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INDUSTRIAL DEVELOPMENT IN TANZANIA: AN ANALYSIS OF THE PATTERN OF INDUSTRIALIZATION AND ITS RELATIONSHIP TO EMPLOYMENT AND PRODUCTIVITY

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ABSTRACT

The study attempts to analyze some of the problems that are faced by a developing country which has been colonized and which upon achieving independence is determined to initiate industrial programs in order to raise the income per capita of her people. The study would specifically seek (1) to analyze the industrial pattern in its historical setting in order to appreciate future institutional changes necessary to bring about rapid economic development, (2) to determine the relationship between labor and capital and ownership, (3) to examine some of the theoretical and practical usefulness of the census reports published by the government agencies relating to labor productivity, (4) to identify the extent to which common market arrangements have historically affected the development of the industries in Tanzania.

The study adopts both descriptive and econometric methods using cross section data covering 50 firms. It was found out that industrial pattern has been biased against the capital goods sector and there was a positive relationship between labor and capital while foreign ownership indicated a negative relationship. Collinearity problems between the independent variables output and capital seemed to have made the coefficient of capital insignificant. No conclusive statement was reached concerning the effect of the common market on Tanzania's industrial development but it was shown that Tanzania's exports as a

percentage of her Gross Domestic Product were relatively small compared to those of the partner states.

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CHAPTER I

INTRODUCTION

I. STATEMENT OF THE PROBLEM

When Tanganyika[1] became independent in December 1961 her Gross Domestic Product was about 3,701 million shillings[2] and in 1971 it was 8,704 million shillings. In terms of the United States dollar the corresponding equivalent values were $530 million and $1,243 million in 1961 and 1971, respectively. Her income per capita as an indicator of standard of living rose from shs[3] 390 ($56) to shs 660 ($95) between 1961 and 1971, respectively.

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[1] In 1964, Tanganyika and Zanzibar Republics united to form the United Republic of Tanzania. In order to retain consistency and avoid confusion to the reader, the name Tanzania will be used throughout but the reader should bear in mind that most of the information provided pertains to Tanganyika. Under the Interim Constitution, matters pertaining to economic affairs are under separate governments. E.g., there are separate development plans for each country though some coordinations are usually present.

[2] The unit of accounting used in Tanzania is a shilling. One shilling is divided into 100 cents. The official rate of exchange between U.S.$ and Tanzanian shilling is about $1 = 7 shillings. For convenience sake, the East African countries, namely Kenya, Tanzania and Uganda, have the same exchange rate. In general the currency used in East Africa is a shilling. Due to the Common Market arrangements in the past and the continuing economic integration, the exchange rate among the member states in the Common Market is at par.

[3] The abbreviation commonly used for shillings is shs.

In order to indicate the relative degree of structural disequilibrium, a sectoral breakdown of Gross Domestic Product is necessary and is presented in Table I.1. It is assumed that the contribution of each sector is exactly equal to the sector's output,[4] then Tanganyika's economic growth prior to 1961 was largely characterized by the development of the primary sectors--agriculture (including subsistence), forestry, fishery, which accounted for about 70 and 60 percent of the Gross Domestic Product (GDP) in 1954 and 1961, respectively. If public administration, wholesale, restaurants and financial services are added to the primary sectors, then the proportion becomes to over 85 percent of the GDP in both 1954 and 1961. This is a further indication of the degree of structural disequilibrium which characterized Tanganyika's economy during the colonial period. In 1960-62, 80 percent of non-food consumer goods purchased by Tanganyikans was imported and 80 percent of food consumed did not pass through any market channels. This reflects the degree to which the economy was still being characterized by subsistence activities. The degree of economic dependence on foreign markets for exports is even more apparent in the narrow range of agricultural commodities namely sisal, coffee and cotton which accounted for over 60 percent of the total exports in 1961 and over one quarter of the GDP in the same period.

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[4] This excludes the multiplier effects of individual sectors simply due to lack of information of such indirect effects. However, the direct calculation has some value in that it distinguishes the dynamic economic sectors and provide some information on changes in the economic structure for future resource allocation.

TABLE I.1

TANZANIA: SECTORAL CONTRIBUTION TO GROSS DOMESTIC PRODUCT FOR SELECTED YEARS

	Value in million shs. (at current factor cost)				Relative Importance in Percentage of Total GDP		
	1954[a]	1961[b] shs	1967[c] shs	1971[c] shs	1961[b]	1967[c]	1971[c]
Agriculture	80.2	2,282	2,855	3,324	62	42	38
Mining and Quarrying	3.0	110	198	122	3	3	1
Manufacturing	5.0	139	594	893	4	9	10
Electricity and Water Supply	0.4	27	64	92	1	1	1
Construction	5.6	117	309	465	3	5	5
Whole, Restaurants, and Hotels	13.1	445	862	1,192	12	13	14
Transport, Storage, and Communication	5.7	171	536	800	5	8	9
Finance, Insurance, and Real Estate		*	729	922	*	11	11
Public Administration	7.5	412	746	1,025	11	11	12
Less Imputed Bank Charges		NA	101	131			
Total	120.5	3,701	6,796	8,704			
of which subsistence		1,247	1,770	2,406	34	26	28

*Included under wholesale, restaurants, and hotels.

[a]Data for 1954 came from C. Ehrlich, "Economic Policy in Tanganyika," Journal of Modern African Studies, II (1964), 266. The values for 1954 are strictly not comparable with those given because of the different units of measurements but are included to illustrate the significance of the primary sector during the colonial period.

[b]Data for 1961 came from United Nations Yearbook of National Accounts Statistics (New York: United Nations, 1963).

[c]Data for 1967, 1971 came from The United Republic of Tanzania: The Economic Survey, 1971-72 (Dar-es-Salaam: Government Printer, 1972), Table 1, p. 5.

Given the low level of economic development and the high dependence on agricultural commodities for foreign exchange and employment, Tanzania appears to have been conscious of her own poverty and in 1964 President Nyerere of Tanzania, when he introduced the First Five Year Plan, stressed the need for industrial growth in the following way:

> Simply to expand agricultural output, however, would be to condemn Tanganyika to a position of permanent economic inferiority in the world. We must have more balance in the economy, and end this absolute reliance on the prices of primary commodities. We must have an industrial base to our economy.[5]

From the President's statement, it would appear that industrialization was to be given an urgent priority if the structural problems stated were to be overcome. Second, given the low income per capita and economic dependence on the narrow range of agricultural commodities, the task of the new leaders would be to alter the pattern of economic structure that the colonial government had left so that the fruit of independence are realized by a majority of the population.

II. IMPORTANCE OF THE PROBLEM

The empirical evidence of both the capitalist and socialist countries demonstrates the rise in real income per capita has been associated with industrialization. It implies that industrialization involves inter alia:

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[5]United Republic of Tanganyika and Zanzibar, Tanganyika Five Year Plan for Economic and Social Development 1st July, 1964 - 30th June, 1969, Volume I: General Analysis (Dar-es-Salaam: Government Printer, 1964), p. x.

(1) increasing the share of manufacturing in total output and the absorption of the resources

(2) qualitative shift in the output of manufactured goods to those requiring complex technology

(3) sectoral shifts in favor of high labor productivity in manufacturing as against the primary sector

(4) self-sustained rise in labor productivity caused by

(a) consistent technical progress

(b) continuous enlargement of market to reap economies of scale

(c) gradual increase in capital per worker.

As this development takes place, it appears that the expenditure on manufactured goods indicates high income demand elasticities irrespective of any social and political economic system. "There is little doubt that as the high income levels are reached, the demand for manufactured goods grows faster than the real income. This seems to be true under centrally planned economies, even though the demand composition for industrial products may be different in these two cases. It seems true regardless of the distribution of income."[6]

"Since industrialization ideally consists in providing with jobs and the tools of production the people who leave the farm, it is generally considered right and proper that transfer of labor from

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[6] R. B. Sutcliffe, Industry and Underdevelopment (London: Reading, Mass., Addison Wesley, 1971), p. 245. This is a quotation from a standard textbook and is presented here to show how often acknowledged the point which is being made here.

agriculture to manufacturing also be matched by a corresponding transfer of saving. This, too, is accomplished by a shift in the relative prices that favor the manufacturer in relation to both the farmer and industrial worker, since this provides the inducement to invest and also savings to invest as well."[7] The proportion of income saved is believed by many to increase with an inequality of income distribution; and sufficiently high prices of manufacturers enable manufacturers themselves to save out of undistributed profits much of what they need for investment. The implication of import substitution would shift the terms of trade and distribution of income in favor of manufacturers. If this is a necessary condition for investment, then because of the lack of domestic entrepreneurs, it would appear that industrialization must either be undertaken by the government or by foreign entrepreneurs. However, even when the government undertakes industrialization, there is a need for financial resources and this must be generated from internal sources or foreign sources. Given the low income per capita, the domestic saving base would certainly be inadequate to meet the need for rapid industrialization. Consequently, Tanzania's reliance in the First Five Year Plan has been on the foreign sources. Ignoring the importance of the local entrepreneurs on employment creation, then the effect of foreign firms becomes relevant in analyzing the effects of

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[7] I. Little, T. Scitovsky, M. Scott, Industry and Trade in Some Developing Countries. A Comparative Study (Organization for Economic Co-operation and Development: Oxford University Press, 1970), p. 47; similar arguments are also expressed by W. A. Lewis, "Economic Development with Unlimited Supplies of Labor," The Manchester School of Economic and Social Studies, XXII, No. 2 (May, 1954), 139-191.

ownership on the demand for labor. It is hoped that this study will provide some insight into the practical and statistical problems involved in the employment-output relationship.

III. OBJECTIVE

The study seeks to analyze the problems that are faced by a country which has been colonized and which upon achieving independence is determined to transform her economic structure by initiating a series of industrial programs. The study would specifically seek

(1) to analyze the industrial pattern in its historical perspective in order to appreciate institutional changes required to bring about rapid economic development.

(2) to identify the extent to which membership in the Common Market has affected Tanzania's industrial development.[8]

(3) to determine the extent to which capital and ownership influence the demand for labor.

(4) to examine some of the theoretical and practical problems involved in employment and output relationship.

(5) to briefly outline some of the theoretical and practical usefulness of the industrial surveys and census reports published by the government agencies. Attention is drawn

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[8]The analysis only narrates the economic conditions which appeared to have affected Tanzania's industrialization though no attempts are made to examine the conditions if Tanzania had not been a member of the Common Market. This would have been a difficult question and also a hypothetical situation.

to problems of productivity of employment output relationship.

(6) to identify some statistical and practical problems involved in the estimation of the demand for labor of individual establishments.

IV. METHODS OF THE STUDY

This study uses both the descriptive approach and an econometric method which attempts to combine the mathematical and statistical concepts in order to explain economic phenomenon. Such approach is useful because it incorporates both the conceptual and empirical methods and as such it is expected to provide some stimulating atmosphere of future discussion to both the ordinary citizen, politician and the technician in the formulation of best industrial strategy.

V. SOURCES AND LIMITATION OF THE DATA

The data used are secondary, abstracted from various sources but the sample data used in the determination of employment comes from the Bureau of Statistics, Ministry of Economic Affairs and Development Planning, Dar-es-Salaam. The data used has been taken at its face value and therefore accepted as the best representative of the industrial condition in Tanzania. The data is also aggregated at the two digit level and therefore does not provide much information. Many of the problems involved in the kind of data and the purpose for which it is used are discussed under the appropriate chapters.

CHAPTER II

HISTORICAL SETTING

In order to understand and explain any given situation, it seems imperative to analyze those historical factors which were of importance in shaping and determining what is now accepted as the status quo. Indeed, any explanation that neglected historical determinants would be largely valueless both as a rigorous analysis of the prevailing conditions and as a potential guide for predicting the time path of future events. From this point of view it can be argued that the industrial conditions in Tanzania were the outcome of the continuing historical processes, the origins of which can be traced to the European colonial penetration at the end of the 19th century. It is the aim of this chapter to discuss the major institutional and economic forces which were responsible for shaping the industrial development of Tanzania.

I. THE COLONIAL PERIOD 1897-1961[1]

During the colonial period Tanganyika, as it was called by then, had a substantial growth of industry, especially between 1948 and 1958. Starting from small beginnings, the net value of manufacturing appears

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[1]Tanzania was ruled by Germany from 1887-1918 and then became a Trusteeship under the League of Nations mandated by Britain until 1961 when it became independent. There was very little industrial growth prior to World War II.

to have at least doubled between 1948 and 1958 from about £4 million to £8 million, while mining production increased about fourfold, i.e., to about £7 million and generation of power fivefold--120 million k.w.h. in the same period.[2] Though these may be considered very remarkable achievements, these activities were still small in relation to the economy as a whole. Manufacturing and mining each contributed only 4 percent of the domestic product including subsistence.[3] The number of persons employed in manufacturing, mining and power generation of about 35,000 in 1958 was less than one-tenth of the number of persons in paid employment.

Despite its small contribution, colonial industrialization appears to have been directed towards the needs of the metropolitan countries. It was characterized by simple export processing activities, e.g., coffee curing, cotton ginning, sisal decortication. These industrial activities accounted for a large proportion of renumerated employment and net output. In 1961 the total work force of manufacturing establishments was over 80,000. Of this, about 45,000 or over 50 percent were engaged in primary processing. In the same year, the contributions of primary processing activities to net output or the manufacturing sector was 46 percent, while the wage bill of the

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[2]Unless otherwise noted all value data are presented in Tanzanian shillings; the International Bank for Reconstruction and Development, The Economic Development of Tanganyika (Baltimore: The John Hopkins Press, 1961), p. 229. Hereafter this source is cited as IBRD.

[3]Ibid.

[4]Tanganyika, Statistical Abstract 1962 (Dar-es-Salaam: Government Printer, 1962), Table L.1, pp. 84-86.

primary processing component amounted to 52 percent of the total payment to labor in manufacturing.[5] The import substitution sector still remained small and accounted for 20 percent of net manufacturing output, while the wage bill and the number of persons employed accounted for nearly 20 and 25 percent of the totals, respectively.[6]

Within the primary processing sector the most important employer was sisal. In 1962 it (sisal and sanseviera processing) employed about 27,000 persons, or over 60 percent of the total labor force employed in the primary processing.[7] The fact that sisal is both an estate crop and an export crop suggests European influence in the development of Tanzania's industrial structure. The specific configuration of that structure was made possible by specific propitious circumstances at that historical juncture. In particular, the developed countries promoted an international division of labor in which colonial or peripheral countries participated as suppliers of raw materials to the center and consumers of manufactured imports.[8] On the one hand, primary processing activities in the export sector freed Tanzania's economic growth from the constraint of the narrow domestic market. On the other hand, and more importantly, the necessity of importing

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[5] Ibid.

[6] Ibid.

[7] Ibid.

[8] The term "center" as used here includes the presently industrialized countries of Western Europe and North America. "Peripheral Countries" refers to developing countries in general.

manufactured goods from the metropolitan areas served to stifle domestic industry.

Tanzania's export trade in primary products was to emerge as a source of foreign exchange capacity to finance its diversified import requirements largely from the metropolitan centers. In doing so, Tanzania's economic growth was to be established within the framework of international division of labor in which the economy was apparently to be based on a narrow range of primary export commodities. As a measure of economic dependence on the world market, sisal, coffee and cotton accounted for over 60 percent of total export value in 1961 and over one quarter of Gross Domestic Product (GDP) came from these three activities. A productive structure that is highly skewed toward primary exports is peculiarly susceptible to secular fluctuations in the world market as well as to natural factors such as weather.

It can be argued that industrialization in the presently advanced countries took a different path. Their exports were not a sign of economic dependence but rather one of dominance. Internally generated investment and technological change made it possible for them to take advantage of the opportunities offered by the external markets and to further diversify an already highly diversified domestic market. This implies that the external market was supplementary to the domestic market. In the early industrialization of the presently advanced countries, there emerged no export sector as such: the manufacturers were consumed in large quantities within the country and any

specialization for the external market had a home market base.[9] With a strong base in the home market, the external demand added strength and flexibility rather than the rigidity that characterizes the Tanzanian structure.

II. THE PATTERN OF INTERNATIONAL DEVELOPMENT

Unlike the presently underdeveloped countries, industrialization in the now advanced economies was undertaken by an indigenous capitalist class that sprang from the feudal and mercantile systems. This indigenous capitalist class was able to expand productive capacity in response to the home demand, a factor which was of importance in the eventual national integration of these economies. In contrast to the centers, industrialization in the peripheral countries has largely been undertaken by foreign entrepreneurs from the center.[10]

The absence of local capitalists to champion the industrialization process suggests that the pattern of capitalist industrial growth as it was manifested historically is unlikely to, indeed cannot, repeat itself because the unfolding of industrial capitalism in the world economy has fundamentally altered the very conditions that spawned it.

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[9] Phyllis Deane, "The Output of British Woolen Industry in the 18th Century," Journal of Economic History, XVII, No. 2 (1957), 222-223; E. C. Eversley, The Home Market and Economic Growth in England, 1750-1780," Land, Labour and Population in Industrial Revolution, eds. E. L. Jones and G. E. Mingay (New York: Barnes and Noble, Inc., 1968), pp. 210-259; United Nations, "The Growth and Decline of Import Substitution in Brazil," Economic Bulletin for Latin America, IX, No. 1 (March, 1964), 1-3.

[10] Shares of foreign capital was over 60 percent in 1966.

The fact that literature on the industrialization of the periphery[11] has concentrated on the features and mechanisms that characterize the now advanced countries' industrialization has neglected the crucial issue of the institutional structure and prime mobile required to reshape the necessary pattern of industry. The belief that the present underdeveloped countries are historically similar in the sense that their past and their present indeed represent the earlier stages of history of the now developed countries is a fundamental misunderstanding of the nature of underdevelopment. The presently underdeveloped countries have been subjected to a different historical experience. The fact that most of them had been colonies of the presently advanced countries indicates that their economies became complementary to the metropolitan economies because the industrial development of Britain, the leading capitalist country of the period, depended heavily on external sources of food and raw materials as well as foreign markets for her manufacturers.[12] More recently rapid technological development and, the unfavorable commercial policies of the advanced countries, have disrupted the long-established pattern of international trade with the primary producing countries (except for oil and some few minerals) have

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[11] See, for example, Lewis, op. cit.; H. B. Chenery, "The Role of Industrialization in Development Programs," American Economic Review, XLV, No. 2 (May, 1955), 40-73.

[12] Karl Marx, Capital, Vol. I (Moscow: Foreign Languages Publishing House, 1964); Maurice Dobb, Studies in the Development of Capitalism (r. ed.; New York: International Publishers, 1963).

generally been more adversely affected than the industrialized countries.[13]

III. PATTERN OF INVESTMENT AND FOREIGN PARTICIPATION

Tanzania's industrialization is a recent phenomenon and its history barely goes back as far as one decade. According to the most recent and comprehensive industrial census of 1965[14] covering establishments with ten or more persons, there were 569 establishments. Of these, 50 percent were established prior to Tanzania's independence in 1961, while about one-third were established in the five years of independence.

Examination of Table II.1 reveals a dominant role of the foreign entrepreneurs in Tanzania's industrialization. In nearly all the consumer goods' sector the share of foreign investment is well above 50 percent and their share in the intermediate and capital goods' sectors is even larger with an average of 70 percent. These sectors also represent the high growth elasticity group at least in the Chenery's sense.[15] The reason for the high degree of foreign shares in the capital

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[13] J. F. Rweyemamu, "International Trade and Developing Countries," The Journal of Modern African Studies, VII, No. 2 (July, 1969), 3-19.

[14] United Republic of Tanzania, "Survey of Industrial Production 1965" (Dar-es-Salaam: Bureau of Statistics, Ministry of Economic Planning and Development, 1967), Table 5 (mineographed).

[15] H. B. Chenery, "Pattern of Industrial Growth," American Economic Review, L (September, 1969), 638, Table 5.

TABLE II.1

DISTRIBUTION OF SHAREHOLDING IN MANUFACTURING PROCESSING INDUSTRIES IN 1965 BY CITIZENSHIP AND INDUSTRIAL ACTIVITIES

CODE ISIC	Industrial Activity	Total No. of Est.[a] 1965	Number of Ests. Owned by Citizens[b]	Number of Ests. Owned by Non-Citizens by Size - Employees 10-50	51-99	100	Percent of Ests. Owned by Non-Citizens
	Consumer Goods						
20	Food Manufacturing	125	46	14	19	46	63
21	Beverage	11	5	1	-	5	54
22	Tobacco	3	1	-	1	1	67
24	Footwear and Clothing	10	4	2	-	4	60
25	Wood except Furniture	73	27	7	11	28	63
27-28	Paper, Printing, Publishing[c]	22	10	4	1	7	55
29	Leather Products	8	3	-	-	5	63
26	Furniture and Fixtures	17	6	-	-	11	65
	Intermediate						
23	Textiles[d]	158	37	26	34	61	77
30	Rubber Products	5	-	1	3	1	100
31-32	Chemical and Products	18	4	1	5	8	78
	Investment						
33	Nonmetallic Minerals	9	1	-	2	6	89
34-35	Metal and Metal Products	19	6	3	1	9	68
36-37	Repair of Machinery	12	2	1	1	2	83
38	Repair and Assembly of Transport	73	27	6	16	30	63
39	Miscellaneous Mfn.	6	2	1	1	2	67

Source: United Republic of Tanzania, "Survey of Industries, 1965" (Dar-es-Salaam: Bureau of Statistics, Ministry of Economic Planning and Development, 1967), Table 5. (Mimeographed). Partly quoted from J. F. Rweyemamu, "The Historical and Institutional Setting of Tanzanian Industry," (The University of Dar-es-Salaam: Economic Research Bureau, 1971), Table 1.2, p. 6.

[a]Establishments employing ten or more persons. Though firms employing 1-9 persons abound in Tanzania, there are no adequate data. The International Bank for Reconstruction and Development (IBRD) 1967 on the basis of the reports of some 656 firms employing 1-9 persons with a total employment of 2,640 concluded that these smallest firms would increase employment by 10 percent and probably raise output by 8-9 percent. IBRD, "Industrial Development in East Africa: Progress, Policies, Problems and Prospects Part III: Tanzania" (New York: United Nations, 1970). (Mimeographed).

[b]Really citizens here refers to Asians who had acquired Tanzanian citizenship in recent years.

[c]Classification of printing is in a wrong group because there were no separate figures for each group. Printing would strictly be treated as an intermediate good.

[c]Textiles include mainly cotton ginning and cleaning (30 establishments) sisal decortication (110 establishments).

goods and intermediate goods sectors seems to suggest their ability to raise capital since most of them are the subsidiaries of international corporations. The lack of access to the financial markets which are also foreign owned is a constraint for the indigenous entrepreneurial class and limits its ability to compete well in these sectors.

Another disadvantage of foreign ownership is the fact that the foreign firms tend to import relatively capital intensive modern technology rather than utilize labour intensive techniques. This is generally true of textiles,[16] chemical products, non-metallic minerals and repair of machinery.

Though consumer goods' establishments accounted for about 50 percent of the total establishments, their proportion in total output was about 70 percent as indicated in Table II.2. Though 70 percent of industrial output is not unusual for low income countries, it is important to note that there is a very small sector of capital goods. Comparing with other countries or regions of the world, Tanzania's economic structure appears different from those of other developing countries. The proportion devoted to consumer goods is obviously higher than that for Kenya, Africa or the low income countries. It is 70 percent, while that for Kenya, Africa and the low income countries is 47, 46 and 29 percent, respectively. The capital goods' sector, which is mainly made up of servicing, transport assembly, metal and metal products, accounted for about 7 percent, indicating its relative unimportance in

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[16] GATT, A Study on Cotton Textiles (Geneva: GATT Secretariat, 1966).

TABLE II.2

COMPARATIVE SECTORAL DISTRIBUTION OF VALUE ADDED
IN MANUFACTURING INDUSTRY (IN PERCENT)

	Tanzania 1966	Kenya 1963	Africa 1963	Developing Countries 1963	World 1963
Consumer goods	70.5	46.6	45.09	29.02	48.01
Building materials	10.3	10.06	10.42	9.18	9.53
Intermediate goods	11.2	11.30	22.79	22.74	23.30
Capital goods	7.1	30.9	19.14	35.20	16.53
Miscellaneous	.9	1.14	2.56	3.86	2.64
Total	100	100	100	100	100

Source: United Nations, The Growth of Industry, 1967, Vol. 1 (New York: United Nations, 1969); United Republic of Tanzania, "Survey of Industrial Production," 1966, quoted from J. F. Rweyemamu, "The Structure of Tanzanian Industry," (The University of Dar-es-Salaam Economic Research Bureau, 1971), p. 56, Table 5.10. (Mimeographed).

the industrial growth and therefore deformed structure of industry in Tanzania.

There are several reasons for the absence of a capital goods industry in Tanzania. First, the fact that Kenya had been a leading industrial pole in East Africa meant that the few basic industries that were established were located in Kenya. When Tanzania attained its independence, she demanded a larger share of the industrial output induced by the common market arrangements; it was the consumer goods and the cement industries which were willing to shift to Tanzania.[17] The new firms, many of them established by those with export interests, tended to be in the consumer goods sector where there was already an assured market, and where the gestation period of the investment undertakings was minimal and therefore less risky.

Secondly, the fact that most of the capital goods were more specialized and normally subject to low duties reduced the threat of foreign investment and encouraged importation of capital goods. Historically, the reason for low import duties was to lower the costs to the European planters' goods.

The bias against a domestic capital goods sector has meant that industry's contribution to agricultural productivity and development of transport networks has been negligible. The agricultural inputs that would have enhanced agricultural productivity include fertilizers,

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[17] See Philip Ndegwa, The Common Market and Development in East Africa (2d ed.; Nairobi: The East African Publishing House, 1968), pp. 173-4.

insecticides, simple farm implements--hoes, ploughs, tractors, agricultural machinery and parts and servicing. Domestic production for none of these was established before 1966. By 1966 there was no fertilizer plant, although one was being constructed; there were small insecticide plants including Sapa Chemical Industries and Fissons (T) Ltd., with a share in the value added of total manufacturing of less than 0.3 percent. There were no farm implement producers, though one plant was under construction in Dar-es-Salaam, an area with minimum concentration of agricultural activities. Similarly there can be said no transport industry. At present there is a tire retreading plant, bicycle tire and tube plant in partnership with General Tyres, Ltd. Though the inadequacy of transport networks was emphasized by the British mission to Tanzania in 1932[18] and then by Hawkins in 1962, the infrastructure has basically remained two railway lines and two major tarmac roads. Imports of both agricultural and transport equipment have resulted in the use of numerous non-standardized models which definitely forestalls the establishment of such industries or even those geared to produce spare parts, for a considerable period.[19]

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[18]Armitage Smith, "Report on the Financial Mission to Tanganyika (London: Her Majesty's Stationery Office, 1932), p. 85; E. K. Hawkins, Road and Road Transport in an Underdeveloped Country: A Case Study of Uganda (London: Her Majesty's Stationery Office, 1962), chapter 9, calculated road density for Tanzania, Uganda and South Africa as 0.08, 0.14, 0.2, respectively.

[19]J. F. Rweyemamu, "The Structure of Tanzanian Industry" (Dar-es-Salaam: Economic Research Bureau, University of Dar-es-Salaam, 1971) p. 57 (mimeographed).

There are several reasons for promoting the local production of capital goods. It can be argued that in the case of Tanzania with varied climatic and soil conditions that are specific to local conditions, there is a need to establish capital goods' industry to meet the specific local demand. Second, the fact that sometimes over-invoicing[20] has been a problem in importing these capital goods suggests that in the long-run domestic production is the best solution. Secondly, the development of the local capital goods industry would increase the learning process.

IV. LUXURY BIASED INDUSTRIALIZATION

The structure of Tanzanian industry is also luxury biased. Though the demarcation line between what is a luxury and necessity is a matter of opinion, I include those goods which are consumed largely by a small proportion of the population because they can afford to pay the high price and those goods which cater to a taste that is alien to the large majority of the population. Then brewery, tobacco, coffee, tea, cashew nut processing and miscellaneous manufacturing can be considered as luxury goods. Breweries produce "European" beer in competition with the "local" beer and it is consumed mainly by the high income group. Similarly cigarettes, coffee, tea and meerschaum can be considered luxuries in the local market although they are largely exported.

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[20] For evidence of overinvoicing in trade see Michael J. H. Yaffey, Balance of Payments Problems of a Developing Country: Tanzania (Munich: Welftforum Publishing House, 1970).

V. SIZE OF ESTABLISHMENTS

It is generally agreed that because of the market limitations, industrialization in the developing countries is characterized by small establishments compared to those in the advanced countries. This widely held belief is also observable in the case of Tanzania. The World Bank Mission concluded that the majority of the establishments employed less than fifty persons and were owned mainly by the foreign firms largely of British origin and managed by residents of Asian or European origin.[21] This position has not changed even after the independence. Of the 438 industrial firms employing ten or more persons in 1966,[22] it was revealed that about 80 percent employed less than 100 persons and 70 percent were engaged in the production of consumer goods and about 60 percent were owned by foreign firms. This phenomenon of industrial structure is indicative of the technical adaptability of firms to the size of the market.

While it is true that certain world-wide technical characteristics of industries determine the size and therefore the international distribution of factories, it is certainly not true that scale of production is inflexible and therefore unadaptable to the size of the market. Crapper's findings revealed that technical indivisibility and

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[21] IBRD, op. cit., p. 231.

[22] United Republic of Tanzania, "Survey of Industrial Production, 1966" (Dar-es-Salaam: Bureau of Statistics, Ministry of Economic Planning and Development, 1967) (mimeographed).

and inability to adapt to the size of the market were not characteristic of many types of industry.[23] The food processing, rubber, plastics, paints and tobacco were established in East Africa with much smaller size than normal. Only brewing, which had no prevalent size, compares with the medium scale of output of the United Kingdom.

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[23]D. B. Crapper (1968), "A Location Study of Some British Based Industrial Firms in East Africa," East African Geographical Review, No. 6 (April, 1968), pp. 51-61.

CHAPTER III

TANZANIA'S PERIPHERY STATUS IN THE EAST AFRICAN COMMON MARKET

It has been argued that "the lack of industrial development in Tanganyika appears to reflect in part its step-child status vis-a-vis its neighbours, [Kenya and Uganda] in the eyes of the British. Given the larger size of the Kenyan market and the apparent certainty of the British control there, the private investors apparently preferred investing in industries in Nairobi"[1]--Kenya's capital city and Mombasa the largest port in East Africa. It is also argued that the common external tariff not only deprived Tanzania of the revenue but also forestalled the development of industries in Tanzania. Indeed, the approximate uniformity of taxation in the three countries deprived individual governments of the constitutional power to alter the tax rate unilaterally in order to generate the necessary revenue for development requirements. The uniform tax rates appeared too low and insufficient to generate adequate revenue.[2] The aim of this chapter is to review and demonstrate the effects of the common market on the development of industries in Tanzania.

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[1] Ann Seidman, Comparative Development Strategies in East Africa (Nairobi: East African Publishing House, 1972), p. 26.

[2] Report of the East African Commission of Enquiry on Income Tax, 1955-57 (Nairobi: East African Royal Commission), pp. 15-32.

The belief that each country in the common market will benefit from the external tariff is one that needs to be demonstrated in each particular case especially where the union is one of developing countries rather than of rich, fully industrialized societies. Yet it is not surprising to discover just how seldom any attempt is made to establish the proposition with any degree of rigour, especially in a developmental context. Generally proofs are reiterated in various vague forms. For example, the establishment of the central African Federation was partially based on the East African Common Market example. But failure to realize the shortcomings of the common market operations were not appreciated.[3] The Raisman Commission of 1961 concluded that the union has worked for the benefit of each country.[4] The methods used to arrive at this conclusion were unsatisfactory, however, and unduly worked against proposals to shift the redistribution of income in favor of Tanzania.[5] Indeed, against the authorities of the East African Common Market in Tanzania it felt necessary to include the opinion of Jacob Viner, the originator of the modern theory of customs union, for the sake of comparison, he strongly believed that the East African Customs Union was:

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[3]A. Hazlewood and P. D. Henderson, "Nyasaland The Economics of Federation," Bulletin of the Oxford Institute of Statistics, XXII (1960), 17-19.

[4]Royal Commission, Report of the East African Economic and Fiscal Commission (London: Her Majesty's Stationery Office, 1961), Cumnd. 1279.

[5]P. K. Lomas, "The Report of the East African Economic and Fiscal Commission," The East African Economic Review, VIII (June, 1961), 14-23.

> A striking instance where a territory [Tanganyika] was brought into a customs union by external authority in order to provide an expanded field for the tariff protection of the industries of another country Kenya .[6]

From the review of the above literature the Customs Union based upon the neoclassical theory is certainly an illegitimate transplant of an economic theory that was appropriate in the advanced countries to dualistic economies.[7] Free entry in these dualistic economies is certainly not meaningful since resources are relatively immobile between uses at least, in the sense of the short-run. Competition is viewed only in the way of supply of commodities without built-in mechanism to offset income inequities arising from price fluctuations since resources are by definition limited in uses.

Given the dualistic economic structure of the East African economies and the leading role of Kenya in manufacturing sector, the contribution of manufacturing industries has lagged behind in the case of Tanzania and Uganda. The value added grew from 4 percent to about 8 percent of GDP between 1958 and 1970, respectively. Comparative relative values for Kenya are 8 percent and 12.5 percent.[8] For Uganda value added by manufacturing between 1958 and 1970 was about the same as for Tanzania. Certainly the 8 percent manufacturing proportion in the GDP in the case of Tanzania appears below the "normal expected pattern" at least in the

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[6]Jacob Viner, The Customs Union Issue (New York: Carnigie Endowment for International Peace, 1950), p. 70.

[7]Joan Robinson, Essays in the Theory of Economic Growth (London: MacMillan and Co., 1962), Chapter I.

[8]H. E. Grundman, "Industrial Development in East Africa: An Appraisal including possibilities for future acceleration," Rasimali:

Chenery's[9] sense which stipulates a normal expected pattern of about 10 percent for a country with per capita income of below $100 and population of around 10 million, the description which fitted the Tanzanian situation.

Though there has been no comprehensive way to measure the extent to which the common market has had a retarding effect on Tanzania's industrialization, there is a general feeling that the inception of the common market has had a direct unfavourable effect on balance of trade. Discontent in Tanzania was voiced by the Controller of the customs union in 1924 who explicitly stated that the customs union would make this country a commercial satelite of Kenya and subordinate Tanganyika to Kenyan influence.[10] This protest was not heeded by the British Secretary of State for the Colonies who was under the influence of the strong Kenya Lobbying Group in London. He apparently could not do otherwise but follow their wishes and interests and in 1927 he formally endorsed the establishment of the customs union. In 1938 another Controller warned that the effects of the customs union had been detrimental to Tanganyika's domestic industries because the imports from Kenya were threatening the production of those products which could have been produced locally in Tanganyika, e.g., food. "The

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Tanzania Investment Outlook, ed. A. Mosille (Dar-es-Salaam: Tanzania Investment Bank, 1973), p. 23.

[9]H. B. Chenery, "Pattern of Industrial Growth," American Economic Review, L (September, 1960), 638.

[10]Michael J. H. Yaffey, op. cit., p. 46.

position is one of the results of customs arrangements with Kenya and Uganda under which the products in these countries are either of older development or more effectively organized marketing."[11]

I. MEASUREMENT OF DEPENDENCE ON THE COMMON MARKET

In order to show the magnitude of the common market's dynamic features, Table III.1 was constructed. The results are based on the assumption that the products traded interterritorially were of local origin and enjoyed a nominal tariff protection against imports from outside East Africa. It was also assumed that there were no indirect multiplier effects of income generated from the trade so it was only the direct measurable benefits that were included. The benefits generated were from the "visible" trade for which the data were available and the exclusion of the "invisible" services such as insurance, transportation, tourism, advertising, stocks, securities and bonds in Nairobi and in Mombasa were wholesale merchants import services for the distribution in Uganda and Tanganyika) and other commercial services--financial and legal advice on taxation, auditing and accounting would tend to underestimate the total benefits but due to statistical difficulties these were eliminated.

As an indication of the dependence of each country on the common market an index was used. The index was the ratio of exports to East Africa to the monetary Gross Domestic Product of each country on the

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[11] Ibid., p. 231.

TABLE III.1

INTERTERRITORIAL EXPORTS AS A PERCENTAGE OF GROSS DOMESTIC PRODUCT FOR SELECTED YEARS[a]

Year	Kenya	Uganda	Tanzania
1946-47[b]	4	10	2
1961-62[b]	10	7	2
1963[c]	6	5	1
1968[c]	5	3	1

[a]GDP data for 1963 and 1968 taken from IMF, International Financial Statistics (International Monetary Fund). Export values prior to 1962 include excise duty. It is also probable that the decline after 1962 might have partially been due to the exclusion of this aspect.

[b]Percent values for 1946-47 and 1961-62 quoted from D. Ghai, "The Territorial Distribution of the Benefits and Costs of the East African Common Market," Federation in East Africa: Opportunities and Problems, ed. Collin Leys and Peter Robson (Nairobi: Oxford University Press, 1965), p. 76.

[c]Export values for 1963 and 1968 taken from Republic of Kenya, Statistical Abstract, 1969 (Nairobi: Government Printer, 1970); The United Republic of Tanzania, Statistical Abstract, 1970 (Dar-es-Salaam: Government Printer, 1972).

assumption that these were correlated. Using this criterion, Kenya's dependence rose from 4 percent to 10 percent between 1946-7 and 1961-62 while the comparative figures for Uganda were 10 percent and 7 percent.[12] The relative decline in the case of Uganda was wholly due to the movement of a cigarette factory from Kampala to Nairobi which reduced her exports by nearly 3 million pounds between 1955-56.[13] Examination of Table III.1 also indicates that Tanzania's exports fluctuated around 2 percent between 1946-47 and 1961-62. The table also reveals the downward trend for all three countries between 1963 and 1968 largely due to the effects caused by the Kampala Agreement imposed in 1964.[14] The relative ratio for Kenya dropped slightly from 6 percent to 5 percent while for Uganda the decline was from 5 percent to 3, while Tanzania's ratio was relatively stabilized at around 1 percent. According to this criterion, the emerging conclusion was that Kenya relied most and Tanzania the lease on the common market.

II. THE RELATIVE COMMODITY COMPOSITION

The conclusion was further strengthened by a consideration of relative composition of intercountry exports from each of the three countries as indicated by Table III.2. As reflected by this table,

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[12] Dharam Ghai, "Territorial Distribution of the Benefits and Costs of the East African Common Market," Federation in East Africa: Opportunities and Problems. eds. Collin Leys and Peter Robson (Nairobi: Oxford University Press, 1965), p. 75.

[13] Ibid.

[14] Ndegwa, op. cit.

TABLE III.2

TANZANIA'S COMPOSITION OF INTERSTATE TRADE BY SITC SECTIONS FOR SELECTED YEARS
(VALUE IN PERCENT OF TOTAL)

SITC Section	Commodity	Transfers to						Transfers from					
		Kenya			Uganda			Kenya			Uganda		
		1963	1968	1973	1963	1968	1973	1963	1968	1973	1963	1968	1973
0	Food	33	22	16	4	2	0	21	19	26	3	2	0
1	Beverages and Tobacco	1	1	7	2	0	0	14	2	2	3	0	0
2	Crude Materials, etc.	16	10	12	1	1	0	1	2	1	0	1	0
3	Mineral Fuels	1	2	0	1	1	0	0	10	16	0	0	0
4	Animal and Vegetable	5	13	4	4	3	0	1	1	0	1	2	0
5	Chemicals	1	5	8	0	0	7	9	12	14	1	1	0
6	Manufactured Goods	13	20	30	4	6	1	21	27	26	8	7	0
7	Machinery and Transport Equipment	0	6	5	0	3	0	1	3	3	0	0	0
8	Miscellaneous Mfn.	15	5	5	1	3	0	16	11	8	0	1	0
Total		85	84	87	17	19	8	84	87	96	16	14	0

Sources: Republic of Kenya, Statistical Abstract, 1969 (Nairobi: Government Printer, 1970); United Republic of Tanzania, Statistical Abstract, 1970 (Dar-es-Salaam: Government Printer, 1972); East African Customs and Excise Department, Annual Trade Report of Tanzania, Uganda and Kenya (Mombasa: Statistical Branch, East African Customs and Excise Department, 1973).

SITC sections 0--4 comprising of food, beverages, tobacco, crude materials and vegetable oils accounted for about half of Tanzania's exports to Kenya between 1963 and 1968 while her exports of manufacturers[15] SITC 5--8 accounted for only about one-third of the total exports to Kenya in the same period. Taking Tanzania's imports from the two countries in the same period it was revealed that Kenya was the dominant trading partner. Of the total imports[16] from the common market to Tanzania, Kenya provided over 80 percent. However, it was also shown that manufacturers SITC sections 5--8 accounted for nearly 50 percent between 1963 and 1968 wholly coming from Kenya.

III. THE KAMPALA AGREEMENT

The period after 1963 indicated a rising share of total imports manufacturers SITC sections 5--8 and a relative decline of 0--4 in the case of Tanzania. Several reasons might have made this trend possible. After her independence Tanzania demanded a larger share of industries and thus culminated in the Kampala Agreement of 1964 which had five basic allocative objectives:[17]

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[15]The increase in group 6 between 1963 and 1968 was largely due to a rise in exports of cotton, yarn and fabrics which together accounted for about 50 percent in 1963 and 23 percent in 1973.

[16]Trade between Tanzania and Uganda was relatively insignificant accounting for less than 20 percent largely due to geographical barriers and the comparative little industrial development of the two countries.

[17]Ndegwa, op. cit., p. 166.

1. to persuade certain firms connected with each country to increase production in the deficit country. (The firms concerned were those producing manufactured tobacco and cigarettes, footwear, beer and cement.)
2. allocation of certain major industries among the three countries.
3. application of quota system and suspended quotas whereby exports from surplus countries would be progressively reduced, and local production increased in the deficit countries.
4. increased sales from a country in deficit to a country in surplus
5. early agreement within the East African Common Market on a system of inducements and allocation of industry in order to secure equitable distribution of industrial development as between the three countries.

Though the Kampala Agreement had never been ratified largely due to political reasons in Kenya, it did result in a substantial increase in Tanzania's industrial capacity but at a cost of the development of surplus capacity elsewhere in East Africa and the disruption of trade. Four major companies affected by the first section of the Agreement were the British-American Tobacco Company (formerly the East African Tobacco Company), the Bata Shoe Co. Ltd., East African Breweries Ltd. and the British Standard Portland Cement Co. These companies agreed that, as far as possible, each country's consumption of these products

should be produced within its borders.[18] The second section of the Agreement gave Tanzania an exclusive right to assemble and manufacture Landrovers, to manufacture and assemble certain types of lorries and trucks, and to manufacture radios and motor vehicle tires and tubes.[19]

Section Three of the Agreement dealing with imposition of a quota system where there was an existing productive capacity in the deficit country and a suspended quota where a deficit country wished to develop her productive capacity was in principle an internal trade restriction aimed at subsequent regional allocation of industries so as to benefit the less developed ones. Though the quota system was never ratified, it produced the most drastic results. The direct result of the unilateral application by Tanzania was the loss of the Tanzanian market to many Kenyan and Ugandan firms--this led, in many cases, to cuts in production and the threat of dismissal to large numbers of workers. This was a process that occurred in virtually all major firms in a wide variety of industrial activities--miscellaneous goods, soap and detergents, paints and varnishes, spinning and weaving, clothing, biscuits and confectionery, paper and packaging materials, cigarettes, bicycle tires and tubes, industrial gases, brewing, miscellaneous textiles and metal and engineering products. To overcome the quota system, many

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[18]Absolute self sufficiency was not always possible. E.g., the Bata Shoe Company had always specialized in certain type of shoe production in their different plants so that it was impossible for them to meet all of the local requirements of Tanzania though the company agreed to begin the manufacture of different types of shoe thus substantially reducing trade imbalance in shoes between Tanzania and Kenya.

[19]However, at her own request, Tanzania was later given an exclusive right to manufacture aluminum foils instead of the assembly of trucks.

Kenyan firms established branches in Tanzania and to a lesser extent, in Uganda. In many cases this led to an increase in the overhead facilities--additional office space, storage facilities, etc., and led to excess manufacturing capacity throughout East Africa--paper and packaging materials, paints, spinning and weaving, textiles, clothing and biscuits and confectionery. "A number of cases were noted of the actual physical movement of firms located in Kenya to Tanzania."[20]

IV. THE EAST AFRICAN TREATY OF COOPERATION

Because of the failure of Kenya to ratify the Kampala Agreement, Tanzania seceded from the common East African Currency Board by establishing her own Central Bank, a move that was followed by the other two partner states in 1966. However, President Nyerere of Tanzania insisted that if economic union was to continue, major institutional reforms were necessary. This position was supported by Uganda and the decision was taken to appoint a commission under the chairmanship of Professor Philip. The Commission's terms of reference covered a wide field and included, inter alia, an examination of how the common market could be maintained and strengthened, and the principles on which, and the manner in which, the common market could in the future be controlled and regulated, an examination of operational arrangements consequential upon the establishment of separate currencies, a consideration of the extent to which common services could be maintained

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[20] F. J. Nixson, Economic Integration and Industrial Location: An East African Case Study (London: Longman Group Limited, 1973), pp. 36-38.

in the future and the extent to which new services could be provided, financial arrangements of common services, legal, administrative and constitutional arrangements mostly effective to promote economic cooperation.

The Commission's report was presented to the three heads of government and signed in 1966 formalizing the common market which in the past had been operating informally. The significance of the Treaty was that it provided four statutory corporations to administer the shared services--The East African Railways Corporation, the East African Harbours Corporation, the East African Post and Telecommunications Corporation and the East African Airways Corporation. The corporations were expected to work on commercial principles and to regulate the distribution of their non-physical investments as to ensure an equitable distribution of benefits, taking into account the scale of their operations in each partner state.

Other provisions of the Treaty dealt with decentralization of the headquarters of various corporations formerly located in Nairobi to the other Partner states.[21] Measures to promote industrial development were the introduction of a transfer tax system, the establishment

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[21]Headquarters of the Railways Corporation remained in Nairobi (Kenya), that of the Harbours Corporation moved to Dar-es-Salaam (Tanzania), and the Post and Telecommunications to Kampala (Uganda), the Administrative headquarters including Central Secretariat and Tribunal moved to Arusha (Tanzania).

of the East African Development Bank and the harmonization of fiscal incentives.[22]

Article 20 of the Treaty outlined the transfer tax system. It stated the conditions under which a partner state could impose a transfer tax which could not exceed 50 percent of the external tariff and could not last more than 8 years though it could be renewed.[23] The transfer was to be used only by a Partner State which was "in deficit in its total trade in manufactured goods with the other two Partner States." The relative decline in the transfers of manufactures from Kenya and Uganda between 1968 and 1973 from 27 percent to 26 percent for Kenya and 7 percent to nil for Uganda was partially indicative of the felt effects of the transfer tax imposed by Tanzania. Its relative manufactured exports jumped from 20 percent of total to 30 percent between 1968 and 1973 as indicated by Table III.2, p. 31.

In conclusion, institutional changes associated with the Common Market introduced in the sixties together with the political independence of these countries must have had some positive effects on the redistribution of industries. However, one emerging feature from Table III.1 (p. 29) was the relative decline in the index of the inter-country exports as a percentage of Gross Domestic Product.

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[22]Ndegwa, op. cit., pp. 173-74 describes in detail the various aspects of the Treaty.

[23]The imposition of transfer tax was aimed at benefiting Tanzania with revenue and also protecting her industries in the early stages of development. The inadequacy of the common market to provide sufficient nominal tariff protection was also approximated by D. Ghai, op. cit., p. 77. Maximum period allowed for transfer tax is 15 years.

If this index were accepted as a measure of gain from the common market, then one would question the long run profitability of the common market. Because of the extremely short period covered and the period which was illustrative of the adjustment process such a conclusion would be premature. But the increasing share of Tanzanian manufactured exports to Kenya may be indicative of common market benefits. To be conclusive on the matter would have required the examination of the capacity utilization of industries in East Africa in order to understand the practical viability of such industrial undertakings in Tanzania and those in the other Partner States. This problem required a closer examination and was not explored here.

Another feature of the post independence period was the emerging national development plan which tended to focus on the development of individual nations and the Tanzanian demand for equitable industrial development in East Africa, appeared to have affected its choice of techniques. Given the fact that the industries which shifted from Kenya to Tanzania were mainly subsidiaries of international corporation, and the fiscal incentives provided to attract foreign investment primarily to raise the income per capita of its population and secondly to redress the balance of trade deficits with the rest of the Partner states, it was not a presumption to conclude that the choice of techniques was considered secondary so as to maximize growth rate or more realistically, it was dictated by the circumstances partly caused by the common market arrangements. Having attained her independence, Tanzania would have found it embarrassing to continue depending on Kenya for part of her

manufactured imports given the growing trade deficits against Tanzania. It was in the light of searching for the quickest possible route out of this industrial inferiority that the choice of techniques was not controlled by the Tanzanian government since the bulk of industrial investment was foreign oriented.

CHAPTER IV

THE RELATIONSHIP BETWEEN LABOR PRODUCTIVITY AND THE SIZE OF AN ESTABLISHMENT

It is generally believed that labor productivity, i.e., output per unit of labor, increases with increases in the size of an establishment at least up to some point.[1] If this relationship in fact holds for various industries, then it would possibly cast a light on the appropriate size that would be ideal for a developing country. This chapter examines the extent to which the labor output relationship of economic theory is substantiated by actual experience of a developing country. Using cross section data it will be demonstrated that such a generalization is not supported by empirical evidence at least in the case of Tanzania's industries. Two measures of size are used, namely size measured by value added and size measured by number of employees. The two measures of classification are adopted in order to illustrate the fact that the conclusion does not depend upon the method of classification used.

I. METHODS AND LIMITATION OF DATA

Ideally, derivation of the relationship between labor productivity and the size of the establishment in the short run requires a census

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[1] See J. Johnston, Statistical Cost Analysis (New York: McGraw-Hill Book Company, Inc., 1960), Table 4-21; also see Gerard K. Boon, Economic Choice of Human and Physical Factors of Production (Amsterdam: Neril Holland Publishing House, 1964), Tables 3.18 and 3.22.

that enumerates all industries into finely divided groups in order to avoid any divergence that might be the result of lumping heterogenous products into one category. However, the data provided are not ideal, as most census reports present data aggregated at the two digit level. Any conclusion derived from such data would undoubtedly conceal differences among the various types of firms in the category. Therefore, stringent tests would certainly require much better and more disaggregated data. In view of the writer being in the United States at the time of writing this assignment, the aggregated census data was the best alternative available.

Ideally, the analysis should also incorporate a time dimension. Since productivity is essentially a flow variable, it is likely to be influenced by time. The use of cross section data would certainly be misleading if the objective is to investigate the long run relationship. However, given the fact that industrialization has had such a short history in the case of Tanzania, it is reasonable to assume that time has not been a significant factor in influencing labor productivity. From the previous chapters it was indicated that despite the achievements of independence fifteen years ago, Tanzania's industrialization has remained below its expected "normal" pattern.[2] It would then seem that the use of cross section data would be a close substitute for the time series.

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[2]"Normal" pattern is here used in the Chenery's sense in which the expected proportion of manufacturing value added to the Gross Domestic Product would have been about 10 percent given the income per capita of below $100 and a population of about 10 million.

Finally, since the data also define labor inputs in terms of number of workers on the payroll, its use would certainly raise doubts about its accuracy since no account of degree of labor participation is taken. Ideally, the data would measure the number of hours worked.[3] If the rate of absenteeism is high for a given establishment and if such establishment is an important one in a particular industry, it would certainly affect value added for the industry.[4] Conversely, a high incidence of overtime work would affect the outcome of the analysis.

Also connected with the issue of labor inputs is the assumption that all skill is homogeneous in a particular establishment. This is really an erroneous assumption and it is only made to simply the analysis. A strict analysis would have taken into account the skill differences. This would have required construction of a skill index and grouping the industries according to this skill criterion. Then using various statistical tests, the significance of each variable in the skill index would have been examined. However, with the data supplied, such analysis has not been possible. There is no occupational index and the level of education indicated that about 95 percent of the workers had less than eight years of formal education. And, there is no record of experience of each worker. Given the low level

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[3]It must also be emphasized that the employment also depends on the degree to which labor is utilized, i.e., intensity and continuity of the effort.

[4]It is assumed that there is a fixed capital stock and factors of production are not freely substituted.

of education and assuming that their working experience has been limited, then the assumption of homogeneous labor inputs may be reasonable. In fact, the assumption that their work experience is about the same is realistic especially in the case of Tanzania. Taking the industrial structure of Tanzania as reflected by Table IV.1, it is evident that food processing, beverages, tobacco and textile manufacturers accounted for about 70 percent of total manufacturing employment. And, measured by the relative value added, those firms accounted for nearly half of the gross value added. This means that the bulk of manufacturing is concentrated in light consumer goods which couples with the fact that the industrial transformation deals with the finishing "touches" to strengthen the assumption that the level of labor skill required is generally low.[5]

II. SAMPLE SIZE

As indicated, the sample used consists of cross section data covering 50 establishments. The sample size represented 11 percent of the total number of establishments. By this criterion, the sample size clearly appears small but it represented 45 percent of total employment in manufacturing and 22 percent value added.[6] This summary is indicated on Table IV.2 (no. 3).

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[5]It is also expected that the more recently established industries tended to be relatively more capital intensive.

[6]The sample has obviously excluded some major "high" productivity firms by value added criterion. Though this is generally an acknowledged fact of econometric studies especially in a developing country, the sample is a compromise of reality and it is an alternative available.

TABLE IV.1

THE RELATIVE IMPORTANCE OF FOOD, BEVERAGES, TOBACCO AND TEXTILE MANUFACTURERS IN THE TOTAL MANUFACTURING

Row	Type of Data	No. of Establishment	Total Number of Employees	Gross Value Added '000 Shillings
1	Total manufacturing	450	49,281	551,678
2	Food and Kindred	123	13,828	123,688
3	Beverages	11	877	26,641
4	Tobacco	3	2,835	32,390
5	Textiles manufacture	51	16,441	78,518
6	Total[a]	188	33,981	261,237
7	Percentage of total manufacturing[b]	42	69	47

Source: United Republic of Tanzania, Economic Survey, 1971-72 (Dar-es-Salaam: Government Printer, 1972), Table 64.

[a]Sum of rows 2 through 5.

[b]Row 6 expressed as a percentage of row 1.

TABLE IV.2

THE RELATIVE SIZE OF THE SAMPLE DATA
TO THE TOTAL MANUFACTURING IN 1970

Row	Type of Data	No. of Establishment	Total Number of Employees	Gross Value Added '000 Shillings
1	Total Manufacturing	450	49.281	551,678
2	Sample Survey	50	22,344	122,729
3	Sample/Total (in percent)[a]	11	45	22

Source: United Republic of Tanzania, Economic Survey, 1971-72 (Dar-es-Salaam: Government Printer, 1972), Table 64; Sample from data given by the Bureau of Statistics Ministry of Economic Planning and Development (Dar-es-Salaam, 1972).

[a]Row 2 divided by row 1.

The adequacy of the sample was also tested by the relative importance of food, beverage, tobacco and textiles. This seemed necessary in order to see whether the sample satisfied the necessary condition of including the predominant industries. Tables IV.2 and IV.3 summarize the necessary conditions.[7] Food, beverage, tobacco and textiles accounted for about 70 percent of the total employment in manufacturing, while the relative proportion for the sample was slightly over 70 percent of the total employment in the sample. Using the proportion of value added as an indicator of coverage, it is seen that while the four dominant industries accounted for 45 percent of the total value added in the manufacturing, they accounted for over 70 percent of total value added in the sample. From the above description, it is apparent that in terms of value added criterion, the sample seemed to have included more of the dominant industries as reflected by the higher proportion than would normally be in the total manufacturing census. However, since the objective is to study the relationship between labor and output, the coverage can be taken as fairly adequate.

III. DEFINITIONS

The following indicators for measuring industrial development in Tanzania were selected from the available statistical material: the number of establishments, the numbers employed, gross output and gross value added.

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[7]The stringent statistical test would have required comparison of two sample groups in order to show whether their variances and means are the same. This would have required a second data set. This is not possible and an alternative test provided is an approximation.

TABLE IV.3

THE RELATIVE IMPORTANCE OF FOOD, BEVERAGES, TOBACCO AND TEXTILE MANUFACTURERS IN THE SAMPLE OF 50 ESTABLISHMENTS

Row	Type of Data	No. of Establishment	Total Number of Employees	Gross Value Added '000 Shillings
1	Sample	50	22,344	122,729
2	Food	16	3,726	23,528,506
3	Beverages	2	2,024	13,489,680
4	Tobacco	1	2,045	6,915,818
5	Textiles	8	8,607	45,058,664
6	Total[a]	27	16,402	88,992,668
7	Percentage of Sample[b]	54	73	73

Source: Calculated from the sample figures provided by the Bureau of Statistics, Ministry of Economic Planning and Development, Dar-es-Salaam.

[a]Obtained by adding rows 2 through 5.

[b]Row 6 as a percentage of row 1.

This study adopts the following definitions recommended by the United Nations and used by the Bureau of Statistics, Ministry of Economic Planning and Development, Dar-es-Salaam.[8]

(a) The number of establishments means the number of manufacturing plants under a single ownership or control at a single physical location.

(b) The numbers employed include all persons on the payroll of the establishment, whether they are part-time, casual or full-time workers. The employment data represent an average computed from the number of employees reported for the quarterly months of March, June, September and December.

(c) Gross output is obtained by the addition of:

(1) The value of sales of goods manufactured by the establishment.

(2) The value of contract of work done for others on their material.

(3) Resales of products bought and resold without further processing.

(4) Receipts for repairs or maintenance work done for others.

(5) The value of assets produced by own employees for capital account.

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[8] United Nations, Indexes to the International Standard Industrial Classification for All Economic Activities (New York: United Nations, 1968).

Correction is then made for changes in stocks of finished goods or work in progress.

Gross value added is measured as gross output minus the cost of the following inputs.[9]

(1) Raw materials,

(2) Fuels,

(3) Electricity purchased,

(4) Cost of repairs and maintenance work done by others,

(5) Cost of contract done by others, and

(6) Cost of goods bought and resold without further manufacture.

However, the above definition used by the Bureau of Statistics includes excise taxes and several other cost variables such as professional fees, water and postal charges, office materials, insurance, advertising, hired transport services and miscellaneous operating costs included in the value added. It is international procedure to subtract all non-factor costs (excluding depreciation costs) from gross output, i.e., excise taxes and other cost variables. However, this definition of value added adopted by the Bureau of Statistics is quite suitable as an indicator for measuring labor productivity.

In order to show the relationship between labor productivity and the size of the establishment by using the value added and number of employees criteria, Tables IV.4 and IV.5 were constructed. Seven

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[9]In order to simplify analysis, gross value added will hereafter be referred to simply as value added.

TABLE IV.4

TANZANIA: THE RELATIONSHIP BETWEEN LABOR PRODUCTIVITY AND SIZE OF ESTABLISHMENT FOR A SAMPLE OF 50 ESTABLISHMENTS IN 1972

Class	Size by Value Added (1)	Classification of Size by Value Added '000 shs					
		M (2)	VA (3)	N (4)	$\frac{VA}{M}$ (5)	$\frac{N}{M}$ (6)	$\frac{VA}{N}$ (7)
A	50 - 100	5	425	84	85	16.8	5.1
B	101 - 200	6	693	122	116	20.33	5.8
C	201 - 500	7	2,237	415	320	59.28	5.4
D	501 - 1000	9	7,049	1,274	783	141.55	5.5
E	1001 - 1500	3	3,773	919	1,258	306.33	4.1
F	1501 - 2000	2	1,754	420	4.176	210.00	8.8
G	2001 and over	18	109,830	19,020	6,108	1,056.67	5.8

Source: Compiled from the data provided by Bureau of Statistics, Ministry of Economic Planning and Development, Dar-es-Salaam, 1972.

TABLE IV.5

TANZANIA: THE RELATIONSHIP BETWEEN LABOR PRODUCTIVITY AND SIZE OF ESTABLISHMENT FOR SAMPLE OF 50 ESTABLISHMENTS IN 1972: CLASSIFICATION OF SIZE BY NUMBER OF EMPLOYEES

Class	No. of Workers (1)	M (2)	VA^a (3)	N (4)	$\frac{VA^a}{M}$ (5)	$\frac{N}{M}$ (6)	$\frac{VA^a}{N}$ (7)
A	10 - 19	5	773	978	90	16.3	5.8
B	20 - 49	9	1,676	263	186	30.4	6.3
C	50 - 99	2	849	140.0	425	70.0	6.1
D	100 - 249	14	13,114	2,142	937	153.0	6.1
E	250 - 499	3	4,875	1,008.0	1,625	336.0	4.8
F	500 - 999	9	39,269	7,065	4,363	785.0	5.6
G	1000 and over	8	62,498	11,648	7,812	1,456.0	5.4

Source: Compiled from the data given by the Bureau of Statistics, Ministry of Economic Planning and Economic Development, Dar-es-Salaam, 1972.

[a]Value in thousand shillings.

groups of establishment size were obtained and these were lettered A through G. The class intervals were arbitrarily determined taking, however, the range of the values into consideration. Because of the wide range of the data, the seven classes were considered adequate to reflect the diversity of the establishment size. This was necessary since the objective was to examine the relationship between labor productivity and the size. Then the simple arithmetic procedure of the necessary calculation was done as follows:

Let:

M = number of establishments in a given size group
N = total number of employees in a given size group
VA = total value added in a given size group

Then:

$$\text{Average value added per establishment} = \frac{1}{M} VA$$

$$\text{Average number of employees per establishment} = \frac{1}{M} N$$

$$\text{Average value added per employee (AVA)} = \frac{VA}{N} = \frac{\frac{1}{M} VA}{\frac{1}{M} N}$$

Tables IV.4 and IV.5 summarize the necessary information. Examination of columns (5), (6) and (7) of these tables reveals that value added and the number of employees per establishment on both criteria increase steadily up the size groups but the value added per employee on the basis of the two classifications indicates up-down-up movement. The correlation between value added and number of employees is 0.896, reflecting a fairly high correlation. This indicates that as the value added increases with the size, the number of workers also

increases. This is the expected relationship postulated under the neoclassical production theory.

However, if value added is taken as a measure of size, then the correlation coefficient between average value added per employee and value added is found to be 0.089. For the degrees of freedom of 38, this coefficient is not statistically different from zero since the critical value of correlation coefficient r = 0.304 at the 5 percent confidence level.[10]

Taking number of employees as a criterion for establishment size, it is found that the correlation between average value added per employee and number of employees to be -0.277. With the same degrees of freedom as for the above case, it is also concluded that this coefficient is insignificant at the 5 percent confidence level.

Taking the industrial census of 1966 for the sake of comparison with the sample results, on page 65, bears further testimony to the fact that average productivity fluctuates with the size of the establishment. With the exception of group D, the similar up-down-up movement seems to be repeated consecutively. Though the accounting numaire used in the census is the pound sterling instead of the Tanzanian shilling as in the case of the sample survey, the exchange rate had remained stable until 1971.[11] It would then appear that the cause of

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[10] Due to missing values for some variables, they were omitted from the computation and this tended to reduce the degrees of freedom.

[11] In 1971, the British pound sterling was devalued and it was equal to about 17 shillings instead of 20 shillings before devaluation. This, however, does not affect the conclusion.

this cyclical fluctuation of labor productivity with the size of the establishment must not be related to the two different bases of classification. This conclusion is contradictory to that reached by Johnston in the case of the United States study of the industrial census reports. He found that average productivity increased with size when value added criterion was used and decreased steadily when number of employees was used as a measure of size.[12]

[12]Johnston, op. cit., pp. 118-119.

CHAPTER V

SOME MICRO-ECONOMIC FOUNDATIONS OF THE MODEL

In order to understand the possible causes of the observed cyclical pattern in the productivity of labor with respect to the size of the establishment, it is considered essential to provide a tentative theoretical background about the behavior of the plants by using the neoclassical analysis.

I. PROPOSITIONS

Shen's hypothesis for cyclical fluctuations in labor productivity is based on "the relationship between the independent variable, changes in output, and the dependent variable, changes in production man-hours."[1] He concludes that "for an individual plant the two principal factors determining the relationship are frictional costs and stretching costs. Friction costs are incurred when labor input is altered in response to output changes--overtime, severance costs, loss of younger workers, training costs of new workers and the value attached by workers to a steady job in their choice of employment. Stretching costs are incurred when labor is held constant while output changes. They would result

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[1]The theoretical possibility of the Shen's proposition is not denied but not considered here due to lack of information on a time series basis. T. Y. Shen, "Cyclical Behavior of Manufacturing Plants," Journal of Industrial Economics, XVI, No. 2 (April, 1968), 107.

directly from straining of inputs or from idle capacity and indirectly from the foregone gains due to capital labor substitution."[2]

Brechling also argues almost along the same lines as Shen but he concludes that the labor productivity depends upon the relationship between labor, output, capital and technology.[3] By assuming imperfect conditions with administered prices, he proposes that "firms will treat their sales as exogenous in the short-run because advertising and other means of encouraging sales are effective only in the long run."[4] He derives his model by making labor services a dependent variable while output, capital and technology are exogenous independent variables. By regressing labor on these variables, he concludes that the exogenous variables were statistically significant in explaining the variation in the demand for labor services. This would suggest that employment would depend upon capital, technology and output. The relationship may be summarized by taking the partial derivatives with respect to each independent variable. With N as labor services, Q as output, K as capital and T as technology, then the demand function for labor and the signs of the first partial derivatives[5] can be written as:

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[2] Ibid. When labor is held constant and output is increased, then some monetary inducements have to be paid, e.g., higher wages, overtime for utilization of labor. If labor and capital are readily substitutable, then idle capacity may be utilized during a downswing and assisted by labor during upswing. It is hard in both cases to hold labor constant.

[3] F. P. R. Brechling, "The Relationship Between Output and Employment in British Manufacturing Industries," Review of Economic Studies, XXXII (1965), 187-188.

[4] Ibid.

[5] The signs of the partial derivatives are obtained from the theory of economic production.

$$N = f(Q,K,T) \tag{V.1}$$

$$\frac{\partial N}{\partial Q} > 0 \; ; \frac{\partial N}{\partial K} < 0; \frac{\partial N}{\partial T} < 0 \tag{V.2}$$

II. ASSUMPTIONS

If the firms behave in the neoclassical way, it would then be reasonable to assume that they are either profit maximizers or cost minimizers in the short run. This assumption is necessary in order to use the concept of optimum output and factor proportions. This would also ensure an optimum labor productivity per establishment in the same industry.[6]

Firms have the same production function. This is to justify the fact that they have the same mean productivity.

Since there is no evidence suggesting the fact that labor productivity is associated more with employment than value added or vice versa, it is assumed that it would make no difference to the conclusion which one of them is taken for analytical purposes. Classification by number of employees is therefore chosen. This has the further advantage of being the most commonly adopted measure of size in much of the literature on industrial economics. It is also probably the more reliable indicator. Value added is usually subject to suspicion, particularly the nonwage portion, since a majority of

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[6] It is, however, not necessary for all plants in the same industry to be in optimum equilibrium.

firms are foreign owned and may be overinvoicing raw materials especially when these are imported.[7] It is also less reliable because firms may understate the value added by manipulating the nonwage value added because they think that industrial census serves the purpose of tax assessment.[8] Value added data may not be available because small firms may have no proper bookkeeping records.[9]

III. AN ECONOMETRIC ANALYSIS

In order to explore the possible causes of the observed fluctuations in the labor productivity, it is thought necessary to show the relationship between labor, output, capital and ownership. The need for this analysis arises because of the dual nature of industrail technology in Tanzania. It is assumed that the institutional changes that have been discussed in the preceding chapters tended to promote industrial investment in Tanzania by shifting some industries from Kenya and inducing others from the developed countries.[10] It is also assumed that since most of the foreign owned industries are generally subsidiaries of the large multinational corporations, they tended to use techniques similar to those used by the parent corporations

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[7]For example, see Yaffey, op. cit.

[8]Ludwig Schatzl, Industrialization in Nigeria: A Spatial Analysis (Munich: Welftforum Publishing House, 1973), p. 38.

[9]Ibid.

[10]J. F. Rweyemamu, "The Historical and Institutional Setting of Tanzanian Industry" (Dar-es-Salaam: Economic Research Bureau University of Dar-es-Salaam, 1971), pp. 23-30 (mimeographed 71-2).

in the developed countries. On the other hand, the indigenous capitalists would tend to use less capital intensive technology since they have smaller accessibility to credit institutions since these are also foreign owned and operate on the usual commercial criteria.[11]

With the limited sample size, an attempt is made to show the effect of capital and foreign ownership on the employment. The method used to estimate such a relationship is the ordinary least square method (OLS) because the relationships which are linear in the parameters, but not necessarily in the variables, have substantial advantages, in that they can substantially describe a wide variety of interdependencies and they are the simplest to handle computationally. Thus we may write the demand for labor as a function of independent variables with value added, capital and ownership.

By letting

N = number of employees
Q = value added
K = capital stock
X = foreign ownership as a dummy variable

then the generalized functional notation for the demand for labor in the short run can be written as:

$$N = f(Q,K,X) \qquad (V.3)$$

Equation (V.3) is an inversion of the general production function conventionally written as $Q = g(N,K,X)$, but inversion and a change in the nomenclature do not, of course, change the production surface, but

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[11] J. Loxley, "Principles of Finance Management in Capitalist and Socialist Economies," Tanzania Investment Outlook, ed. A. Mosille (Dar-es-Salaam: Tanzania Investment Bank, 1973), pp. 9-15.

they do serve to emphasize that in the short run demand for labor is endogenous, while Q, K and X are exogenous. This, however, does not deny the fact that in the long run, independent variables capital and output are endogenous.

By working with the logarithms of these variables a better fit of the regression line is obtained and this choice of method has the advantage that it deals with elasticities which are independent of the measure of values used in the variables.

Now, by letting

N_i = logarithm of labor

Q_i = logarithm of value added

K_i = logarithm of capital

X_i = 1 if foreign owned, 0 otherwise

$i = (1, 2, 3, \ldots, 50)$

we can predict the demand for labor by linear multiple regression:

$$N_i = b_1 + b_2 Q_i + b_3 K_i + b_4 X_i + U_i \qquad (V.4)$$

Where b_1, b_2, b_3, and b_4 are constant coefficients

b_1 measures the effects of other factors on employment other than those in the model

b_2 direct elasticity of employment with respect to output

b_3 direct elasticity of employment with respect to capital

b_4 measures the effect of foreign ownership on employment

U_i is a disturbance term reflecting the stochastic nature of the relationship in the ith firm.

IV. EMPIRICAL RESULTS[12]

The results of the regression were as:

$$N_i = \underset{}{-\ 8.537} + \underset{(0.395)}{0.928Q_i} + \underset{(0.045)}{0.047K_i} - \underset{(0.028)}{0.026X_i}, \quad \underset{(0.043)}{} \quad R^2 = 0.97, \quad F = 435.54, \quad df = 36 \qquad (V.5)$$

From the regression results, it is revealed that the fit of the regression line is quite good with 97 percent of the total variability in the dependent variable explained by the independent variables. From the fit of the line it is obvious that the higher value of F used as a test of variance is quite significant and obviously there is no need to look for other variables which would normally have been required to achieve a significant reduction in the variation of the residuals.

Testing for the significance of the coefficients of the explanatory variables, the use of t test is made. From the values of t, it is found that only Q is statistically significant at the 5 percent level while K and X are significant at over 10 and 50 percent, respectively. The conclusion implied by these findings is that at the 5 percent level of significance, the percentage change in the capital does not significantly affect the number of workers employed. Similarly, percentage change in the foreign ownership does not affect employment. This would suggest that though the foreign firms are generally capital intensive, they do not necessarily increase employment.

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[12] Unless otherwise stated, the values in parenthesis are standard errors for the estimated coefficients and df = degree of freedom.

It would then appear that the cause for the variations in the labor productivity must be in the nature and composition of the goods in a particular group. The need for this search is necessitated by the fact that there is a significant statistical relationship between the number of workers (N) employed and the value added (Q). For example, for every one percentage increase in the value added, the number of workers employed increases by nearly 1 percent. This constant relationship between employment and value added is also borne out by Table IV.5, columns (5) and (6) (p. 51). The visual inspection of these two columns indicates that doubling of average value added per establishment would also double the average number of workers per establishment when moving from a smaller size group to the next larger group. This seems to suggest a constant productivity. It would then suggest that equation (V.1) can be rewritten as:

$$N = F(Q) \qquad (V.6)$$

and by running regression of N on Q, we can get the predicted value of N by using a simple linear regression:[13]

$$N_i = b_1 + b_2 Q_i + U_i \qquad (V.7)$$

where, as in equation V.2, b_1 and b_2 are parameters to be estimated and U_i is a random term.

The results obtained were:

$$N_i = -8.558 + 0.995Q_i, \quad R^2 = 0.97 \qquad (V.8)$$
$$(0.401) \quad (0.028) \quad F = 1253.9 \quad df = 38$$

[13] All variables are in logarithms.

From the above results it can be seen that the fit of the regression line has remained unchanged even after the elimination of the two variables of equation (V.5).

Comparison of equations (V.1) and (V.8) would suggest that the Brechling conclusion is partially satisfied, and equation (V.8) reflects a fact that there is a significant statistical relationship between the number of workers employed and the value added. From this relationship, then, the average productivity of workers can be obtained as follows:

$$AP = \frac{Q}{N} \tag{V.9}$$

where AP is the average productivity of labor for all industries while Q and N are value added and number of employees, respectively. Since there is a significant statistical relationship between N and Q, then the production function can now be written in its conventional form with N as an independent variable and Q a dependent variable, holding capital[14] and technology constant. Then the production equation can be rewritten as:

$$Q = g(N) \tag{V.10}$$

Linear Regression of logarithm of Q on logarithm of N provided the following results:

$$Q_i = \underset{(0.0001)}{8.805} + \underset{(.0001)}{.980N_i}, \quad R^2 = .97 \tag{V.11}$$

$$F = 1253.9, \quad df = 38$$

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[14] It is really hard to keep capital constant since different firms will have different quantities of capital and change from one size group to another may change the capital stock.

From (V.11) it is seen that fit of the regression line is quite good with the independent variable explaining about 97 percent of the total variation of the dependent variable.

Then from this relationship, it is thought necessary to see the relationship between labor productivity (AP) and the size. By using number of workers as a proxy for the size of the establishment, a linear regression method is used to explore any possible relationship between the logarithm of AP and that of N where N is the independent variable.

V. RELATIONSHIP BETWEEN AVERAGE PRODUCTIVITY AND SIZE OF AN ESTABLISHMENT

By letting

AP_i = logarithm of average productivity per employee

N_i = logarithm of number of employees as a measure of size

then

$$AP_i = b_1 + b_2 N_i + U_i \qquad (V.12)$$

and the regression results were:

$$AP_i = 6613.247 - 0.773N_i, \quad R^2 = 0.09 \qquad (V.13)$$

$$(361.22) \quad (0.449) \quad F = 1.762, \quad df = 38$$

From the above results it is quite clear that there is no linear relationship between labor productivity and the size of the firm. It would appear, then, that this reinforces the observed trend of Tables IV.4, IV.5, and IV.6 (pp. 50, 51, and 65, respectively).

TABLE V.1

TANZANIA LABOR PRODUCTIVITY AND SIZE OF ESTABLISHMENTS FOR 1966 CENSUS OF INDUSTRIAL PRODUCTION: CLASSIFICATION OF SIZE BY NUMBER OF EMPLOYEES

Group	Size by No. Employees (1)	No. of Establishment (2)	Gross Output[a] (3)	Total Employees (4)	Average Product per est.[b] (5)	Average Employees per est.[c] (6)	Average Product per Employee[d] (7)
A	10 - 19	132	3,255	1,745	24.66	13.22	1.87
B	20 - 49	138	9,300	4,433	67.39	32.12	2.10
C	50 - 99	73	10,929	5,314	149.71	72.79	2.06
D	100 - 499	40	30,358	16,224	758.95	405.6	1.87
E	500 and over	9	11,537	4,155	1,281.89	461.67	2.77

Source: International Bank for Reconstruction and Development International Development Agency, "Industrial Development in East Africa: Progress, Policies, Problems and Prospects Part III: Tanzania" (New York: United Nations, 1970), Tables III-6, III-8, and III-10. (Mimeographed).

[a]Unless otherwise stated all monetary values are in pounds.

[b]Column (3) divided by column (2).

[c]Column (4) divided by column (2).

[d]Either column (5) divided by column (6) or column (3) divided by column (4).

It can be concluded that though there is a direct and proportional relationship between number of employees and the value added, there is no significant statistical correlation between size and average productivity. There is, therefore, a need to search for some qualitative explanation which might have led to this statistical conclusion.[15] There is a danger in generalizing the relationship between output and employment as a sole determinant of productivity because when capital changes with size, the productivity may also be affected. There are statistical problems involved in the relationship of independent variables and also as to whether the short run assumptions allowing for the changes in capital are really valid in the discussion of productivity in the short run. These questions and related questions are investigated in the following chapter by using some graphical and statistical methods.

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[15] A number of functional forms, including polynomial, were tried but no significant results were obtained.

CHAPTER VI

THE SHORT RUN RELATIONSHIP BETWEEN EMPLOYMENT AND OUTPUT: TWO FACTOR MODEL UNDER MINIMUM LABOR HYPOTHESIS[1]

The regression results of equation V.5 appear to be interesting because of the positive coefficient of capital, a fact which would seem contradictory to the economic theory of factor substitution. Second, the coefficient is also insignificant a fact indicating a statistical collinearity problem between output and capital in the results of the preceding chapter. This chapter examines the theoretical and practical problems involved in this situation and its implication for labor productivity by applying the fixed factor proportion theorem within certain output ranges.

I. ASSUMPTIONS

In order to derive the demand for labor, the following assumptions seem necessary for analytical simplicity.[2]

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[1]This approach is slightly adapted from Walter Oi, "Labor as a Quasi-Fixed Factor," Journal of Political Economy, LXX (December, 1962), 538-55. Minimum labor is defined to be the minimum number of workers required to work with the given capital stock on the assumption that there is no full automation. There must be a minimum number of office workers, production managers, sales personnel, operatives, etc., in order for the production process to take place under the given capital stock conditions regardless of the level of output.

[2]Some of these assumptions were adapted from Michael P. Todaro, "An Analysis of Industrialization, Employment, and Unemployment in Less Developed Countries," Yale Economic Essays, VIII, No. 1 (Fall, 1968), 344.

(A) A firm has two homogeneous factors of production Labor (N) and Capital (K).

(B) Factor prices are constant.

(C) There is full utilization of capacity.

(D) Capital is a constraint to expansion.

(E) Constant returns to scale so that all firms are on the same production function. This also allows for the aggregation of the demand for labor for all industries. It also implies constant technology.

(F) Capital is not perfectly adaptable to the size of labor inputs but it is perfectly divisible.

II. PROPOSITION

For a firm, given the production function and capital stock, there is, in the long run a one-to-one correspondence between the level of output and employment. Thus theoretically, the desired level of labor inputs, could be derived by an inverted production function. In practice, however, the approach is invalid since the use of a long-run production function implies that capital is an amorphous input, adaptable to any quantity of labor. What is required instead is a short-run or expost function which takes account of the fact that in the short-run capital is cast into a specific form which is not perfectly adaptable to unlimited range of labor inputs.

Adaptability here, as defined by Stigler refers to the elasticity of the marginal product curve of labor for a given amount

and form of fixed capital, i.e., for a given physical plant in existence.[3]

III. MODEL

Assume that the firm operates in the long-run according to a Cobb-Douglas production function, in the short-run, however, there are fixed labor requirements.

Given this assumption together with assumptions A-F, it will be shown that labor requirements result in increasing output per unit of labor over a substantial range of output. There is also a positive relationship between the logarithm of labor and that of capital. This relationship would suggest that labor and capital are complements[4] rather than substitutes and we would expect the increase in one would require an increase in another since by assumption (B) the factor prices are constant.

If the firm uses two homogeneous production factors, labor (N) and capital (K) to produce one product and suppose that the plant production function is the following Cobb-Douglas type:[5]

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[3]George Stigler, "Production and Distribution," Readings in the Theory of Income Distribution. (Philadelphia: The Blakiston Company, 1951), pp. 119-42.

[4]In order to simplify analysis, complements referred here are gross complements which carry both income and price effects. Since analysis does not go either into the price and income analysis this definition is a general one.

[5]Slightly adopted from Norman S. Hubbard, "Short Run Changes in Labor Productivity in United States Manufacturing, 1954-59," Yale Economic Essays, op. cit., pp. 74-76.

$$Q = AN^{a}K^{B} \qquad \text{(VI.1)}$$

$$0 \leq a \leq 1,\ 0 \leq B \leq 1$$

Where A = level of technology

N = number of workers

K = capital stock

a and B = factor shares of labor and capital respectively

In the short run, the firm must employ a minimum number of workers along with its fixed amount of capital (K_o). Assume that this minimum (N_{min}) is directly related to the amount of capital available (K_o) in the following manner:

$$N_{min} = \phi K_o \qquad \text{(VI.2)}$$

where ϕ is a factor of proportionality then the demand for labor (N_D) for this firm can be written as $N_D = (Q/AK_o^{B})^{1/a}$ (VI.3)

By substituting (VI.2) into (V.1) the production function can be written as:

$$\phi = A\,\phi^{a}K_o^{a+B} \qquad \text{(VI.4)}$$

then the average productivity (AP) for $Q = Q_1$ is derived as:

$$AP = Q/\phi K_o \qquad \text{(VI.5)}$$

Average productivity will increase up to output Q_1 as shown in Figure VI.1 and VI.2 and will fall after that level of output. Two sub-cases may occur:

(a) $AP = Q/\phi K_o$ if $Q \leq Q_1$ and average productivity will be rising as shown in Figure VI.1.

Thus it is seen that for output less than Q_1, output and average productivity move in the same direction and the percentage change in average productivity (AP) is equal to percentage change in output (Q).

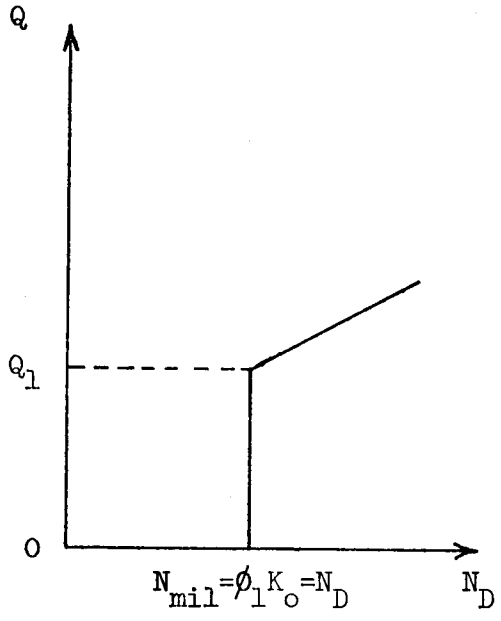

Fig. VI.1. The Relationship Between Output and Employment*

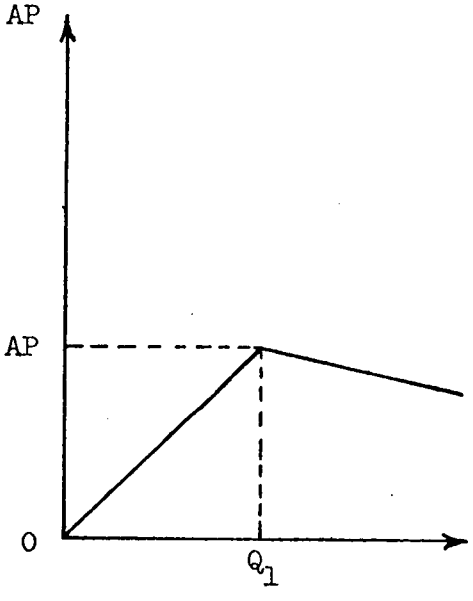

Fig. VI.2. The Relationship Between Average Productivity and Output*

*Slightly adopted from Norman S. Hubbard, "Short Run Changes in Labor Productivity in the United States Manufacturing, 1954-59," Yale Economic Essays, VIII, No. 1 (Fall, 1968), 75.

(b) However, for output levels greater than Q_1,[6] the average productivity falls since by definition (VI.2) the minimum labor requirements (N_{min}) have been satisfied, then an increase in the level of output with capital held constant, would result in a proportionate increase in the level of employment. However, capital labor ratio falls with an increase in the quantity of labor demanded. Since the coefficient of correlation of output and capital was 0.712 and it was significant at the 1 percent level, then an increase in the quantity of labor beyond the minimum labor requirements would result in not only the fall of capital labor ratio, it would result in a decreasing output growth rate beyond ϕ_1 since by assumption (D) capital stock is given and fixed in the short run. This would be accompanied by a falling average product (AP) for output levels greater than Q_1 as shown in Figure V.2.[7]

III. STATISTICAL PROBLEM

The analysis of this chapter has assumed capital stock as given in the short-run so that demand for labor is determined solely by changes in the levels of output. This however, does not tackle the

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[6] For $Q \quad Q_1$ and for a firm with a Cobb-Douglas production function, the average productivity becomes $AP = A\ 1/a\ Ko\ B/a\ Q\ \frac{a-1}{a}$ derived from (VI.4) and (VI.3).

[7] Even when minimum labor inputs are satisfied, output will continue to increase beyond Q_1 given the capital stock K, but the increase in output will be at a decreasing rate due to the capital constraint assumption and decreasing marginal productivity of labor after Q_1.

problem of capital changes from one size group to another. It does assume that the capital stock is given for all firms and that changes in the size of the firms depend upon the output levels demanded. Changes in the demand for labor are directly determined by changes in the levels of output. This analysis then does not explain the implication of equation (V.5) where the demand for labor is simultaneously determined by the value added (Q) and the quantity of capital stock. Then by varying capital stock and output, we also encounter a statistical problem of collinearity between the independent variables[8]--value added and capital. Since there is a significant coefficient of correlation between labor and capital, and simple linear regression of logarithm of labor on that of capital in order to determine the possible effect capital might have on the quantity of labor, provided the following results:[9]

$$N_i = 0.608 + 0.438K_i, \quad R^2 = 0.533 \qquad \text{(VI.7)}$$
$$(0.896)\ (0.063) \quad F = 47.8$$

Though the fit of the regression line is not very good, the important objective is the statistical significance of the coefficient of capital. It is significant at the 1 percent level. The positive coefficient of capital changes is not inconsistent with the analysis of this chapter since it was seen that changes in output alone without changes in

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[8]Changes in capital with simultaneous changes in output do not affect assumptions of short-run as long as technology remains unchanged.

[9]Standard errors for the estimated coefficients are given in parentheses below appropriate coefficients.

capital stock would have a direct relationship with average productivity for the lower levels of output and that by definition (VI.2) the minimum labor requirements are directly related with the capital stock.

However, by changing capital stock and output simultaneously, the analysis does not become a long-run one since technology is assumed to be constant. The usefulness of this approach is to demonstrate the significance of additional capital investment on the demand for labor. This would tell us whether additional capital investment by individual firms would significantly increase employment. Here we are faced with one statistical problem of collinearity between the independent variables (Q) and (K) of equation (V.5). Since simple linear regression of labor on capital with output held constant[10] indicates that there is a significant statistical relationship as reflected by equation (VI.7) above, then the insignificance of the capital coefficient in equation (V.5) is clearly due to the collinearity between the two variables, i.e., capital and value added. Because of the higher correlation coefficient between labor and value added, it would appear that the effect of capital on labor is swamped by that of value added. The fact that the coefficient of capital is insignificant may lead to the erroneous conclusion that capital is insignificant in the employment creation. This would likely be important in the areas with surplus labor. As

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[10]This would imply changes in factor proportions along a given isoquant but here output changes too so it becomes difficult to eliminate this problem.

[11]The coefficient of correlation between labor and value added is .984 and significant at the 1 percent level.

Eckaus very well points out there must be a minimum amount of capital to work with the surplus labor. Thus it would presuppose that demand for labor will grow in direct proportion to the growth rate of total output which, in turn will be directly governed (in accordance) with assumption (D) by the rate of capital accumulation. This is the familiar argument made famous by the 1955 Eckaus article on technological dualism.[12]

The insignificant coefficient for foreign ownership in equation (IV.5) is rather unexpected but at least it has the expected negative sign. As it has been indicated in Chapter II that there is relatively a large proportion of establishments under the foreign ownership, so there is a tendency for these foreign firms to use relatively capital intensive techniques. This is because most of them are subsidiaries of international corporations which are usually not constrained by financial resources and that the management, techniques, organization and control have evolved in the technological environment of the industrial centers and cannot easily be adapted to the conditions in the periphery. There is a reason to believe that the investment spectrum under consideration may not include labor intensive techniques. As Perroux and Demonts have pointed out that the multinational firm applies to all its branches technical methods corresponding to its

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[12]R. S. Eckaus, "The Factor Proportions Problem in Underdeveloped Areas," American Economic Review, XLV (September, 1955), 539-565.

capital whatever the importance of the factor at work in the countries it settles.[13] It would thus suggest the effect of foreign firms would be to reduce employment by using a relatively capital intensive technique.

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[13] F. Perroux and R. Demonts, "Large Firms-Small Nations," Presence Africaine, No. 38 (1961), p. 46 as quoted by G. Arighi, "International Corporations, Labor Aristocracies and Economic Development in Tropical Africa," Essays on the Political Economy Tropical of Africa (New York: Monthly Review Press, 1973) p. 113.

CHAPTER VII

CONCLUSION

The study has attempted to outline the qualitative factors which appeared to have affected the pattern of industrial structure that has emerged from the interaction of these factors. It was observed that industrialization prior to Tanzania's independence in 1961, was largely confined to simple processing activities namely agricultural products for export. At her independence, Tanzania was simply to inherit the existing economic structure and she was also faced by the low income per capita which was too low to generate sufficient domestic sources of saving. The absence of a domestic entrepreneurial class to champion industrialization also meant government had to depend upon the foreign sources of investment which were to shape the pattern of industrial structure which until to date seems to have changed little in form. The pattern of industrialization that was to emerge after independence seems to have concentrated on the processing of consumer goods such as food processing, cigarettes, beverages and some intermediate products like textiles and rubber products. While it is acknowledged that this pattern of industrialization is not uncommon for most developing countries, but it is rather unusually marked by the absence of the capital goods. In the case of Tanzania, the proportion of consumer goods is also exceptionally high by the standard of the developing countries or the world as a whole. This imbalance in the industrial structure would be expected to continue for some time.

The examination of the Common Market also revealed that if economic dependence on the Common Market were measured by the intercountry exports as a percentage of the Gross Domestic Product, concluded in general Kenya, due to her geographical and the colonial status, gained the most from the Common Market arrangements while Tanzania seems to have benefited the least. It would appear from the institutional changes made by the East African Common Market in 1964 and 1967, there is a tendency to develop industries for national markets first and this seems to be a major obstacle to developing integrated heavy industries like iron and steel which require a larger market than the existing national ones if foreign investment is to be attracted.

The industrial pattern characterized by brewery, cigarettes and other luxury goods would certainly not benefit the majority of the people and it is expected that such industrialization will likely reinforce the kind of consumption reflected by the advanced countries and therefore would certainly lead to high propensity to consume and small domestic saving.

Since the process of industrialization involves inter alia a shift of labor from the agricultural sector to the manufacturing sector, the employment problem becomes relevant especially when the investment is undertaken by foreign enterprises. The demand for labor for an individual firm was shown to have a positive relationship with changes in output if capital is held constant but it was also shown that the positive relationship of labor with respect to output and capital simultaneously was rather unusual. It does reflect the fact that demand for labor increases with increases in capital. The reason for this was

explained by the minimum labor requirements adopted from Oi and the Eckaus' factor proportion concept. This apparent factor complementarily is certainly to be taken with some caution. First the data is a cross section one and for one year so such a generalization would require a more time series data.

Second, it was also assumed that there is full utilization of capacity. Since there are usually the theoretical and practical problems as to the meaning and measurement of capacity, it is sometimes thought that under utilization of capacity exists and the application of the traditional model may not be appropriate.

However, the model built is a first approximation for projecting demand for labor of an individual firm but adjustments have to be made depending upon the circumstances of an individual firm and therefore the interpretation of labor productivity must be taken with great caution under these circumstances.

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