.11%, 28.66% and 26.14% respectively. This is a reflection of the importance of the Central Business District (C.B.D.) of Johannesburg as the metropolitan focus in terms of service activities provided "not only to the inner metropolitan zone itself but as 'exports' to the outer metropolitan zone" (L. Green 1957b pl4). Imports were primarily agricultural in nature.

TABLE 5: The Economic Base of the Johannesburg Magisterial District, 1960.

Economic Activity.	Actual Employment.		Absolute number of Net "Surplus" Workers.	Total Employment Index of Net "Surplus" Workers	
	No.	%		No.	%
Commerce	100,159	18.6	56,833	.1068	56.1
Manufacturing	109,360	20.3	45,109	.0835	43.9
TOTAL	209,519	38.9	101,942	.1903	100.0
Mining	33,969	6.3	- 23,364	-.0439	23.1
Others	295,407	54.8	- 78,578	-.1464	76.9
Total	329,376	61.1	-101,942	-.1903	100.0
Grand Total	538,895	100.0	-	-	-

Source: Population Census, 1960. (Sample tabulations).

In focussing our attention on Johannesburg, and employing the same indices as above, the economic base of the city in 1960 appears different from that of the inner and outer metropolitan zones (TABLE 5). Commerce is most basic although less people are employed than in manufacturing. Mining, owing to the increasing importance of the above two activities and the decline of mining

.../activities

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