

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20723
BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

Batch 57

1. SUBJECT CLASSIFICATION	A. PRIMARY	TEMPORARY
	B. SECONDARY	

2. TITLE AND SUBTITLE
Unemployment in Jamaica and the contribution of the bauxite-alumina industry to the employment problem

3. AUTHOR(S)
Nelson, L.G.

4. DOCUMENT DATE 1974	5. NUMBER OF PAGES 97p.	6. ARC NUMBER ARC
--------------------------	----------------------------	----------------------

7. REFERENCE ORGANIZATION NAME AND ADDRESS
Cornell

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)
(Thesis M.S.--Cornell)

9. ABSTRACT
(Employment R&D)

10. CONTROL NUMBER PN-AAD-556	11. PRICE OF DOCUMENT
----------------------------------	-----------------------

12. DESCRIPTORS	13. PROJECT NUMBER
	14. CONTRACT NUMBER CSD-3158 211(d)
	15. TYPE OF DOCUMENT

PN-A-10-558

CSD-3/58 246
Cornell

UNEMPLOYMENT IN JAMAICA AND THE CONTRIBUTION
OF THE BAUXITE-ALUMINA INDUSTRY TO THE
EMPLOYMENT PROBLEM

A Thesis

Presented to the Faculty of the Graduate School
of Cornell University for the Degree of
Master of Science

by

Locksley George Nelson

June, 1974

BIOGRAPHICAL SKETCH

The author was born in Kingston, Jamaica on the 11th December, 1947. He attended high school at Cornwall College in Montego Bay, from which he graduated in 1964. In the same year, he was awarded a Jamaican Government Scholarship to pursue studies in Engineering in England. He graduated from Poole College of Technology in 1966 with an Ordinary National Certificate in Mechanical Engineering. For the following three years he attended Bournemouth College of Technology and pursued a course of study leading to the Higher National Diploma in Production Engineering. In 1969 he returned to Jamaica and was employed as a consultant Engineer at the Jamaica Industrial Development Corporation.

To

Monica and Yvonne

My mother and wife

and for

the 26,000 unemployed Jamaicans whose
jobs were exported by the bauxite-alumina
companies in 1972.

ACKNOWLEDGEMENTS

I would like to express my appreciation to Professor V. Stoikov, Chairman of my Graduate Committee who so patiently supervised the writing of this thesis, Professor J. Vanek, my Minor Member, who helped me to prepare for this task and Professor T. Davis, who so kindly substituted, at very short notice, for Professor J. Vanek who had to go abroad before the completion of this work. This study could not have been completed without the financial support from the Program on Policies for Science and Technology in Developing Nations at Cornell University.

I would also like to thank Alcan (Jamaica) Ltd., the National Workers Union and the Jamaican Industrial Development Corporation for their assistance in carrying out the research required for this study. Further, I thank my many friends for their suggestions and encouragement, as well as Mrs. M. Rash for her invaluable assistance in typing this thesis. Finally, I want to thank my wife, Yvonne, for assisting in the proof-reading, and most of all, for her support and tolerance during the researching and writing of this thesis.

TABLE OF CONTENTS

List of Tables	vii	
CHAPTER	PAGE	
I	INTRODUCTION	1
	1. Economic Background	1
	2. The problem	4
	3. Plan of Study	6
II	POPULATION, LABOR FORCE, EMPLOYMENT AND THE UNEMPLOYMENT	8
	1. Population Growth	8
	2. Rate of Natural Increase	9
	3. Emigration	11
	4. Geographic Distribution of the Population Urban/Rural	13
	5. The Labor Force, Employment and Unemployment	17
	6. Labor Force	18
	7. Age Distribution of the Labor Force	21
	8. Sectoral Distribution of the Classified Labor Force	18
	9. Growth of Employment and Unemployment	25
	10. Characteristics of the Unemployed	26
	11. Summary and Conclusion	29
III	THE BAUXITE-ALUMINA INDUSTRY	32
	1. Institutional Background	32
	2. Growth of Bauxite Production	36
	3. Growth of Alumina Production	40
	4. Impact on the Economy	44
	5. Conclusion	49
IV	THE DIRECT EMPLOYMENT EFFECT OF THE BAUXITE-ALUMINA INDUSTRY	
	1. Introduction	50
	2. Direct Employment	50
	3. Wages and Productivity	62

TABLE OF CONTENTS (CONT'D)

CHAPTER	PAGE
4. Corporate Decision-Making and the Distribution of Benefits	70
5. Conclusion	78
V SUMMARY AND CONCLUSION	80
BIBLIOGRAPHY	86

LIST OF TABLES

TABLE	PAGE
2.1 Birth and Death Rates 1952-1972	10
2.2 Births, Deaths and Net Emigration, 1952-1972	12
2.3 Population by Parishes 1943, 1960, 1970 Census	15
2.4 Dependency Ratios - 1943, 1960, 1970	17
2.5 Growth of Population and the labor force	19
2.6 Labor force by Age group, 1960, 1972	21
2.7 Sectoral Distribution of the Classifiable Labor Force by Industry Groups 1943, 1960, and 1972	23
2.8 Employment and Unemployment 1943-1972	25
2.9 Unemployed Labor Force by Age Groups and Sex; Female Labor Force as % age of Total Labor Force by Age Groups, 1972	26
3.1 Alumina Operations in Jamaica (1972)	35
3.2 Summary of Bauxite Production 1952-1972	37
3.3 Jamaica's Contribution to World Bauxite Production	38
3.4 Alumina: World Production by Countries (Thousand Short Tons)	41
3.5 Quantity and Nominal Value of Exports of Bauxite and Alumina, 1952-1972	43
3.6 Local Payments by the Bauxite-Alumina Companies, Current and Capital	45
3.7 Share of Intermediates and Value Added in Gross Output National and Foreign Content	48
3.8 Percent Share of Wages, Taxes and New Profit and Depreciation in Value Added in the Bauxite-Alumina Industry	48

4.1	Employment Provided by the Bauxite-Alumina Industry in Jamaica, 1960-72	51
4.2	Annual Rate of Growth of Output and employment in the Jamaican Bauxite-Alumina Industry, 1960-72	54
4.3	Index of Growth of Output Employment and Labor Productivity in the Jamaican Bauxite-Alumina Industry, 1960-72	56
4.4	Estimates of Employment Levels in the Bauxite-Alumina Industry in Jamaica, had all Bauxite Been Converted into Alumina, 1960-72	61
4.5	Growth of Productivity, Real and Money Wages in the Bauxite-Alumina Industry, 1960-72	63
4.6	Gross Product Per Worker by Industrial Sectors, 1972	64
4.7	Index Number of Inter-Industry Differentials in Average Earnings of Unskilled Workers	67

CHAPTER I

INTRODUCTION

1) Economic Background

Jamaica has been and continues to be a predominantly agricultural society developed out of a system of slavery based on large plantations. The sugar plantation has been for two centuries the typical unit of production. Each plantation was allied to a British merchant house which provided it with capital and supplies and absorbed its output for sale on the British market. Labor was provided in the form of enslaved Africans. The absolute amount and the sex composition of the slave population was determined on the basis of the large amounts of labor required to maintain the sugar plantations. The chief economic effects of this system were an inherent structural dependence on metropolitan capital, supplies and markets and an inherently hostile labor force.¹

Following the abolition of the slave trade and slavery in 1834, the freed labor force settled on much of the mountainous land which, because of its lower quality had not been acquired by the plantations. Some of the plantations which could not compete under

1. Eric Williams, Capitalism and Slavery. Chapel Hill, 1944.

changed labor conditions were also purchased by the new peasantry and thereby joined the peasant sector. Subsistence farming in this section resulted in an enormous expansion of domestic food production.² However, because of the shortage of land, most of the freed labor force had to continue working on the plantations. The subsistence system prevailed side by side with the large plantations which provided the export crops (sugar and banana).

By the time of the general uprising in the West Indies and the resultant Moyne report³ the dualism in the agricultural sector was firmly established. Of course, with the growing population and lack of land for further settlements, employment would have to be provided by the new agricultural sector. However, by the 1940s, the population had increased to the point where agriculture could not absorb any more of the labor force, unless it was prepared to remunerate agricultural workers on the basis of a zero marginal productivity of labor. The simple fact was that the land/population ratio was just too small.

The Moyne Commission failed to provide any meaningful solution to the nation's economic problems and particularly the fairly imminent unemployment problem. Nonetheless, the riots of the late 1930s did lead to full internal self-government along with full adult

2. W. K. Marshall, "The Rise of the Peasantry in British West Indies," Social and Economic Studies, Sept. 1968.

3. The Moyne report was the report submitted by the Moyne Commission which was a Royal Commission sent to the British West Indies to investigate the causes of the wide spread riots of the late 1930s throughout the region and to make recommendations for improving the social conditions in the British West Indies.

suffrage. In 1944, Jamaica had its first truly democratic election. The new all-Jamaican government was now faced with the mammoth task of designing a strategy for the economic development of the nation.

By the late 1940s, it was clear that the government had decided that industrialization was to be the road to Jamaica's development. In light of the shortage of skilled labor, capital and entrepreneurs at that time, the government decided on a strategy of industrialization based on Puerto Rico's "operation bootstrap" and Professor W. A. Lewis's celebrated model for economic development in countries with unlimited supply of labor.⁴ This approach has grown to be known as "industrialization by invitation." This system basically involved the establishment of industrial incentive laws which were designed to make Jamaica an attractive investment area to foreign investors. In order to efficiently execute this process of industrialization by invitation, the Jamaican government established the Jamaica Industrial Development Corporation (J.I.D.C.) in 1948. The J.I.D.C. is a special statutory board whose responsibility it was to promote and facilitate foreign investments in Jamaica. The foremost argument presented in support of this system was that it provided all the necessary requirements for industrialization, requirements that Jamaica did not have. Moreover, the new industries would themselves generate new capital which could then be used to create even more industries. In other words, the system was alleged to be self sustaining.

4. W. A. Lewis, "Economic Development with Unlimited Supplies of Labor," Manchester School of Economic and Social Studies, Vol. XXII, No. 2, 1954.

The government made massive propoganda about these new industries and boasted the system of economic development as the very best and one capable of solving most of the country's economic problems. These pronouncements certainly, if nothing else, initiated a continuous migration of people from the rural agricultural areas to the urban centers where it was alleged that this industrialization would begin.

The bauxite industry was introduced into Jamaica in about 1951 and has grown to be by far the most important of all industries introduced under the system of "industrialization by invitation." This fact makes the bauxite industry a prime test of the impact of the system of industrialization on the economic development of Jamaica. There is one special feature of the bauxite industry, which has only just begun to be understood by Jamaicans and therefore probably not understood at the time of the introduction of the industry. The industry is owned and controlled by vertically integrated multinational corporations (M.N.C.). Therefore, in this study we will also attempt to assess the importance of this feature of the industry on the developmental potential of the industry.

2) The Problem

Professor Lewis, in discussing his model, made it very clear that the establishment of new industries was an essential part of a program for agricultural improvement.⁵ As early as the 1930s, it was clear that for agriculture to provide a decent standard of living for

5. W. A. Lewis, "The Industrialization of the British West Indies," Caribbean Economic Review, No. 2, May, 1950.

workers, the number of people working in agriculture had to be significantly reduced and labor productivity increased. The new industries were therefore designed to absorb the displaced agricultural workers and the bulk of the future entrants to the labor force. Manufacturing industries were called upon to supply only a fraction of the required jobs, while tourism and emigration would account for the remainder of the jobs.

Since the initial attempts at industrialization during the late 1940s, Jamaica has, in general, experienced very high rates of growth. However, when one examines the indices of economic development, Jamaica has not experienced any significant level of development; the most obvious failure being in the area of employment. The unemployment rate in 1972 was only about three percentage points less than the rate for 1943, although it did have downward fluctuations during the 29 year period. This rate persists in spite of the massive emigration from Jamaica during the late 1950s and throughout the 1960s.

The government was quick to blame the relatively high rate of population growth experienced in Jamaica for the high unemployment rate. This prompted them to initiate a massive program of birth control, a program which in the opinion of this writer, has been given disproportionate prominence in the battle against unemployment. In conjunction with the birth control program, the government has also been actively seeking new outlets for the population.

The fact is, in spite of all the above mentioned measures, the unemployment rate is dangerously high and we are forced to analyze the economy for structural malfunctioning which might explain, at least in part, the causes of this growing unemployment. In this respect, the bauxite industry will be analyzed for the type of structural weaknesses that could encourage the continuance of high unemployment and a generally low level of development. Specifically, we must determine the impact that this industry, the leading growth industry in the economy, has had on the employment problem.

It is vital to Jamaica that this cancer of unemployment be arrested and reversed as soon as possible. It is important not only in an economic sense but because of the social crisis that it is now creating. Jamaica has already produced a massive army of urban unemployed workers who constitute the Human input into ghettos as bad as any to be found anywhere in the world. This has resulted in a large increase in violent crime in the urban areas.

3) Plan of Study

Chapter two will examine some of the characteristics of the population, with particular emphasis on the rate of growth, rural/urban distribution and age distribution. The chapter will then proceed to outline the absolute levels and growth of the labor force, the employed and the unemployed. Finally, the chapter will discuss some of the characteristics of the unemployed and try to draw some conclusions about the relationship between the population growth, employment and the unemployment rate.

Chapter three sets the bauxite industry in perspective relative to the rest of the Jamaican economy. The chapter seeks to determine the effects of the particular organization of the companies on the distribution of the economic benefits of the industry between the Jamaican economy and the M.N.Cs. The distribution is discovered to be distinctly in favor of the M.N.Cs.

The employment effect of the bauxite industry is the topic of Chapter four. This chapter attempts to analyze the relationship between output and employment, and uses these arguments to explain the low absolute level of direct employment provided by the industry within Jamaica. The chapter will then proceed to discuss the differing employment effects of each stage of the aluminum producing process and estimate the employment content of exports from the Jamaican bauxite industry in 1972. Included also are discussions on the employment effects of this industry on others and the secondary employment contributable to the bauxite industry in Jamaica. Finally, the chapter discusses the importance of the fact that the industry is owned by M.N.Cs., on the level of employment provided in the industry and the economy in general.

Chapter five presents a summary and conclusions.

CHAPTER II

POPULATION, LABOR FORCE, EMPLOYMENT AND UNEMPLOYMENT

1) Population Growth

The census of population carried out in 1970 showed the population of Jamaica to be 1,813,590¹ persons, an increase of some 203,790 over the 1960 census population. This represents an increase of 12.7 percent between the 1960 and 1970 censuses or an annual rate of growth of 1.13 percent. The previous inter-censal rate of increase, that is, between 1943 and 1960 was 1.4 percent per annum.² The male population increased by 13.4 percent while the number of females increased by 10.0 percent during the inter-censal period 1960-1970.³

This increase means that the population density rose from 366 persons per square mile in 1960 to 411 in 1970. This density

1. Population census of Jamaica, 1970.

2. Department of Statistics, Jamaica, Demographic Statistics, 1972.

3. The slow rate of growth of the female population is, to a large extent, a reflection of the relatively large emigration of females to Canada and the U.S.A. under a domestic service program.

is less than that of other developing nations in different parts of the world including some Caribbean nations.⁴ However, when one recalls that the Jamaican terrain is mostly mountainous, in fact only 892 square miles are flat, this means that the population must of necessity be unevenly distributed. We must now examine the factors that influence the rate of population growth. This involves consideration of the rate of natural increase and net migration from the country.

2) Rate of Natural Increase

Table 2.1 shows some of the salient features concerning the rate of natural increase during the period 1952-1972. The birth rate showed a steady increase in the 1950s rising from 34.0 in 1952 to 42.1 per thousand in 1960 (Table 2.1) which was also the high for the decade. However, since 1960 the birth rate has steadily declined to 33.8 per thousand in 1972.

The death rate in Jamaica has shown a constant downward trend, going from 11.7 in 1952 to 7.1 per thousand in 1972. The decrease in mortality in Jamaica has been brought about primarily by the transfer of new methods of disease treatment at a reasonable cost from the developed nations through international organizations such as the World Health Organization.⁵

4. Puerto Rico and Barbados, for example, have population densities of 676 and 1,396 persons per square mile.

5. An example of this is the reduction in the incidence of Malaria, which has been reduced to negligible proportions through the use of D.D.T.

Table 2.1: Birth and death rates 1952-1972.

Year	Crude Birth Rate (per 1,000)	Crude Death Rate (per 1,000)	Rate of Natural Increase (per 1,000)	Infant Mortality rate (per 1,000 live Bi
1952	34.0	11.7	22.3	75.1
1953	35.3	10.7	24.6	64.1
1954	36.5	11.1	25.4	67.1
1955	37.5	10.3	27.2	63.2
1956	38.5	9.7	28.8	55.4
1957	39.4	9.2	30.2	54.7
1958	40.6	9.5	31.1	62.2
1959	39.9	10.3	29.6	69.6
1960	42.1	8.8	33.3	50.9
1961	40.0	8.6	31.4	48.8
1962	39.1	8.5	30.6	48.8
1963	39.0	8.9	30.1	51.1
1964	39.3	7.6	31.7	38.0
1965	39.0	7.9	31.1	37.4
1966	38.9	7.8	31.1	35.4
1967	35.9	7.1	28.3	30.5
1968	34.2	7.6	26.6	34.7
1969	35.1	7.6	27.5	33.4
1970	34.4	7.7	26.7	32.2
1971	34.9	7.4	27.5	27.1
1972	33.8	7.1	26.7	30.9

Source: Department of Statistics, Demographic statistics 1972, Jamaica.

The infant mortality rate fell from 75.1 percent per 1,000 live births in 1952 to 30.9 percent per 1,000 live births in 1972. However, while the death rate in Jamaica is now down to that of most developed nations, the infant mortality rate while better than that for most South American countries, still lags behind that of most developed nations where rates are typically below 20 per 1,000. The high incidence of malnutrition among the poorer sections of the community appears to be a major factor in this regard.⁶

Over the twenty year period 1952-72, the average crude birth rate was 37.2 per thousand and the average death rate 8.8 per thousand, making for a rate of natural increase of 28.4 per thousand. In the absence of migration the population would have grown by 1,016,708 or approximately 2.9 percent per annum. The actual growth rate was of the order of 1.9 percent.

3) Emigration

Table 2.2 shows that emigration during the period 1952-1972 amounted to more than 34 percent of the net growth of the population by natural increase. Net emigration increased steadily from 1952 showing a substantial increase in the figures from 1955 onwards, reaching a peak of 38,500 in 1961.

6. A survey carried out in the 1950's led to suggestions that total food supplies might have been below the nutritional needs of the population. See C. A. Morse, The measurement of levels of living with specific reference to Jamaica, H.M.S.O. 1957.

Table 2.2: Births, Deaths and Net Emigration, 1952-1972.

Year	Births	Deaths	Natural Increase	Net Emigration	Net Increase
1952	48,470	16,720	31,750	3,880	27,870
1953	51,140	15,450	35,690	4,300	31,390
1954	53,630	16,300	37,330	8,400	28,930
1955	55,767	15,330	40,437	18,900	21,537
1956	58,177	14,670	43,507	17,400	26,107
1957	60,445	14,130	46,315	15,200	31,115
1958	63,517	14,820	48,697	8,200	40,497
1959	60,824	16,550	47,274	13,150	34,174
1960	68,413	14,321	54,092	30,300	23,792
1961	66,128	14,193	51,935	38,500	13,435
1962	64,913	14,167	50,746	28,750	22,046
1963	66,189	15,159	51,030	7,300	43,730
1964	68,359	13,267	55,092	13,500	41,592
1965	64,768	14,084	55,684	6,500	49,184
1966	71,364	14,288	57,076	8,900	48,176
1967	67,438	13,245	54,143	22,049	32,094
1968	65,402	14,550	50,845	24,996	25,849
1969	64,688	14,094	50,594	23,535	27,059
1970	64,375	14,352	50,023	22,064	27,959
1971	66,277	14,078	52,199	20,233	31,966
1972	66,219	13,970	52,249	18,034	34,215
	<u>1,324,493</u>	<u>307,793</u>	<u>1,016,708</u>	<u>353,991</u>	<u>662,717</u>

Source: Demographic statistics-Jamaica, 1972; Economic survey Jamaica, sundry years.

In order to explain the phenomenal growth of emigration during the period 1952-72, we must examine both the push and pull factors. On the one hand unemployment and poor living conditions in

Jamaica were factors which tended to induce emigration. However, the major contributors seem to have been the flow of encouraging information on job possibilities, and social conditions in the U. K. from Jamaicans who had stayed in the U. K. after the second World War, coupled with the expansion of transport facilities from Jamaica. The particularly high rate of emigration during the years 1960-1962 appears to have been an attempt to beat the rumored legislation to curb the increasing flow of immigrants into Britain. This rumour was proven well founded with the passing of the Commonwealth Immigration Act on July 1, 1962. This act made it necessary for migrants from commonwealth countries to obtain work permits before being admitted into the United Kingdom. The act seemed to have had the required effect as reflected in the figures shown in Table 2.2 for migration after 1962.

In spite of the reduction in the number of migrants to the United Kingdom after 1962, net emigration to all countries rose substantially to 22,049 in 1967, due primarily to the delayed effect of the non-quota status granted to Jamaica by the United States in 1965.

4) Geographic Distribution of the Population: Urban/Rural

Table 2.3 sets out the distribution of the population by parishes and highlights the gains of predominantly urban areas (Kingston and Urban St. Andrew) relative to the rest of the island which is predominantly rural. Urban St. Andrew together with the

capital parish of Kingston, constitute the Kingston Metropolitan Area which is the political, industrial and commercial nerve center of the island. The population of this area increased from 376,520 to 475,548, an increase of 27 percent between 1960 and 1970. This compares with an average of 12.7 percent for the island as a whole during the same period.

Only two rural parishes, viz St. James and Clarendon, experienced rates of population growth higher than the national average for the 17 year period, 1943-60. In the following ten year period there were three rural parishes whose growth was in excess of the national average, they were St. James, St. Cathrine and rural St. Andrew. In the 27 year period, 1943-70, only two rural parishes whose growth was in excess of the national average, they were St. James, St. Cathrine and rural St. Andrew. In the 27 year period, 1943-70, only two rural parishes exceeded the national average, viz, St. James and St. Cathrine.

Differential rates of growth between urban and rural areas are explained largely by internal migration, the pace of which increased substantially in the 1950's. As was the case during the period 1921-43, when the tempo of internal migration increased as pressure on the available land built up and opportunities for emigration to Panama and Cuba dried up, St. Andrew was the chief destination for internal migrants. The population of St. Andrew increased by 39.6 percent between 1960 and 1970.

Table 2.3: Population by Parishes 1943, 1960, 1970 Census.

Parishes	Population			Change					
	1943	1960	1970	1943-1960	percent	1960-1970	percent	1943-1970	percent
Kingston	110,083	123,403	111,879	13,320	12.0	-11,524	-9.3	1,796	1.6
St. Andrew (urban)	92,855	253,117	363,669	160,262	172.6	110,552	43.7	270,814	292.1
St. Andrew (rural)	35,291	42,896	49,660	7,605	21.5	6,764	15.8	14,369	40.7
St. Thomas	60,693	68,725	69,391	8,032	13.2	666	1.0	3,698	14.3
Portland	60,712	64,510	67,497	3,798	6.2	2,987	4.6	6,785	11.2
St. Mary	90,902	94,233	98,392	3,331	3.6	4,159	4.4	7,490	8.2
St. Ann	46,193	114,360	120,001	18,167	18.9	5,641	4.9	23,808	25.0
Trelawny	47,535	56,080	60,504	8,545	18.0	4,424	7.9	12,979	27.3
St. James	63,542	83,003	100,529	19,461	30.6	17,526	21.1	36,487	58.1
Hanover	51,684	53,902	58,296	2,218	4.3	4,394	8.2	6,612	12.8
Westmoreland	70,109	109,606	112,863	19,497	21.6	3,257	3.0	22,754	25.2
St. Elizebeath	100,182	116,706	125,279	16,524	16.4	8,573	7.4	25,097	25.0
Manchester	92,745	111,788	121,407	19,043	20.5	9,619	8.6	28,662	30.9
Clarendon	123,505	163,450	173,823	40,445	32.7	9,873	6.0	50,318	40.7
St. Cathrine	121,032	153,535	180,404	32,503	26.8	28,869	17.5	59,372	49.0
Total	1,237,063	1,609,814	1,813,594	372,751	30.1	203,750	12.7	576,531	46.6

Source: Census of Jamaica 1943, 1960, 1970.

The reasons for the movement from the rural areas into the Kingston metropolitan area are not difficult to find. The major cause has been the failure of the agricultural sector to provide a tolerable standard of living for the increasing population. Another factor has been the publicity and growth of the industrial sector, especially the relatively new Kingston Industrial Estate. The number of people who made the trek to the city far outnumbered the amount who could be absorbed by the development of light industries.

Finally we must now examine the age distribution of the population. The dependency ratios as revealed by the census of 1943, 1960 and 1970 is shown in Table 2.4. The general characteristics of an increasingly young population is evident from the table. The population under 15 years increased from 41.2 percent of the total population in 1960 to 45.9 percent in 1970. Linked with this was a decrease of over 6 percent in the proportion of the population between 15 and 59 years. As shown in Table 2.4 in 1970 for every 100 persons that there were in the age group 15-59, there were 101 in the younger age group and 19 in the older age group. These trends in the age distribution is consistent with those of countries with a relatively high rate of natural population increase. Furthermore, to the extent that emigration draws mainly from the adult population, the tendency for the percentage of the population in the dependency ages to increase is reinforced.

Table 2.4 Dependency Ratios - 1943, 1960, 1970

Census Year	Enumerated Population	% Age of Population			Youth Dependency Ratio (1)	Aged Dependency Ratio (2)	Total Dependency Ratio (3)
		under 15	15-59	60 and Over			
1943	1,236,722	36.6	56.9	6.6	64	12	76
1960	1,609,814	41.2	52.1	6.7	79	13	92
1970	1,813,594	45.9	45.7	8.5	101	19	120

(1) (population under 15 years/population 15-59 years) x 100

(2) (population 60 years and over/population 15-59 years.) x 100

(3) youth dependency ratio + aged dependency ratio

Source: population census, Jamaica, 1970.

5) The Labor Force, Employment and Unemployment

The level of output and its rate of growth have for long been accepted as the most significant indicators of a country's progress. In recent years, however, satisfaction with these criteria has diminished. Development rather than growth has increasingly become the concern of economists and administrators in any determination of a country's social and economic performance. Economists have now turned their attention to the structural characteristics of a particular economy. In this context, the availability and deployment of human resources are represented by the labor force.

The labor force is a highly volatile and mobile entity and is extremely difficult to measure. This is particularly true in countries such as Jamaica where full employment conditions exist in very few industries and where the pattern of employment is seasonal and casual more than regular.

Two types of labor supply measurements have been available in Jamaica to date. One is derived from censuses, total and sample, and relates to the years 1943, 1953 and 1960. The second may be derived from labor force sample surveys for the years 1953, 1957, 1966 and 1972. The 1957 and 1966 surveys were not published because of misgivings about the reliability of the samples.⁷ The adjusted figures for 1953 and 1957 and the 1972 survey along with data collected in connection with the population census of 1943, 1960 have shed light on some of the characteristics of the labor force as well as trends in the level of employment and unemployment.

6) Labor Force

Table 2.5 shows that while the population increased by 21.2 percent during the period 1960-1972, the labor force increased by almost 24 percent. This coupled with the fact that the population 14 years and over, from which the labor force tends to be

⁷ Labor force sample surveys are in general more sensitive indicators of labor supply than are censuses; see G. E. Cumper, "A comparison of statistical data on the Jamaican labor force, 1953-1961," social and economic studies, vol. 13, no. 4, December, 1964. The data for 1953 and 1957 have subsequently been adjusted by Carmen McFarlane to improve their comparability with that for the census years. See her "Education and employment: An assessment of the institutional response by the Jamaican education system to the demand for skills," unpublished M. S. thesis, University of the West Indies, 1968. The figures used in this section are the adjusted ones as quoted in Owen Jefferson, The post war economic development of Jamaica, Institute of social and economic research, University of the West Indies, Jamaica, 1972.

drawn, increased at a much slower rate than the total population (13.2 percent as compared with 21.2 percent), would indicate that there have been changes in the labor force participation rate.

This suggestion is reinforced by the fact that there were appreciable increases in both the employment and unemployment figures for the same period. The growth of the labor force also reflects to some extent a reduction in emigration during the 1960s and early 1970s.

Table 2.5: Growth of population and the labor force 1943-1972.

	(Thousands)			Percentage
	1943	1960	1972*	Change (1960-1972)
Total population	1,237	1,609	1,949	21.2
Population 14 yrs. & over	808	975	1,104	13.2
Labor force	555	654	808	23.6
Employment	416	566	626	10.8
Unemployment	139	88	181	105.7

Note: The labor force is here defined to include all persons who were employed or expressed a desire to be employed during the survey week.

* Labor force survey 1972 unadjusted.

Source: Census of Jamaica 1943 and 1960; The labor force, Jamaica 1972.

The present analysis should go forward in order to assess more critically the effects of falling emigration on the island's labor force. However, because of the lack of data on the characteristics (age, employment/unemployment, and so on) of emigrants,

it must suffice at this time simply to recall that during the period 1953 to 1955, due to the influence of emigration, the male labor force increased by only 12.7 thousand despite new accessions amounting to 32.4 thousand. In 1955 the labor force as a whole actually experienced a net loss of 660 workers.⁸

The total labor force participation rate increased significantly between 1960 and 1972 from 67.1 percent to 73.2 percent. This resulted from a slight decrease in the rate for males and an extremely large increase in the rate for females. For males, the rate declined from 88.3 to 87.5 percent. In the case of females, the rate increased from 48.1 in 1960 to 60.3 in 1972, reaching a maximum of 75 percent in October 1969. This represents an increase of 12.2 percentage points, and resulted in a change in the sex composition of the labor force, from 61.4 percent and 38.6 percent for males and females respectively in 1960 to 56.5 percent for males and 43.5 percent for females in 1972. This enormous increase in the participation rate for females must be considered a major factor in the total increase of the labor force.

8. G. W. Roberts and D. O. Mills, Study of external migration affecting Jamaica, 1953-55, supplement to social and economic studies, vol. 7, no. 2, 1958.

7) Age Distribution of the Labor Force

Table 2.6: Labor Force by Age Group, 1960, 1972.

Age Groups	Labor Force		1972	% Age	Absolute Change
	1960	% Age			
14 - 24	164,193	25.1	210,149	26.0	45,956
25 - 34	161,960	24.8	171,730	21.2	9,770
35 - 44	135,724	20.7	148,072	18.4	12,348
45 - 54	112,005	17.1	127,987	15.8	15,982
55 - 64	57,707	8.8	104,512	12.9	46,805
65 & over	23,025	3.5	46,021	5.7	22,996

Source: Census of Jamaica 1960; Labor Force survey, Jamaica, 1972.

Table 2.6 shows the age distribution of the labor force for 1960 and 1972. There were increases in the percentages of the labor force in the age groups 14-24, 55-64 and 65 and over, and resultant reductions in the age groups 25-34, 35-44 and 45-54; these are the age groups in which one expects to find the most skilled and highly productive workers. In the age groups 14-24 and 65 and over, it is usual to expect a high percentage of unskilled and low productivity labor. The result of this being that firms are faced with a labor supply of mostly young and old workers in need of training. This, in turn has the effect of increasing the relative price of labor to the employers and could cause some degree of factor substitution-capital for labor.

Because of the 12 year period between the two samples, it means that the figure for the age group 14-24, in 1972, is a measure of the new entrants to the labor force in that age group. The average annual absolute increase of the labor force in the age group 14-24 was over 17,000 persons between 1960 and 1972.

8) Sectoral Distribution of the Classified Labor Force

Changes in the structural distribution of the labor force are shown in Table 2.7. The most striking change was in the Agricultural sector where employment actually fell by some 11 thousand during the period 1943-1972. There was an increase of 8.6 thousand during the period 1943-1960 but in the following period there was a significant reduction of almost 20 thousand in the employment of that sector. This means that for the first time in Jamaica's history the Agricultural sector is not the leading employer of labor. This change is explained by a number of factors such as mechanization in the agricultural export sector and migration from the rural areas both to urban areas and overseas.⁹

Increased activity in the manufacturing sector was accompanied by an appreciable increase in the proportion of the labor force employed there during the period 1943-1960 from 11.7 percent in 1943 to 14.8 percent in 1960. But during the period 1960-1972 this proportion fell to 12.7 percent in 1972. Again this can be explained

9. A significant contributor to this situation is the export of contract labor to North America, which amounted to almost 15,000 in 1970.

Table 2.7: Sectoral Distribution of the Classifiable Labor Force by Industry Groups 1943, 1960 and 1972

Industry Groups	Classified Labor Force			Absolute Change (thousands)			% Age Distribution		
	1943	1960	1972	1943-60	1960-72	1943-72	1943	1960	1972
Agriculture, Forestry & Fishing	228.0	236.6	216.8	8.6	-19.8	-11.2	45.1	39.0	29.6
Mining & Quarrying	0.6	4.5	7.4	3.9	2.9	6.8	0.1	0.7	1.0
Manufacturing	59.2	89.5	93.1	30.3	3.6	33.9	11.7	14.8	12.7
Construction	34.1	49.8	52.5	15.7	2.7	18.4	6.8	8.2	7.2
Transportation, Communication & Public Utilities	12.7	22.6	29.1	9.9	6.5	16.4	2.5	3.7	4.0
Commerce	39.5	60.3	90.7	20.8	30.4	51.2	7.8	9.9	12.4
Other Services including personal service & public administrators	102.4	132.8	244.4	30.4	111.6	140.0	20.3	21.8	33.3
Unspecified	28.5	10.7	-	-17.8	-10.7	-28.5	5.6	1.8	-
	<u>505.0</u>	<u>606.8</u>	<u>734.0</u>	<u>101.8</u>	<u>127.6</u>	<u>299.4</u>	<u>100</u>	<u>100</u>	<u>100.3</u>

Source: Census of Jamaica 1943, 1960, and Labor Force Survey 1972, Department of Statistics, Jamaica.

by a number of factors such as increasing capital intensity in both the manufacturing export and import substitution sectors which might have been heightened by the advent of CARIFTA.¹⁰ This situation might also have been aggravated by a shortage of certain key skills required by this sector, which led to a certain amount of factor substitution - capital for labor.

Construction showed a slight decline as an employer of labor, falling from 8.2 percent in 1960 to 7.2 percent in 1972 of the employed labor force. This is the result of a small absolute increase in the amount of people employed by the sector between 1960 and 1972. However because of the seasonal nature of employment in this sector, it is difficult to draw any meaningful conclusion about the behavior of the sector as an employer of labor. Commerce on the other hand showed a sizable increase in its relative importance as an employer of labor. While the data for 1972 does not permit a direct comparison, there are indications that the large increase in the sector called "other services," which includes Personnel service, might be a reflection of the increase in the female participation rate coupled with the inclusion of a sub-sector called "Public Administrators" which was never used as a classification before.

In general then, all but two sectors-commerce and other services, showed slower rates of employment growth during the period 1960-1972 than for the previous period 1943-1960. It is precisely to the question of employment growth that we must now turn our attention.

¹⁰. The Caribbean Area Free Trade Association

9) Growth of Employment and Unemployment

While the labor force increased by 23.6 percent between 1960 and 1972, employment grew by only 10.8 percent so that the ranks of the unemployed increased by 93 thousand persons. This represents a 9 percentage points increase in the unemployment rate from 13.5 in 1960 to 22.5 percent in 1972. Table 2.8 gives some indication of the trend of employment and unemployment over time.

Table 2.8: Employment and Unemployment 1943-1972.

Year	Labor force (thousands)	Employment	Unemployment	
		Number (thousands)	Number (thousands)	Percent of Labor force
1943	555.6	416.1	139.5	25.1
1953	634.9	523.9	110.0	17.5
1957	658.1	545.5	112.6	17.1
1960	654.6	566.1	88.5	13.5
*1972	808.0	626.5	181.5	22.5

* unadjusted labor force survey

Source: Adapted from Carmen McFarlane, op. cit; Labor Force Survey, 1972

Unemployment declined in relative terms from 25.1 percent in 1943 to 17.1 percent in 1947 and subsequently to 13.5 percent in 1960. However, it increased to 22.5 percent in 1972, confirming the general feeling that the previous reduction was caused by the very high emigration during the 1950s and early 1960s and not by the ability of the economy to absorb the labor force.

10) Characteristics of the Unemployed

In 1972 the incidence of unemployment amongst females was considerably higher than that for males - 34.6 and 13.6 percent respectively. Thus, females accounted for 66 percent of all unemployment although they represented only 44 percent of the labor force, Furthermore they accounted for almost 59 percent of all unemployed persons between the ages of 14 and 24 (Table 2.9).

Table 2.9: Unemployed Labor Force by Age Groups and Sex;
Female Labor Force as % age of Total Labor Force
by Age Groups, 1972.

Age Groups	Unemployed Labor Force			Percentage of Unemployed L.F.		Female Labor Force as % age of Total Labor Force
	Male	Female	Total	Male	Female	
14-24	35,339	50,521	85,860	41.4	58.6	44.2
25-34	11,185	30,250	41,435	26.8	73.2	48.0
35-44	6,488	19,908	26,904	26.0	74.0	46.6
45-54	3,750	10,457	14,207	26.5	73.5	43.7
55-64	3,781	6,785	10,566	35.9	64.1	34.9
65 & over	1,478	1,835	3,312	44.5	55.5	32.2
Total	62,021	119,756	181,777	34.0	66.0	43.5

Source: Labor Force Survey, Jamaica 1972.

The data in Table 2.9 show that the female labor force as a percentage of the total labor force is fairly evenly distributed over all age groups, ranging from a high of 48 percent amongst the age group 25 - 34 to a low of 32.2 percent amongst the 65 and over age group. The age distribution of the unemployed females

shows that for the age groups 25-34, 35-44 and 45-54, females represented approximately 73 percent of all (female + male) unemployment in each age group. The data in the table shows that for the age group 14-24 both males and females showed high percentages of the unemployed labor force - 41.4 and 58.6 percent respectively. This reflects the economy's inability to absorb neither male nor female new entrants to the labor force.

The unemployed are not evenly distributed throughout the country. In the absence of data for 1972, it must suffice at this time simply to point out that in 1960 unemployment in Kingston (urban) amounted to 19 percent of the labor force in that parish. In St. Andrew (about 86 percent urban) the rate was 16 percent and for the rest of the island (predominantly rural) 11 percent.¹²

Unemployment is undoubtedly one of Jamaica's greatest problems. Unlike developed countries, Jamaica makes no provision for unemployment insurance, and the unemployed have to rely on support from friends and family. The figures for unemployment which we have been examining have revealed quite a bit about the problem in Jamaica, however, there are factors affecting the economy which cannot be highlighted in these figures. Underemployment and disguised unemployment are two such problems. Although there is no statistical evidence of either of these problems available for 1972, the labor force survey of 1957 revealed that 16 percent

12. Owen Jefferson, *op. cit.*

of the employed labor force worked for three days or less in the survey week, usually unskilled rural workers. In terms of full-time equivalents, the method of including anyone who has held a job during a particular year among the employed, tends to overstate the level of employment by something of the order of 20 to 25 percent.¹³ This does not include the large number of people squeezed in the service industries who may be classified as employed for the greater part of the year but whose productivity and income are very low.

While it is obvious how the reduction in emigration would contribute to the renewed rise in the unemployment rate, it carries with it other serious implications. There is some evidence, for instance, which suggests that in the early post-war wave of emigration to the United Kingdom, a relatively high percentage of the male emigrants were skilled craftsmen.¹⁴ This coupled with the fact that immigration policies in both the United States and Canada have made it relatively easy for professional, technical and other skilled personnel to enter as permanent residents, has posed a double problem for the Jamaican economy. Not only has unemployment reverted to the 1943 rate, but simultaneously there has been a shortage of certain skilled and professional personnel. This has the effect of creating bottlenecks in certain sectors and thus reduce the ability of the economy to absorb more of the labor force.

13. Ibid.

14. G. W. Roberts and D. O. Mills, op. cit.

With the unlikely prospect of future large-scale emigration, family planning has been elevated to a position of great importance in government policy.¹⁵ Family planning has been linked with the solution or control of unemployment. It is far too early for any meaningful assessment to be made of the family planning program, but it has run into its fair share of social problems and there are strong anti-family planning groups, predominantly among the poor. However, even if the family planning programs are successful, their effect on unemployment will not be felt for about three decades. A heavier burden should not be put on the family planning program than it can reasonably be expected to bear.

11) Summary and Conclusion

Jamaica managed to reduce its annual rate of population growth from 1.4 percent during the period 1943-1960 to 1.13 percent between 1960 and 1970. However, the labor force grew at a faster annual rate during the period 1960-1972 than during the period 1943-1960 - 1.24 and 1.16 percent respectively. Emigration had the most profound effect on both of these variables. Emigration held down population growth in both periods, but more so during the period 1943-1960. Because emigrants are usually drawn from the adult population, it had the effect of holding down the growth of the labor force during the period 1943-1960.

15. See five year independence plan, 1963-68.

The most important change was in the rate of growth of employment. During the period 1943-1960, employment grew at an annual rate of 1.4 percent. However, during the period 1960-1972, employment grew by only 1.0 percent per annum.

Unemployment is undoubtedly one of, if not the most serious problem facing Jamaica today. This much we know, however, we must address ourselves to the possible solutions to this problem. The rate of unemployment can be reduced in two ways. Firstly, as was the case during the period 1943-1960, the supply of labor can be reduced, by population control and emigration. However, because of the characteristics of emigrants (skilled) and the positive utility of human life, this is a relatively non-productive approach to the unemployment problem in Jamaica. The second approach, while still recognizing the need to control the labor supply pressures, puts greater emphasis on the creation of more employment by the economy. In other words, this approach requires significant increases in the demand for labor. We have seen in the above information, that during the period 1960-1972, the population growth rate, while still high, was less than that for the period 1943-1960. However, employment grew at a much slower rate between 1960 and 1972 than during the period 1943-1960. It is this reduction in the rate of employment growth coupled with the general reduction in emigration that is responsible for the increase in the unemployment rate between 1960 and 1972.

In the absence of future large-scale emigration, and even with a successful birth control programme, Jamaica can expect its labor force to grow at the same or higher rates than it did during the period 1960-1972, for at least three more decades. Given this situation, the economy must start providing employment at a rate significantly higher than it did during the period 1960-1972, if the unemployment rate is to be reduced. It is in this context that we will analyze the employment effect of Jamaica's leading growth sector - the mining sector, of which the bauxite-alumina industry accounts for about 95 percent of the sector's output.

The bauxite-alumina industry in Jamaica is owned and controlled by vertically integrated multinational corporations and it is only because of this fact that the analysis will have anything to do with multinational corporations at all. Our major concern is to establish the direct employment provided by this industry and to examine its potential and reasons for the difference between the industry's potential and its actual performance.

From the evidence provided in this chapter, it is clear that "over-population" does place significant pressure on the labor supply. It is not at all clear however, that population growth is the only or even main cause of the increase in unemployment. The increase in the unemployment rate is a result of the inability of the economy to provide a sufficient number of jobs for the evergrowing population. Factors such as the lopsided distribution of income and the growing propensity to import foreign technology suggests that the government must take a much more active role, if the problem of unemployment is to be overcome.

CHAPTER III

THE BAUXITE - ALUMINA INDUSTRY IN JAMAICA

1) Institutional Background

The first official geological survey of Jamaica was reported in 1868.¹ It noted the widespread occurrence of aluminium ore, but the announcement attracted little attention since the process for extracting the metal aluminium from the ore was still uncertain and only came into commercial operation some 20 years later in the 1880s. The rediscovery of bauxite in Jamaica came when the new demands for the metal encouraged a search for new sources of the ore. In 1938 the agricultural chemistry division of the department of agriculture found that certain infertile red soil had a high aluminium content and in 1942 some of these were identified as low grade bauxite.² This attracted the attention of aluminium interests abroad because the demand for aluminium during the 1939-45 war had stimulated interest in possible new sources of the raw material. Jamaica was particularly convenient in light of the losses of ships hauling bauxite from Surinam and Guyana

1. Brown, Charles, Saunders, James et. al., Report on the geology of Jamaica, Longmans Green and Co., London, 1869.

2. Zans, V. A., "Bauxite resources of Jamaica and their development." report from Colonial geology and mineral resources, vol. 3, no. 4, 1952, H.M.S.O., London, pp. 303-307.

(it was then called British Guyana) during the second world war. Jamaica was less than half the distance from the Gulf ports and therefore had a considerable strategic advantage.³ In other words, the requirement of large quantities of aluminium in the United States for military application, which had constituted a heavy drain on her dwindling domestic reserves, pointed the way to a potentially large market.

Because of technical problems involved in treating Jamaican bauxite,⁴ it remained commercially unproven. Hence Jamaican bauxite did not have an easy entry into the North American aluminium market nor the U. S. government's stockpiling programme. Reynolds Metal Company was the only foreign enterprise to maintain interest in the possibility of commercially producing Jamaican bauxite.⁵

3. This point was reinforced by the U. S. Bureau of Mines report to the National Security Resources Board in materials survey-bauxite, 1953. where it states:

.....The availability of the reserves of Jamaica and Hispaniola is particularly fortunate, since the shipping lanes from these islands to the United States are at no point considered to be out of range of the protection of land-based aircraft.

4. Chemically, Jamaican bauxite runs to extremes, being especially low in one major impurity, silicon oxide, but unusually high in the other major impurity, iron oxide. There is 18 to 20 percent iron oxide in Jamaican bauxite, while it runs as low as 6 percent in typical U. S. bauxite and down to 1 percent in South American bauxite. Physically, Jamaican bauxite is such an extremely powdery mineral that it is rated as the finest particled natural occurring mineral in the world.

5. For a detailed account of Reynolds early activities in Jamaica, see Reynolds in Jamaica, Reynolds Jamaica Mines Ltd., 1971.

After several years of experimentation in cooperation with the Massachusetts Institute of Technology and the United States Bureau of Mines, in an effort to demonstrate the utility of Jamaican ore, Reynolds was prepared to use Jamaican bauxite on a plant scale commercial basis, and began seeking developmental funds.

On January 24, 1950 Reynolds reported to the Jamaican government that a loan was cleared with the Economic Cooperation Administration (E.C.A.), the U. S. government agency which was responsible for the administration of Marshal plan funds, and that E.C.A. was ready to loan f2,775,000 of the total f3,625,000 (U.S. \$14,500,000) estimated cost of Reynolds Jamaican project. The E.C.A. also advanced funds amounting to U. S. \$2.5 million and f1.5 million sterling to Jamaican Bauxite Ltd. (now Alcan (Jamaica) Ltd.), a subsidiary of Aluminium Limited for the same purpose. The funds advanced by the E.C.A. represented 85 and 16 percents of the initial investments in Reynolds Jamaica Mines and Alcan (Jamaica) Ltd., respectively.

In the meanwhile, after great delay, the Jamaican government, by letter on April 29, 1949, indicated that a proposal submitted earlier by Reynolds, was for the most part, acceptable. On May 8, 1950 the "Bauxite and Alumina Industries (Encouragement) Bill" was presented to the Jamaican House of Representatives. The Bill was passed by the House on May 23 and by the Legislative Council on June 2, and became law on June 11, 1950 when the Governor signed it. This bill made provisions for the remission of tonnage tax and customs duty on plant, machinery and building materials necessary for mining, treating and transportation of bauxite.

Table 3.1: Alumina Operations in Jamaica (1972).

Company	Parent Company	Mine Site	Plant Site	Port	Rated Annual Capacity
Alcan Ja. Ltd.	Aluminium Co. of Canada	Shooters hill	Kirkvine	Port Esquivel	550,000 LT
"	"	Schallenburg	Ewarton	"	550,000 LT
Aluminium partners of Ja, Ltd	Partnership of Anaconda, Reynolds Metal Co. Kaiser Al. & Chem. Corp.		Nain	Port Kaiser	1,161,000 LT
Revere Ja Alumina Ltd.	Revere Copper & Brass Inc.	Maggotty	Magotty	Rocky Point	196,400 LT
Alcoa Minerals of Ja. Inc.	Aluminium Co. of America	Mocho Mtns.	Halse Hall	Rocky Point	492,000 LT

LT - Long Tons

(a) The Kaiser and Reynolds partners each own 36.54 percent interest in Alpart while Anaconda holds the remaining 26.92 percent interest.

Source: The mineral Resources of Jamaica, Geological Survey Dept., Kingston, Jamaica; Bulletin No. 8, 1973," by I. G. Hughes.

In 1952 the first shipment of bauxite from Jamaica was made. Production for that year was 413,000 tons. The companies involved at the start of the industry's life in Jamaica were Reynolds Jamaica Mines, Kaiser Bauxite Company (Jamaica Ltd.)-both American and Jamaica Bauxite Limited (name later changed to Alumina Jamaica Ltd. and subsequently to Alcan (Jamaica) Ltd. in 1962) - a Canadian

owned company producing alumina.⁶ Other companies appeared later on the scene. Alcoa Minerals (Jamaica) Ltd. started mining operations in 1963 and alumina production in 1972, Alumina Partners of Jamaica, a consortium of Reynolds, Kaiser and Anacanda, went into alumina production in 1968 and Revere Jamaica Alumina Ltd. went into production in 1972. Table 3.1 shows all alumina producing companies operating in Jamaica and their parent companies. One common factor amongst all these companies is the fact that they are all vertically integrated—from bauxite mining to fabrication—Multi-National Corporations (M.N.C.) based in North America.

2) Growth of Bauxite Production

The output of bauxite grew from 340,420 long dry tons in 1952 to 12,341,032 long dry tons in 1972 (See Table 3.2). Output grew to the stage where Jamaica became the world's largest producer of bauxite by about 1957 and was not surpassed until 1971, when Australia, with its large and relatively newly found reserves, exceeded Jamaica's production.

The growth of world production and Jamaica's production as a percentage of it, is shown in Table 3.3 for the period 1952-71. So rapid was the growth of output of Jamaican bauxite, that its

6. For a detailed account of why Alcan (Jamaica) Ltd. was the only one to convert bauxite to alumina within Jamaica, see H. D. Huggins, *Aluminium in Changing Communities*, pp. 30-69. See also N. Girvan, Foreign Capital and Economic Underdevelopment in Jamaica, Institute of Social and Economic Research, University of the West Indies, Jamaica, 1971, pp. 30-35.

Table 3.2: Summary of Bauxite Production 1952-1972.

Year	Bauxite Shipped Net Dry Tons	Bauxite Converted into Alumina	Total Bauxite Produced Net Dry Tons	Alumina Shipped
1952	239,949	100,471*	340,420	-
1953	1,054,978	99,194	914,223	28,732
1954	1,728,103	315,683	2,043,786	106,366
1955	2,182,818	462,527	2,645,345	183,969
1956	2,574,673	566,836	3,141,509	213,320
1957	3,641,168	954,775	4,595,943	435,837
1958	4,798,750	923,240	5,721,990	373,108
1959	4,196,785	928,810	5,125,603	399,210
1960	4,147,555	1,595,467	5,745,022	665,361
1961	4,974,802	1,688,318	6,663,120	703,466
1962	5,988,678	1,506,443	7,495,121	627,685
1963	5,161,568	1,741,567	6,903,115	725,653
1964	5,969,209	1,843,978	7,813,188	768,324
1965	6,784,462	1,729,899	8,541,365	720,523
1966	7,028,479	1,898,763	8,927,242	791,151
1967	7,142,422	1,978,879	9,121,301	824,533
1968	6,212,053	2,178,763	8,390,816	907,818
1969	7,601,534	2,731,373	10,332,907	1,138,072
1970	7,575,486	4,244,590	11,820,076	1,689,221
1971	7,589,775	4,653,816	12,243,591	1,783,125
1972	7,048,952	5,292,080	12,341,032	2,102,055

* includes 200 tons sample shipment of crude bauxite.

Source: Annual report on the Bauxite-Alumina industry, 1973;
Department of Mines, Jamaica.

Table 3.3: Jamaica's Contribution to World Bauxite Production.

Year	World (1,000) tons	Jamaica as a percentage
1952	12,600	2.7
1953	13,600	6.7
1954	15,500	13.2
1955	17,500	15.0
1956	18,540	16.9
1957	20,150	22.8
1958	21,075	27.0
1959	22,690	22.6
1960	27,020	21.3
1961	28,945	23.0
1962	30,835	24.3
1963	30,206	22.8
1964	32,826	23.8
1965	36,849	23.2
1966	40,041	22.3
1967	43,889	20.8
1968	45,256	18.5
1969	51,782	19.95
1970	56,919	20.8
1971	62,109	19.7

Source: As for Table 3.2

share of world production grew from a mere 3 percent in 1953 to almost 20 percent in 1971, reaching a high of 27 percent in 1958. Jamaica's output averaged about 23 percent of world production during the period 1957-72. Despite Jamaica's relatively large share of the market, she exerts no influence on the price of bauxite since bauxite is rarely traded in the open market because of the vertically integrated structure of the companies involved in the aluminium industry.

The rapid rate of exploitation of Jamaican bauxite can be attributed to the U. S. government policies toward Alcoa's monopoly of the U. S. aluminium industry and stockpiling of strategic materials as well as the desire of the companies that own and control the industry in Jamaica to make maximum use of the large reserves⁷ and relatively low cost of mining Jamaican bauxite, due to the small amount of "overburden" that has to be stripped before extraction can be effected.⁸ Jamaica's nearness to the gulf ports was also a factor which contributed to the relatively fast expansion of production.

Another of the factors making for the rapid rate of exploitation of Jamaican bauxite, was the growing world demand for aluminium, initiated in the early 1950s by aggressive drives by the companies for new markets. This was done by demonstrating the

7. By mid-1950's Jamaica's reserves was estimated at 550 million tons and at output levels achieved in the 1950s, this was enough to assure production for over a hundred years.

8. See Bracewell, Smith, "Bauxite, Alumina and Aluminium." Overseas Geological Surveys, Mineral Resources Division, London H.M.S.O. 1962.

potential of the metal for various new uses and in the manufacture of products formerly dominated by the older metals.

3) Growth of Alumina Production

The process of extracting aluminium from bauxite consists of two stages. In the first instance, the bauxite has to be reduced to alumina by a chemical process (Bayer process). The final stage is concerned with the smelting of alumina by an electrolytic process to make aluminium metal.

Jamaica's position as a producer of alumina is very different from its position with respect to bauxite. Although the quantity of bauxite exported in 1972 was approximately three and a half times as much as the amount of alumina exported. The value of alumina export was almost twice that for bauxite (see Table 3.5). Up until 1969, there was only one company producing alumina in Jamaica, i.e. the Canadian owned Alcan (Jamaica) Ltd. However, by 1972 there were no less than four companies converting bauxite into alumina within Jamaica.

At the end of 1971, world alumina production stood at 24.9 million short tons, of which Jamaica accounted for only about 2.0 million short tons. Table 3.4 shows the world production of alumina by countries. It is interesting to note that while Jamaica produced almost 20 percent of the world's output of bauxite in 1971, it only accounted for 8 percent of the world's output of alumina. On the other hand, the U. S. which only produced about

Table 3.4: Alumina: World Production by Countries
(Thousand Short Tons)

COUNTRY	1968	1969	1970	1971
Canada	1,100	1,107	1,218	1,220
United States	6,442	7,334	7,148	7,213
Brazil	89	96	131	200
Guyana	297	334	336	336
Jamaica (exports)	1,017	1,274	1,892	1,997
Surinam	896	1,046	1,117	1,406
France	1,135	1,219	1,246	1,310
Czechoslovakia		80	80	80
Germany, East	59	59	60	60
Germany, West	718	749	835	911
Greece	246	331	344	514
Hungary	420	450	486	500
Italy	324	315	346	289
Norway	19	12	3	-
Romania	160	187	231	231
United Kingdom	100	112	118	120
U. S. S. R.	2,300	1,800	2,000	2,200
Guinea	585	631	672	680
Peoples Rep. of China	209	250	280	300
India	270	294	360	400
Japan	911	1,173	1,416	1,767
Taiwan	41	48	46	47
Australia	1,443	2,129	2,357	2,944
TOTAL	18,911	21,164	22,783	24,863
Jamaica as % of world	5.4%	6%	8.3%	8%

In addition to countries listed, Czechoslovakia may produce limited quantities of alumina, but information is inadequate to make reliable estimates of output levels. Austria produces a small quantity (about 200,000 tons annually) of fused aluminum oxide, but this is excluded from table because it is used for production of abrasives.

Source: As for Table 3.2.

3 percent of the world's bauxite and Canada with no bauxite deposits at all, accounted for 29 and 4.9 percents, respectively, of the world's alumina production in 1971.

This situation, arising from the control and ownership of Jamaica's bauxite-alumina industry by vertically integrated M.N.C.s, has been very costly to the Jamaican economy in terms of income and jobs foregone. For the year 1965, for instance, the losses arising from the external processing of Jamaica's bauxite into alumina, amounted to about 6.1 percent of Jamaica's G.N.P. for that year⁹ and almost 4,000 full time jobs.¹⁰ This represented slightly more than the local payments made and jobs provided in Jamaica by the industry for that year. In 1972, only 43 percent of Jamaican bauxite production was converted into alumina within the country.

The growth in output of bauxite and alumina was paralleled by the growth in their export values, which is shown in Table 3.5. The export value of bauxite and alumina grew from a mere J\$800,000 in 1952 to J\$201.9 million in 1972, at which time they represented 68.8 percent of the value of all domestic exports. It should be noted however, that because of the vertical integrated structure of the companies involved in this industry, there is no market price for these commodities and the values shown in the trade statistics are arbitrary.

9. N. Girvan, *op. cit.*

10. See Chapter 4, p.61.

Table 3.5: Quantity and Nominal Value of Exports of Bauxite and Alumina, 1952-1972

	Bauxite		Alumina		Total Value of Exports of Bauxite & Alumina. J\$million	Exports of Bauxite & Alumina as % age of Total Merchandise Exports
	Quantity (1,000 ton)	Value J\$million	Quantity (1,000ton)	Value J\$million		
1952	239	0.8	-	-	0.8	2.3
1955	2,182	7.8	184	9.6	17.4	26.8
1958	4,798	25.2	373	18.2	43.4	46.4
1961	4,974	26.2	703	33.8	60.0	49.5
1964	5,988	31.4	768	36.4	67.8	44.5
1966	7,028	36.8	791	38.6	75.4	46.5
1967	7,142	37.2	825	41.8	79.0	49.1
1968	6,212	38.0	908	50.8	88.8	48.6
1969	7,601	46.6	1,125	70.3	116.9	49.0
1970	7,575	75.8	1,689	106.3	182.1	65.4
1971	7,590	75.9	1,783	103.3	179.2	65.2
1972	7,049	70.5	2,102	131.4	201.9	68.8

Source: Department of Mines, Jamaica; Annual Report on the Bauxite-Alumina Industry, 1973.

4) Impact on the Economy

The G.D.P. accruing from the mining sector has grown from J\$5.2 million in 1953 to J\$141.1 million in 1972, representing an increase of 2,610 percent. It is worth noting here that the sector's contribution to G.D.P. in 1968 was only J\$72.4 million, thus we have seen a doubling of its contribution to G.D.P. caused mainly by the addition of three alumina plants between 1968 and 1972. Throughout most of the period, bauxite and alumina accounted for more than 90 percent of the sector's output. Nonetheless, the impact of this industry on the Jamaican economy must be subject to closer examination, primarily because of the vertical integrated multinational organization of the North American companies that own and control the bauxite-alumina industry in Jamaica.

Firstly, we must establish the share of the export value of this industry that accrues to Jamaica. Table 3.6 shows the expenditure of the companies within Jamaica. Column (1) represents payments mainly for transportation and construction materials and to a large extent reflects the miniscual linkages between the industry and the rest of the economy. The sudden increase in the share of current expenditure on materials and supplies between 1968 and 1972 is a reflection of the construction of three new alumina plants during this period and it is matched by a proportionate increase in the capital expenditure. It is worth noting here the relatively low share and constant proportion of wages and salaries in the value of gross output. We will return to this point in the

Table 3.6: Local Payments by The Bauxite-Alumina Companies, Current and Capital.

Year	Current J\$'000				Capital (J\$'000) (5)	Total (6)	Current as % of export value (7)
	Materials & Supplies (1)	Wages & Salaries (2)	Taxes (3)	Total (4)			
1958	2,801	5,142	8,906	16,849	6,466	23,315	38.9
1959	3,331	5,921	7,848	17,100	2,452	19,552	41.9
1960	3,469	6,617	7,482	17,568	1,506	19,074	32.0
1961	4,104	6,893	12,283	23,280	1,591	24,871	38.8
1962	3,872	8,188	14,656	26,716	3,895	30,611	43.7
1963	3,856	8,000	11,200	23,056	7,390	30,446	39.0
1964	5,176	8,496	13,200	26,872	2,078	28,950	39.6
1965	5,958	9,326	17,000	32,284	4,446	36,730	45.9
1966	4,900	11,046	15,800	31,746	22,294	54,040	42.1
1967	7,900	14,422	19,000	41,322	25,681	67,003	52.3
1968	18,073	12,274	15,400	45,747	33,600	79,347	51.5
1969	34,644	19,874	21,300	75,818	46,538	122,356	64.9
1970	38,309	22,918	31,700	92,927	45,063	137,990	51.0
1971	18,939	26,159	34,200	79,298	59,638	138,936	44.2
1972	28,071	32,510	34,137	94,718	77,950	172,668	46.9
	183,403	197,786	264,112	645,301	341,538	986,889	

Source: Economic Survey, Jamaica, Sundry Years.

next chapter. The table also shows that tax payments are the largest single item of local current expenditure and a wide year to year fluctuation in capital expenditure. Column (7) shows the local share in current operations, which varied between 32.0 and 64.9 percent.

Reasons for this low local share have been most adequately dealt with by Girvan¹¹ and a summary and update of his findings would be most adequate at this point. Firstly, he quite rightly noted that the chief influence on the local share of the industry is the share of the value added which accrues to national as compared to foreign factors of production. Since the industry in Jamaica is owned and operated by M.N.C.s, it follows that the capital is foreign owned, and therefore, the chief influence on the local share is the returns to capital as compared to the returns to labor. Other things being equal, the higher the returns to capital in value added (gross profit) the higher the foreign content of value added. In turn, the chief influence on the share of capital in value added is the capital/labor ratio employed in the production process. The higher the capital/labor ratio, the higher the returns to capital in value added "ceteris Paribus". This is

11. Foreign capital and economic underdevelopment in Jamaica.
Institute of Social and Economic Research, University of the West Indies, Jamaica, 1971.

typically the case in the Jamaican bauxite-alumina industry. In 1972 the capital/labor ratio employed in the industry was approximately J\$66,000.¹² The result being that the share of wages in value added in Jamaica is low. J. R. and U. K. Hicks in their report on finance and taxation in Jamaica, stated:

The bauxite companies.....are in a sense external to the Jamaican economy. It is easiest to think of the somewhat peculiar effect which they have had on the economy of Jamaica if we mentally put a fence around them and think of the land which has been sold to the bauxite companies.....as being outside Jamaica....If we look at the matter in this way the whole value of the bauxite ceases to be a Jamaican export; what is exported from the Jamaican economy in the narrower sense is no more than the wages paid and a few purchases of other Jamaican products, together with the taxes which they pay to the Jamaican government.

Table 3.7 shows both the national and foreign shares of intermediates and value added in gross output. The table reinforces Girvan's theory by showing that the chief influence on the local share of the industry is in fact the share of value added accruing to national as opposed to foreign factors of production. This is demonstrated by the low share of intermediates in the gross output and the correspondingly high share of value added. The relatively high share of intermediates during the period 1952-56, is probably due to the fact that this was the period in which the industry was introduced in Jamaica. Moreover, some of the share of intermediates is due more to rising unit prices than additional purchases.

12. In 1972 the capital/labor ratio employed in the industry was approximately J\$66,000.

Table 3.7: Share of Intermediates and Value Added in Gross Output, National and Foreign Content.

	TOTAL inter- mediates	value added	NATIONAL inter- mediates	V-A	FOREIGN inter- med- iates	V-A
Bauxite-Alumina (1952-56)	23	77	n.a	n.a	n.a.	n.a
Bauxite-Alumina (1957-69)	15	85	7	35	8	50
Bauxite-Alumina (1970-72)	17	83	15	32	2	51

Source: Economic Survey, Jamaica, Sundry Years.

The table shows the relatively low share of value added accruing to Jamaica as compared to that accruing to the M.N.Cs.

Table 3.8 shows taxes as the largest component of the local share, however it accounts for less than 25 percent of total value added. Hence, the share of wages and taxes together in value added is actually much less than the share accruing to the foreign factor of production, capital. The net result being that although the industry accounts for 68.8 percent of the value of all exports and 14.5 percent of Jamaica's G.D.P. in 1972, more than half of the value added in Jamaica leaves the economy by way of profits to the M.N.Cs.

Table 3.8: Percent Share of Wages, Taxes and New Profit and Depreciation in Value Added in the Bauxite-Alumina Industry.

	Wages	Taxes	Net Profit and Depreciation
Bauxite-Alumina (1957-69)	16.4	24.3	59.3
Bauxite-Alumina (1970-72)	17.4	21.3	61.3

Source: As for Table 3.7

5) Conclusion

While we have seen that the contribution of the bauxite-alumina industry to Jamaica's growth has been considerable, it has also been demonstrated that because the industry is owned by M.N.Cs., this contribution has been accompanied by severe limitations. The domestic share of the value of the industry's output has been low, few linkages exist between the industry and the rest of the economy, considerable losses have been entailed by not converting more bauxite locally and the industry uses a very high capital/labor ratio in its production process.

What is more important than the high capital/labor ratio used in this industry, is its ability to create employment within Jamaica. It is to this question that we turn in the next chapter.

CHAPTER IV

THE DIRECT EMPLOYMENT EFFECT OF THE BAUXITE-ALUMINA INDUSTRY IN JAMAICA

1) Introduction

In 1953, the first full year of bauxite production in Jamaica, Jamaica's unemployment rate was 17.5 percent. Nineteen years later, the bauxite-alumina industry has grown to the stage where it has made the mining sector the leading growth sector in the Jamaican economy. However, during the same nineteen years, the unemployment rate has increased to 22.5 percent and during this period employment grew at an annual rate of 1.2 percent. While there is no obvious connection between the bauxite-alumina industry and the unemployment rate nor the slow rate of growth of employment, the indications are that the industry can significantly influence the level of employment in Jamaica. It is the industry's precise impact on the level of employment that will be the concern of this chapter.

2) Direct Employment

Because of the high capital/labor ratio used in the bauxite-alumina industry, the amount of direct employment provided forms a very low proportion of the labor force. Table 4.1 shows the total employment provided by the industry during the period 1960 to 1972. Total employment provided by the industry did not

experience any significant growth during the period 1960 to 1968.

The total employment provided by the industry is divided into three main sections and one relatively insignificant section, "other," which accounts for primarily casual labor.

Table 4.1: Employment Provided by the Bauxite-Alumina Industry in Jamaica, 1960-72.

Year	Mining Processing & Related Activities*	Const- ruction	Agric- ulture	Other	Total Employment
1960	3,038	144	1,216	391	4,789
1961	3,334	139	885	347	4,705
1962	3,635	654	1,115	316	5,720
1963	3,624	826	1,013	299	5,762
1964	3,436	311	1,021	338	5,106
1965	3,457	526	1,119	315	5,417
1966	3,429	522	1,191	357	5,499
1967	3,938	226	1,416	437	6,017
1968	3,485	126	1,126	578	5,315
1969	4,734	2,949	1,975	521	10,179
1970	5,187	5,910	1,987	306	13,390
1971	6,162	3,938	1,145	-	11,245
1972	5,393	1,530	1,233	659	8,815

* includes prospecting labor and port workers.

Source: Department of mines, Jamaica.

The section "mining processing and related activities" is the only direct employment provided by the industry and represents the employment attributed to the industry in government statistics. Construction, on the other hand, will be considered as indirect

employment created by the bauxite-alumina industry and is included in the construction sector in all labor statistics. The section called agriculture, while making a steady and significant contribution to total employment, is in fact employment generated by the government negotiators and not the industry per se.¹ Nonetheless, the total employment provided by the industry in Jamaica, will for now include all four sections.

The significant increase in total employment provided by the industry during the period 1969-72, is, to a large extent, a reflection of the construction required for the expansion of production facilities in the form of three new alumina plants, coupled with the employment created in these plants. This can easily be seen when one observes the employment lag between "construction" and "mining, processing and related activities." Between 1969 and 1970, employment in the section "mining, processing and related activities" grew by 9.6 percent and accounted for only about 13 percent of the increase in total employment provided by the industry, while employment in the "construction" section grew by 100.4 percent and accounted for 86 percent of the increase in total employment for that period. However, during the following period (1970-71), while employment in the "mining, processing and related activities" section grew by almost 19 percent, employment

1. It was the Jamaican government who insisted that all lands owned by the companies, should be used for agricultural purposes before and after mining operations. See Reynolds in Jamaica, Reynolds Jamaica Mines Ltd., December, 1971.

in the "construction" section fell by 33 percent and caused a net reduction of 16 percent in the total employment provided by the industry. Hence from Table 4.1, we see that in 1972, with the completion of most of the necessary construction, total employment provided by the industry was significantly down from the 1969, 1970 and 1971 level.

From the above analysis, by the direct employment provided by the bauxite-alumina industry, we will now be referring to the employment created by the "mining, processing and related activities" section only. Therefore, the proportion of the labor force employed by this industry remained unchanged at 0.5 percent for both 1960 and 1968, however, in 1972 direct employment created by the industry increased to represent 0.7 percent of the labor force.

While output of bauxite grew at an annual rate of 7.0 percent during the period 1960-72, employment grew by 5.7 percent per annum. Using the ratio of employment growth to output growth as a crude measure of the output elasticity of employment, Table 4.2 shows that for the period 1960-72, a 1 percent increase in output was associated with a 0.81 percent increase in employment. For the period 1960-68, during which time very little or no expansion of production facilities took place, the output elasticity of employment was only 0.37. However, during the period of extensive expansion, i.e. 1968-72, the output elasticity of employment increased to 0.99 which is what we would expect to happen in times of large

expansions. From the figures for the period 1971-72, we can see that the industry was in the process of adjusting output and employment in order to bring the output elasticity of employment to somewhere near that for the period 1960-68.

Table 4.2: Annual Rate of Growth of Output and Employment in the Jamaican Bauxite-Alumina Industry, 1960-72.

Time Period	Percentage Change		Ratio E/O
	Output (O)	Employment (E)	
1960-61	16.0	9.7	0.61
1961-62	12.7	9.0	0.72
1962-63	-7.9	-0.3	0.04
1963-64	13.2	-5.2	-0.39
1964-65	9.3	0.6	0.06
1965-66	4.5	-0.8	-0.18
1966-67	2.2	14.8	6.73
1967-68	-8.0	-11.5	1.44
1968-69	23.1	35.8	1.55
1969-70	14.4	9.6	0.67
1970-71	3.6	18.8	5.22
1971-72	0.8	-12.5	-15.6
1960-68	5.4	2.0	0.37
1968-72	10.5	10.4	0.99
1960-72	7.0	5.7	0.81

Source: Tables 3.2 and 4.1

What then are the reasons for employment expanding as fast as output during the period of rapid expansion of production facilities? Firstly, this is a reflection of the relatively low productivity of labor that should be expected in the new companies. The effects of this was magnified by the fact that all the companies

operating in this industry in Jamaica, adhere to the unwritten rule of not "poaching" labor from each other and therefore the period required for new employees to arrive at an efficient level of productivity is increased. However, it is reasonable to expect increased labor productivity through "learning by doing."

Table 4.3 shows an index of the growth of output, employment and labor productivity for the period 1960-72, using 1960 as the base. The data in the table shows the index of labor productivity increasing steadily between 1960 and 1966, since which time it has fluctuated reaching 121 in 1972. The reduction in productivity in 1967, is a result of the general contraction of the industry in that year caused by a minor depression in the U. S. economy; 1968 showed signs of recovery and productivity was up to 127.4 on the index scale. The period 1968-72, gives evidence of our above arguments on labor productivity. In both 1969 and 1972, productivity showed significant decreases, reflecting the beginning of production by Alpart in 1969 and Alcoa and Revere in 1971. Labor productivity started to show an upward movement in 1972.

There is another related but more technical reason why employment grew as fast as output during the period 1968-72. With the advent of new production facilities, there were certain "teething" problems with the process, particularly in the case of Revere, and this resulted in a reduction of output and hence a

longer time required to achieve targeted capacity. Thus, Revere did not produce at required capacity until 1972².

Table 4.3: Index of the Growth of Output, Employment and Labor Productivity in the Jamaican Bauxite-Alumina Industry, 1960-72.

Year	(1960 = 100) Index of:		
	Output	Employment	Labor Productivity
1960	100	100	100
1961	116	109.7	105.7
1962	130.5	119.6	109.1
1963	120.2	119.3	100.8
1964	136.0	113.1	120.2
1965	148.7	113.8	130.7
1966	155.4	112.9	137.6
1967	158.8	129.6	122.5
1968	146.1	114.7	127.4
1969	179.9	155.8	115.5
1970	205.7	170.7	120.5
1971	213.1	202.8	105.1
1972	214.8	177.5	121.0

Source: As for Table 4.2

The net result of the above findings then, is that there was a downward movement of labor productivity for the industry since 1968, and while we can expect an increase in the output elasticity of employment during periods of expansion, the realistic figure will be nearer that for the period 1960-68 than for 1968-72.

2. See Report on the bauxite-alumina industry in Jamaica, Department of mines and natural resources, Kingston, Jamaica, 1972

This means that for the industry, in periods of little or no expansion, we can expect an output elasticity of employment well below 1 and probably less than 0.5.

One explanation of the employment lag then, is the increase in labor productivity caused through "learning by doing" and, of course, training. However, there are other reasons more directly related to the multinational, vertically integrated structure of the companies that own and operate the industry in Jamaica. In so far as each subsidiary company is fully integrated with its overseas parent, it is thereby divorced from the national economy, not only in respect of its output, but also in respect of its inputs and in its choice of factor proportions. In its choice of factor proportions, the firm operates within the limits of prevailing technology. In alumina processing, the chemical process dictates relatively fixed, capital intensive technology. But there seems to be a wide choice in the use of capital or labor intensive techniques in bauxite mining, which is essentially an earth moving process. However, the evidence indicates that the M.N.Cs. do use capital intensive techniques in bauxite mining in Jamaica. The output elasticity of employment for Reynolds Jamaica Mines, for example, was -0.2 for the period 1960-70³.

The use of capital intensive technology in bauxite mining in Jamaica, is doubtless influenced by the need to maintain a regular

3. See Reynolds in Jamaica, op. cit.

flow of bauxite to alumina plants, but there are other factors to be considered. The range of technology available to the M.N.C.s is North American; i.e. it is defined by the state of technology in the engineering of earth-moving equipment in the developed industrial countries. Such technology is progressively more capital intensive, reflecting the greater and greater abundance of capital in relation to labor in these countries. Thus the M.N.C.s may actually adjust their production methods to factor prices, but the price ratios they face are quite different from local firms.

Yet another reason for the employment lag is the existence of significant economies of scale, particularly in alumina production. In 1945 Engle, Gregory and Mosse estimated that on the basis of early 1940s prices, there was a 20 percent difference in cost between a 100,000 and a 500,000 ton per year alumina capacity.⁴ From Table 3.1 we can see that all but one of the alumina producers in Jamaica have rated capacities above 500,000 tons per year.⁵ In the case of alumina production, there may also be a shortage of some types of skilled labor required by the firms, and therefore, the firm may have to bear the cost of training, thereby contributing, along with other labor market imperfections, to make the price of labor relative to capital (to the M.N.C.s) not such as to encourage its use. However, this is not the case in bauxite mining and

4. Engle, Gregory, Mosse, Aluminium, an industrial marketing appraisal, Irwin, Chicago, 1945.

5. Alcoa's capacity is near enough to 500,000 tons per year to include them in this group.

there could simply be a limit to the availability of labor intensive techniques for this process.

The analysis of the direct employment effect of the bauxite-alumina industry in Jamaica, must be taken a stage further in order to show the differing employment effects of bauxite mining alone as opposed to bauxite mining and alumina production. However, in the absence of data on employment and output for each company, it must suffice at this stage for us to estimate this differential based on limited data.

In 1970, Reynolds Jamaica Mines produced 2,549,769 long tons of bauxite and employed only 548 workers. In 1972, Alcan (Jamaica) Ltd., an alumina producer, employed 2,143 workers in order to mine and convert 2,601,177 long tons of bauxite into 1,040,471 tons of alumina. Therefore, we can see that for approximately the same quantity of bauxite mined, reduction to alumina increased direct employment almost four-fold.

Using the output/labor ratio for Alcan (Jamaica) Ltd., and assuming constant technology across firms in the industry and over time, we can estimate the level of employment that would have been provided by the industry, had all bauxite been converted into alumina during the period 1960-72.

Table 4.4 shows these estimates and the difference between them and the actual employment that was provided by the industry in Jamaica. The table indicates that in any of the years covered, relatively substantial employment gains could have been had with

more processing within Jamaica. In fact as exports of bauxite grew during the 1960s, it served to increase the level of potential full-time jobs that could have been enjoyed by the Jamaican people.

From the table, we can see that in 1961, had all bauxite mined been converted into alumina, the industry would have provided more jobs in that year than it actually did in 1972, and, from our discussions in the previous chapter, it could have done this without loss of revenue to the government. Moreover, the industry could have almost doubled the level of employment in 1972 by taking the process to the alumina stage within Jamaica.

Using information from Table 4.4 and the output/labor ratio in the U. S. smelting and aluminium ingot fabricating industries, we estimate that the employment content of exports from the Jamaican industry in 1972 was approximately 4,700 full-time jobs in alumina processing and 21,000 full-time jobs in smelting. In other words the total employment content of output from the Jamaican bauxite-alumina industry in 1972 was estimated to be approximately 26,000 full-time jobs or approximately 14 percent of the unemployed labor force in Jamaica for that year. This of course excludes the employment created in the production of inputs for these processes and the massive employment in semi-fabrication. All this means that in 1972, the Jamaican bauxite-alumina industry exported about five times as many jobs as it provided within Jamaica. To say that the participation in the overall benefits, and specifically in the

employment content of the industry, was highly unequal, would therefore be a gross understatement. Nonetheless, it must now be recognized, that this industry is a particularly capital intensive one.

Table 4.4: Estimates of Employment Levels in the Bauxite-Alumina Industry in Jamaica, had all Bauxite Been Converted into Alumina, 1960-72.

Year	Employment if all bauxite was Converted to Alumina	Actual Employment Provided by Industry	Employment Foregone
1960	4,940	3,038	1,902
1961	5,695	3,334	2,361
1962	6,430	3,635	2,795
1963	5,950	3,624	2,326
1964	6,715	3,436	3,279
1965	7,348	3,457	3,891
1966	7,675	3,429	4,246
1967	7,840	3,938	3,902
1968	7,210	3,485	3,725
1969	8,885	4,734	4,151
1970	9,720	5,187	4,533
1971	9,680	6,162	3,518
1972	10,140	5,393	4,747

There is also another very important point not to be overlooked. Any expansion of the process within Jamaica, to include aluminium production, would also mean very large incremental increases in government revenue from the industry - revenue that could be used for reinvestment in the local economy. This is the type of reinvestment capital that Professor A. Lewis spoke about in

his historic paper on "Economic Development with Unlimited Supply of Labor." Therefore, the employment foregone by the Jamaican people is clearly in excess of the 26,000 jobs exported in 1972, and must include the new jobs that would have been generated by the investment of this large increase in government revenue from the industry.

3) Wages and Productivity

On average, money wages increased at a faster rate than productivity which grew by 24.8 percent during the period 1960-72. This increase in productivity represents an annual rate of growth of 2.1 percent (see table 4.5). When adjustments are made for changes in import prices, real wages lagged somewhat behind productivity for this period. This result is in contrast with the popular opinion that bauxite wages are growing at a disproportionate rate, moreover there is evidence that since 1960 wages in other sectors have been rising faster than in the bauxite-alumina industry.⁶ However, it must be pointed out that wages in the bauxite industry were growing from a much higher base than other sectors.

6. For the period 1960-65, the growth in money wages of unskilled workers in the bauxite industry was 64.1 percent, while money wages in construction grew by 146.7 percent, sugar by 106.3 percent and food and beverages by 128.6 percent. The data is taken from the department of statistics, annual report on wage rates, Jamaica.

Table 4.5: Growth of Productivity, Real and Money Wages in the Bauxite-Alumina Industry, 1960-72.

Year	Money Wages		Real Wages (1965=100)		Productivity
	J\$	% age change	J\$	% age change	% age change
1960	n.a	n.a	n.a	n.a	n.a
1961	n.a	n.a	n.a	n.a	5.7
1962	n.a	n.a	n.a	n.a	3.2
1963	n.a	n.a	n.a	n.a	-7.6
1964	0.58	n.a	0.59	n.a	19.2
1965	0.61	5.2	0.61	3.4	8.7
1966	0.67	9.8	0.64	4.9	5.3
1967	0.71	6.0	0.66	3.1	-11.0
1968	0.83	16.9	0.68	3.0	4.0
1969	0.83	0.0	0.67	-1.5	-9.3
1970	0.89	7.2	0.70	4.5	4.3
1971	1.00	12.4	0.72	2.9	-12.8
1972	1.00	0.0	0.66	-8.3	15.1
		7.2		1.5	2.1

Source: Collective Labor Agreement, Sundry Years; Table 4.3 and Statistical Abstract, 1972, Department of Statistics, Jamaica.

The capital structure of the industry has contributed to a pronounced disparity in the value added per worker between the industry and the rest of the economy, with the resulting of a much higher level of wage rates in the mining sector. The gross product in Table 4.6 illustrates the situation. The gross product per worker in the mining sector was J\$17,500 in 1972, which was almost five times the product per worker in transportation, communication and public utilities; almost ten times the product per worker in manufacturing and over forty times the product per worker in agriculture. Viewed in this way, the mining sector appears as a

highly capitalized enclave within an otherwise largely underdeveloped economy.

Table 4.6: Gross Product Per Worker by Industrial Sectors, 1972.

Industry Groups	Gross Domestic Product J\$'000	Labor Force (thousands)	G.D.P. per Worker J\$
Agriculture	93,611	216.8	431.8
Mining	129,340	7.4	17,500
Manufacturing	165,514	93.1	1,777.8
Construction	130,866	52.5	2,492.7
Transportation Communication & Public Utilities	102,843	29.1	3,534.1
Commerce & Finance	192,015	90.7	2,117.0
Services	240,863	244.4	285.5

Source: Statistical Abstract, Department of Statistics, Jamaica, 1972

The question of the impact of the relatively high wages paid in the bauxite industry on wages in other sectors and its implication for unemployment must be given special attention.

It has been the popular opinion for years that the advent of the bauxite industry and the accompanying high wages paid had the effect of forcing up wages in other sectors. This of course was just, since it was very difficult, if not impossible, to maintain different wage levels within the economy. However, one basic and vital point was overlooked: bauxite workers incomes were high because productivity was high. When incomes in the other sectors rose however, there was no corresponding increase in productivity and inevitably prices increased or firms mechanized.

The most interesting thing about these popularly believed views is the fact that they have never been empirically proven. Brewster⁷, on the other hand, has empirically tested some of the above assumptions and a summary of his findings should shed some light on the subject.

Brewster's study showed quite clearly that while money wages for the economy as a whole rose faster than productivity, real wages lagged behind. This relationship between real wages and productivity was shown to be true for most sectors including agriculture. On this point Brewster's findings are supported by Hall.⁸ In his study, Hall found that changes in productivity was the key explanatory variable of changes in money wages. These results are in serious contrast with those of our initial "popular opinion."

Hall's study also showed that only for unskilled workers was there any significant relationship between wage rates in the mining sector and those of other sectors, and even then, the coefficient was only 0.1, indicating great inelasticity in the impact on money wage changes of the relative difference of wages in the mining sector. This study showed that it would require a 50 percent difference in wage levels between mining unskilled and other unskilled to generate 5 percent increase in the wage rates of the other unskilled.

7. Havelock Brewster, Wage, Price and Productivity Relations in Jamaica, 1957-62, Social and Economic Studies, vol. 17, No. 2, June, 1968

8. Marshall Hall, An analysis of the determinants of money wage changes in Jamaica, 1958-64, Social and Economic Studies, vol. 17, No. 2, June, 1968.

Secondly, Brewster demonstrated that inter-industry wage differentials could and were maintained in the economy. Table 4.7 shows an index of inter-industry differentials in average earnings of unskilled labor. The table clearly shows that for more or less homogenous kind of labor, the inter-industry differences in wage rates are surprisingly large and have been tending to widen between 1957 and 1961. These general occurrences are in spite of large-scale unemployment and a falling trend in employment.

The principal reason for this inter-industry difference in wage-rates is the ability-to-pay criterion used by unions in conducting wage negotiations.

Both Brewster and Hall concluded that the wage-rate in the bauxite industry had very little to do with the wage increases in other sectors, but instead the main determinant of these was the corresponding increase in productivity in those sectors. These findings suggests most strongly that trade unions have increased wages for their members and thus maintained labor's share of the total domestic income, at the expense of growing inequality and rising unemployment among the laboring class rather than non-labor income.

In the light of these findings and the absence of any new or improved data on wage rates in Jamaica, one must conclude that while the presence of the bauxite industry in Jamaica might have encouraged the union's use of the ability-to-pay criterion in wage negotiations, the actual wages paid in the industry has not in fact forced up

wages in other sectors faster than they would have risen and therefore, the industry cannot be reasonably accused of being the cause of unemployment in other sectors.

Table 4.7: Index Number of Inter-Industry Differentials in Average Earnings of Unskilled Workers

	1957	1960	1962
Mining	411	448	531
Construction	284	204	247
Commerce	244	257	259
Manufacturing	224	200	198
Services	196	183	259
Transportation	161	166	208
Sugar	146	149	173
Agriculture	100	100	100

Source: H. Brewster, Wage, Price and Productivity Relations in Jamaica, 1957-62, Social and Economic Studies, Vol. 17, No. 2, June, 1968.

Because the bauxite-alumina industry in Jamaica is owned and controlled by M.N.C.s, wages are best viewed as simply another form of payments to the national economy for the exploitation of its resources. The absolute level of wages can now be seen in its true perspective as being no more than a distributive mechanism for some payments to the economy and therefore the wage rate paid in the industry will be of greater interest to the government than to the companies (so long as it remains significantly less than the wage rate for the industry's North American counterpart) because income distribution in this case, is the governments responsibility.

The industry's share of Jamaica's total wage bill in 1972 was only 5.4 percent, as compared to its 14.5 percent share of gross domestic product in the same year.

Finally we must comment further on the secondary employment effect of the bauxite industry. From the previous chapter and our comments so far in this chapter, it should be clear that there are very few linkages between this industry and the rest of the economy. Nevertheless, it is necessary for us to discuss the more significant secondary employment effects of this industry.

The major secondary employment generated by this industry is restricted to those sectors shown in Table 4.1, namely agriculture and construction, as well as transportation. The companies have had to undertake farming operations in Jamaica. This followed from their legal obligations to maintain the land they had acquired in at least the pre-existing state of agricultural productivity, and to restore mined out areas to their previous state of agricultural productivity. In some instances, usually with companies that only mine bauxite, this agricultural operation, which is not their principal objective, has provided more jobs than their bauxite mining operations. For example, Reynolds Jamaica Mines employed more than twice as many people in their agricultural operations than they did in their bauxite mining operations. However, it should be pointed out that the vast majority of their agricultural employees were temporary contract workers. The employment generated by the industry's agricultural operations varied between 885 and

1,987 workers during the period 1960-72 (see Table 4.1) and averaged 1,265 workers per year.

The stimulation of a large increase in the output and capacity of the construction industry must be credited to the bauxite industry.⁹ This is all the more significant since the construction industry is locally owned and being a labor-intensive industry it creates significant employment and labor income. Moreover, since the construction industry is based to a large degree on indigenous inputs, it has substantial backward linkages with the rest of the economy. However, it must be remembered that secondary employment in construction is most heavily stimulated during periods of heavy capital investments by the bauxite industry. Hence, during the period covered in Table 4.1, relatively high employment was only generated during during the period 1969-72 during which there was large scale expansion of production facilities in the bauxite industry. Nonetheless, almost 6,000 construction jobs were created by the bauxite industry in 1970.

The bauxite industry also generated very limited secondary employment in the transportation sector, namely in the transport by rail of alumina from plants to port. This secondary employment was limited because the rail service was only used by Alcan (Jamaica) Ltd. and more recently by Alcoa.

9. Norman Girvan, Foreign Capital and Economic Underdevelopment in Jamaica, Institute of Social and Economic Research, University of the West Indies, Jamaica, 1971.

The fact that in 1970 the bauxite industry in Jamaica generated more secondary than direct employment, is clear indication of the industry's potential for generating new and highly productive jobs. However, this depends directly on the extent to which the industry is integrated into the rest of the economy.

It is evident that the extent to which the latent potential of the industry as an employer of labor is realized, depends principally on two factors. First, the extent to which the transformation of the ore into the finished product is carried out within the economy. The second factor relates to the extent to which the form of organization in the industry permits technology and capital it accumulates to be made available to other sectors.

It is immediately evident why the realization of such potential of the Jamaican bauxite-alumina industry must be virtually non-existent. In 1972, 57 percent of bauxite output had been exported as dried ore, the remainder having been carried only to the alumina stage. The absence of linkages with the rest of the economy is conspicuously small. The result being that by far the bulk of value added and jobs has been exported to North America. Jamaican production has been confined to the relatively insignificant stages of the industry.

4) Corporate Decision-Making and the Distribution of Benefits

It was the M.N.C.s which determined that Jamaica's bauxite would be transformed abroad rather than at home. Being vertically integrated, these companies themselves carry out the stages of

production of alumina, aluminium smelting and semi-fabrication. Some also provide inputs for these processes, such as hydro-electric power (Alcan and Alcoa) and caustic soda (Kaiser).

How far were these locational decisions influenced by the fact that the agents of decision-making were M.N.C.s? In attempting to answer this question, it is important for us to examine those factors that applied to the companies in the early 1950s in such a way as to make processing within North America the natural choice.

Following the end of the second world war, the U. S. government in their continued effort to break the monopoly held by Alcoa in the aluminium industry, sold aluminium smelters, an alumina plant and bauxite mines, originally costing U.S.\$174 million to Reynolds for a mere U.S.\$57.6 million. Kaiser obtained smelters and an alumina plant originally costing U.S.\$127 million, for a sum of U.S.\$43.5 million.¹⁰ In so far as Jamaican bauxite was fed into these processing capacities, it was clear that for these companies, there would have been no question of contemplating the establishment of alumina processing, smelting nor semi-fabricating capacity within Jamaica.

With the outbreak of the Korean war and the resultant increase in demand for aluminium, the existing capacities of the U. S. firms was clearly insufficient to accommodate the companies' planned

10. This and other information in this chapter taken from M. J. Peck, *Competition in the aluminium industry, 1945-58*, Cambridge, 1961.

increase in output. The question of the location of incremental capacity had to be decided. Both Reynolds and Kaiser opted to take advantage of the existence of economies of scale in large alumina plants and expanded their existing (government built) alumina plants instead of building new plants in Jamaica.

While economies of scale and the ownership of subsidized processing capacity may explain these decisions, they do not explain why new alumina plants designed specifically for Jamaican bauxite were built within the United States rather than in Jamaica by both companies in the 1950s. Even when one remembers that there was a duty on imported alumina and none on bauxite, in terms of variable costs, it would have been 12 percent cheaper to produce and transport the alumina from Jamaica, inclusive of duty, than to produce it on the Gulf Coast from bauxite shipped from Jamaica.¹¹

We are thus forced to look for other factors to explain the locational decision. One such factor could have been security conditions. These plants were built at the height of the Korean war and the growth of the cold war, and the United States was understandably sensitive about the vulnerability of the sea route across the Caribbean to sub-marine attacks. The value of a ton of alumina at that time was about eight times that of a ton of bauxite, so that losses were obviously much less for the shipment of ore. However, these fears of shipping losses must have been

11. H. D. Huggins, *Aluminium in changing communities*, Andre Deutsch in association with the Institute of Social and Economic Research, University of the West Indies, Jamaica, 1965.

minimized by the proximity of Jamaica to the gulf coast, a fact which allowed for the protection of shipping lanes by land based aircrafts.¹² Because of the relationship between the companies and the U. S. government, it is also possible that the U. S. government was reluctant to allow the companies to build alumina plants in countries which were not proven politically "safe."¹³ This feeling is reinforced by the recently reported decision by Alcoa to locate a smelter in Puerto Rico, which has neither bauxite nor cheap conventional sources of electric power; a point to which we will return later. Another, though weaker, factor was that these plants could yield external economies which could be internalized by the companies.¹⁴

These new plants did not only prevent alumina processing in Jamaica in their year of construction, but instead, with the existence of economies of scale, this meant that as alumina needs of the two companies grew over the late 1950s and early 1960s, incremental alumina capacity was provided by simply adding to the capacity of these plants. Thus it was not until the late 1960s

12. See footnote 3 in Chapter 3.

13. At the time of the construction of these plants, Jamaica was still a British colony, which had been pressing for independence from before the second world war. These claims for independence were expressed in various forms including wide spread riots in the late 1930's. The U. S. at that time had very little to do with the internal affairs of Jamaica, and may have felt that it required more time to evaluate the "political safety" of Jamaica.

14. Huggins points to the production of electricity in the caustic soda and alumina processes as one such external economy. H. D. Huggins, op. cit., p 50.

that new plants were required, giving rise to the decision by Reynolds and Kaiser, in consort with Anaconda to build an alumina plant in Jamaica, and in 1969 Alumina Partners of Jamaica (Alpart) started production of alumina in Jamaica. Alcoa and Revere, who had entered Jamaica much later than the others, soon followed Reynolds and Kaiser and constructed alumina plants in 1970 and 1971 respectively. Thus for the first eighteen years of the life of the Jamaican bauxite industry, a situation existed whereby three-quarters of the bauxite produced was exported in its unprocessed state.

Now that the existence of alumina supplies within Jamaica is no longer a limiting factor on the undertaking of further stages of processing for the U. S. companies, the question of the location of these processes needs to be taken in its own right. In the case of Alcan, the alumina stage was carried out within Jamaica from the outset, so that smelting within the country has always been a real possibility.

The feasibility of smelting is inextricably tied up with the availability of a large, regular supply of electric power at low cost. For every short ton of metal produced, between 16,000 and 20,000 kilowatt hours of electricity are consumed.¹⁵ Because Jamaica had no conventional source for the production of the enormous quantity of electricity required for smelting, it seems unlikely that Jamaica could have started a feasible aluminium smelting

15. United Nations department of economic and social affairs, Pre-investment data of the aluminium industry, New York, 1966, p 15.

industry in the early 1950s. Alcan built their required smelting capacity in British Columbia, where it developed its own hydro-power to treat Jamaican alumina. Alcoa, Kaiser and Reynolds built theirs in the pacific northwest and on the gulf coast, where they had access to electric power based on water and natural gas.

However, it is only in the static sense that the provision of electric power is dependent on the existence of conventional sources. In the dynamic, long run sense it is ultimately dependent on the direction and rate of technological progress. This in turn depends on the particular needs and objectives of the institution undertaking the activities of research and development. It is not unrealistic to assume that institutions concerned with maximizing the national value added on Jamaican bauxite would have allocated considerable research resources to the problem of developing new methods and sources of obtaining cheap and abundant power.

By 1966 nuclear technology had advanced to the stage where large plants could successfully compete with conventional power sources and provide electricity at a price sufficiently low for feasible aluminium production. In late 1966 it became clear that in the U. S. nuclear power would be competitive with coal and water-based power in the satisfaction of incremental demand. Thus a pacific northwest power group decided to build a 1,000 M. W. nuclear plant in the heart of traditional low cost hydro-power supplies.

Reactors with capacities of 500 to 1,000 M.W. would require aluminium production of between 200,000 and 400,000 tons per annum to provide a continuous market for the power at a high load factor.

This in turn requires alumina supplies of 350,000 to 750,000 tons per year, which is well within the alumina capacity of Alcan, Alpart and Alcoa's operation in Jamaica. However, in none of the cases is such a development being planned.

It was not difficult to envisage why the companies remained indifferent to the possibilities of smelting in Jamaica during the 1950s and early 1960s. To locate incremental capacity within North America would afford the possibility of expanding existing smelters, making possible economies in the capital costs of plant expansion and in current operational costs.¹⁶ For Alcan and Alcoa, large excess hydro-power potential could be brought into use, and both Kaiser and Reynolds would be able to bring company owned coal deposits into use. All these possibilities would become the opportunity cost of erecting a smelter-cum-nuclear power complex in Jamaica.

However, while these conditions may have been the reasons for the absence of aluminium production in Jamaica during the 1950s and early 1960s, it is difficult to find an economic explanation of the announcement, in 1969, by Alcoa of plans for construction of a smelter in Puerto Rico, a nation without neither bauxite nor cheap conventional source of electric power. This action leads the writer to conclude that there must be other non-economic factors which are considered by the M.N.C.s in determining the allocation of resources for this industry.

16. United Nations, op. cit., pp 13-18.

All this is not to say that smelting based on nuclear power is not feasible in Jamaica. It simply may not be rational to the present agents of decision-making and resource allocation. From the Jamaican point of view, the feasibility calculus would look entirely different. Thus what influences the investment decisions is not merely the comparison of costs and returns, but also whose costs and whose returns are being considered, i.e. who makes the decisions and determines the resource allocation.

So far as semi-fabrication goes, the possibilities are virtually ruled out as long as aluminium is not produced within the country, a stage in the process which appears in the light of the announced Puertican smelter, to be a long way off. Finally, the surplus created by this industry and others in the global complex of these M.N.C.s are not available for investment in other industries within Jamaica. The M.N.C. will allocate reinvestment funds according to the conditions that are necessary for the maximization of their global operations, without particular regard for the needs of specific nations in which they operate. Capital mobility between the industry and other industries in Jamaica is non-existent. This is a particularly serious limitation, in that bauxite is a wasting asset, and the social calculus would require that part of its surpluses be used to develop other industries in anticipation of time when reserves become exhausted or when technological changes make the industry no longer the engine of growth.

From the above analysis, it is clear that the locational decisions were a direct result of the fact that the agents of decision making were vertically integrated M.N.C.s. Since the potential of this industry as an employer of labor depends primarily on the question of resource allocation within Jamaica and on the extent to which capital and technology is transferred to other sectors of the Jamaican economy, it must now be clear that the Jamaican government must take immediate steps to transfer the powers of control and decision-making to agencies directly concerned with the problem of unemployment and the economic development of the country in general.

5) Conclusion

The evidence indicates quite clearly that the absolute level of direct employment generated by this industry is relatively small because of the prevailing technology used. We estimated that in 1972, approximately 26,000 jobs were exported from Jamaica, however, this accounts for only 14 percent of the unemployed labor force in that year. Of course, the absolute level of employment in the industry could be increased by the development of labor intensive bauxite mining techniques. This, however, would not be the primary interest nor responsibility of the M.N.C.s, but instead the Jamaican government.

Nonetheless, it was shown that the major employment benefits of this industry lie in the expansion of the process, to at least

the aluminium stage, within the country. On the other hand, we saw that the methodology used by the M.N.C.s in making decisions about resource allocation, excluded Jamaica from participating in the more important stages of the industry to date.

CHAPTER V

SUMMARY AND CONCLUSION

There can be little doubt that unemployment has been and continues to be one of the greatest problems facing Jamaica. Our analysis of unemployment in Jamaica, showed that the unemployment rate in 1972 was within 3 percentage points of the rate for 1943, almost thirty years before.

Unemployment is basically the residual left after the equalizing of demand and supply of labor in an economy. In the case of Jamaica, the government has traditionally and still, to a large extent, concentrates its efforts in the area of reducing the supply. They have done this by promoting and sponsoring birth control programs and emigration. Nonetheless, the evidence shows that while the rate of population growth was slowed from 1.4 percent during the period 1943-60 to 1.13 percent for the period 1960-70, unemployment increased from 13.5 percent in 1960 to 22.5 percent in 1972. This clearly shows that population increase was not the main cause of the increase in the unemployment rate.

During the period 1960-72, the population of Jamaica increased by 21.2 percent and the labor force grew by 23.6 percent. The population 14 years and over increased by only 13.2 percent, and the remainder of the increase in the labor force was made up by a large increase in the labor force participation rate for women, which increased from 48.1 to 60.3 percent during the period 1960-72. On the other hand, employment increased by only 10.8 percent, and hence the ranks of the unemployed increased by 93,000 persons. It is precisely this slow increase in the level of employment provided within the economy that seems to be the major cause of the increase in the unemployment rate.

So the evidence shows clearly that while the government definitely reduced the rate of supply of labor, the economy just did not generate enough new jobs to absorb the labor force. Our analysis went forward and showed some of the reasons why the government failed in accelerating the rate of growth of employment. The bauxite-alumina industry was used as a classic example of this failure.

It is clear that the bauxite-alumina industry has been the most important single industry in the post war economic growth of Jamaica. The statistics on the industry were quite impressive, for instance, exports from this industry accounted for 68.8 percent of the value of all domestic exports. However, our analysis also showed that less than 50 percent of the value of output from

this industry, accrued to national as compared to foreign factors of production.

The absolute level of employment provided by this industry in 1972 was only 5,393. Our analysis also showed that in the same year the employment content of exports from the industry was about 26,000 full-time jobs in alumina processing and aluminium smelting. This represented 14 percent of the unemployed labor force. While these jobs alone would not solve the unemployment problem in Jamaica, it still represents a relatively substantial amount of jobs foregone.

It is totally unrealistic for one to expect any one industry to absorb all or even most of the unemployed labor force in any developing country. However, when one remembers that the extension of the process to include aluminium production within Jamaica, also means substantial increases in government revenue and that such revenue could be used for investment in other industries, then the full potential of this industry as a catalyst for expanding employment and output in the economy can be clearly seen.

The significance of a high degree of capital-intensity in the industry merits special comment. It is normal to regard as a disadvantage the capital-intensity of an industry such as bauxite-aluminium in a developing economy such as Jamaica. The disadvantages of capital intensity are real, and we have seen how they apply to the Jamaican case. However, it should be pointed out that

there are certain advantages which, although they have not so far been enjoyed by the Jamaican economy, are potentially available. Capital intensity can give a great stimulus to the development of a capital goods industry.

The concept of a capital goods industry within Jamaica also warrants special comment. While Jamaica on its own, might not now have all the necessary resources for the development of such an industry, it certainly gains this potential when viewed as part of a larger integrated Caribbean state. The direction of development plans since the 1960s, have been towards the establishment of meaningful economic linkages between all the English speaking Caribbean countries. This of course, serves to widen the resource base and also expand the local market for such products. The logical extension of such a plan would, of necessity, eventually involve the entire continent of South America which is now bound by similar arrangements with foreign capital as is Jamaica.

While the sum required to establish the industry may be large, so is the share of profit in the value of output, therefore capital investments can be recovered within as short a time as labor intensive investments. Moreover, once the industry reaches maturity, it can begin to provide a large and growing stream of investable surpluses to other more labor-intensive industries, something that labor intensive activities have a limited capacity to do. Capital

intensiveness can therefore decidedly enhance an industry's ability to contribute to the transformation of the economic structure.

The solution to Jamaica's unemployment problem clearly does not only or even mainly lie in the control of population growth, but instead, it depends on the expansion of employment within the economy. In this respect, the bauxite-alumina industry is unmatched in terms of being a potential catalyst for expanding employment. Expansion of productive employment within Jamaica requires capital, which is at present not available neither to the Government nor private sector. We have demonstrated that the expansion of the industry within Jamaica, to at least the aluminium stage, would not only increase the direct employment provided by the industry 500%, but would afford the Government badly needed investable capital. However, the evidence presented also clearly showed that the extension of the processes performed within Jamaica depends on decisions of resource allocation made by the M.N.C.s. In light of the Puerto Rican smelter, it seems very unlikely that Jamaica will participate in the more important stages of the processes for the foreseeable future. This of course negates the possibility of the industry generating substantial incremental investable capital.

The situation highlights the obvious conflicts of interest between the M.N.C.s and Jamaica. It is the government's responsibility to use all the resources of the nation to the maximum benefit of the people. Under the present arrangement, most of the value of output goes abroad to the M.N.C.s in the form of profits. The decision

to extend the process to the aluminium stage within Jamaica also depends on the M.N.C.s. However, the responsibility of expanding employment is the government's. Surely, this is a totally unacceptable position for governments to be in. On one hand, there is no way for them to force the M.N.C.s to produce aluminium within Jamaica and it is reasonable to expect an absence of such developments until it fits into the global profit maximizing model of the M.N.C.s, and on the other hand, the profits now being generated from the industry is not available for investment within Jamaica. Therefore, it seems that if the Jamaican government is to fulfill its responsibility to its people, it has, of necessity, only one course left open to it - that is, nationalize the industry and use the profits for reinvestment which along with the birth control programme has serious possibilities of solving the unemployment problem.

Moreover, since foreign capital has been the principal factor responsible for the high rate of growth of the post-war Jamaican economy, the application of similar policy decisions to other sectors of the economy could only serve to expand present employment in those industries and to generate more surplus capital for investments in new industries.

BIBLIOGRAPHY

- Annable Jr., James. The transference of technology, industrialization and the urban Employment problem in Low-income Countries. Ph.D dissertation, Princeton University, 1971.
- Aronson, Robert L. Labor Commitment Among Jamaican Bauxite Workers, New York State School of Industrial and Labor Relations, Cornell University.
- Best, L. "A Model of Pure Plantation Economy" Social and Economic Studies, September 1968.
- Bracewell, Smith. Bauxite, Alumina and Aluminum. Overseas Geological Surveys, Mineral Resources Division, London H.M.S.O. 1962.
- Brewster, Havelock. "Wage, Price, and Productivity Relations in Jamaica, 1957-62." Social and Economic Studies, June, 1968.
- _____ Economic Dependence: A Quantitative Interpretation, Social and Economic Studies, March, 1963.
- _____ and Thomas, C. Y. The Dynamics of West Indian Economic Integration, Institute of Social and Economic Studies, March, 1967.
- Brown, Charles, Saunders, James et. al. Report on the Geology of Jamaica, Longmans Green and Co., London, 1869.
- Cumber, G. E. "A Comparison of Statistical Data on the Jamaican Labor Force, 1953-61" Social and Economic Studies, December 1964.
- Department of Mines, Jamaica, Annual Reports.
- Edwards, J. Unions versus Management, ABENG Pamphlet No. 1, October, 1971.
- Engle, Gregory, Mosse. Aluminum; an industrial Marketing appraisal, Irvin, Chicago, 1945.

Farrell, T.M.A. The Multinational Corporation, The Petroleum Industry and Economic Underdevelopment in Trinidad and Tobago, Ph.D. dissertation, Cornell University, 1974.

Geological Survey Department, The Mineral Resources of Jamaica. Kingston, Jamaica; Bulletin No. 8, 1973.

Girvan, N. Foreign Capital and Economic Underdevelopment in Jamaica, Institute of Social and Economic Studies, University of the West Indies, March, 1971

_____ "Regional Integration vs Company Integration in the Utilization of Caribbean Bauxite" Third Caribbean Scholars Conference: Caribbean Integration.

_____ "The Guyana-Alcan Conflict and the Nationalization of Demba" Readings in Government and Politics of the West Indies.

_____ "Why we need to Nationalize Bauxite and How" Readings in the Political Economy of the Caribbean.

_____ "Multinational Corporations and Dependent-Underdevelopment in Mineral Export Economics" Social and Economic Studies, December 1970.

Gleaner (Jamaica) Daily.

Hall, Marshall "An analysis of the determinants of Money Wage changes in Jamaica, 1958-64" Social and Economic Studies, June, 1968.

Henry, H. H. G. The Role of the Bauxite Industry in the Economic Development of Jamaica, M. A. Thesis, Cornell University, 1960.

Hicks, J. R. and U. K. Report on Finance and Taxation in Jamaica. Kingston, Government Printers, 1955.

Huggins, H. D. Aluminium in Changing Communities, London, Andre' Deutch and ISER, 1965.

International Labor Organization, Employment objectives in Economic Development.

_____ Employment and Economic Growth, I.L.O., Geneva.

- Jamaica, Government of Five Year Independence Plan 1963-68.
Kingston, Government Printing Office, 1963
- _____ Ministry paper No. 2, 1957.
- _____ Ministry paper No. 52, 1966.
- Jefferson, O. The Post-war Economic Development of Jamaica,
ISER, March, 1972.
- Journal of the Geological Society of Jamaica, Bauxite/Alumina
Symposium, 1971. Special Issue.
- Lewis, Vaughn. "Comment on Multinational Corporations and
Dependent-Underdevelopment in Mineral Export Economics."
Social and Economic Studies, December, 1970.
- Lewis, W. A. "Economic Development with Unlimited Supplies of Labor"
Manchester School of Economic and Social Studies, Vol XXII,
No. 2, 1954.
- _____ "The industrialization of the British West Indies"
Caribbean Economic Review, No. 2, May, 1960.
- Marshall, W. K. "The Rise of the Peasantry in British West
Indies." Social and Economic Studies, September 1968.
- McFarlane, Carmen, Education and Employment: An Assessment of the
institutional Response by the Jamaican Education System to the
demand for skills. M. S. Thesis, University of the West Indies,
1968.
- Morse, C. A. The Measurement of Levels of Living with Specific
Reference to Jamaica, H.M.S.O., 1957.
- Okun, Arthur, M. The Battle Against Unemployment, Norton and
Company Inc., New York, 1972.
- Peck, M. J. Competition in the Aluminium Industry, 1945-58.
Harvard University Press, Harvard, 1961.
- Reynolds Jamaica Mines Ltd. Reynolds in Jamaica, 1971.
- Roberts, G. W. and Hills, D. O. "Study of External Migration
Affecting Jamaica, 1953-55. Supplement to Social and Economic
Studies, 1958.

Rodney, Walter. How Europe Underdeveloped Africa. Bogle-L'Ouverture Publications and Tanzania Publishing House, 1972.

Strassream, W. Paul, Technological Change and Economic Development.

United Nations, Department of Social and Economic Affairs. Pre-Investment Data for the Aluminium Industry, New York, 1966.

United States, Bureau of Census, Census of Manufactures, 1970.

_____ Bureau of Mines, Minerals Yearbook (Annual).

_____ Bureau of Mines, Materials Survey -- Bauxite, 1953.

_____ Department of Commerce, Bureau of Economic Analysis, Special Survey of U. S. Multinational Companies, 1970.

Wallace, D. H. Market Control in the Aluminium Industry, Harvard, 1937.

Williams, Eric. Capitalism and Slavery, Chapel Hill, University of North Carolina Press, 1944.

Yhi-Min-Ho Development with Surplus population - the case of Taiwan: A Critique of the Classical Two-Sector Model, a' la Lewis. Economic Development and Cultural Change, January 1972.

Zans, V. A. "Bauxite Resources of Jamaica and the Development." Colonial Geology and Mineral Resources, Vol. 3., No. 4, 1952.