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THE IMPACT OF INDUSTRIALIZATION ON EMPLOYMENT IN KENYAN MANUFACTURING SECTOR SINCE THE FIRST FIVE-YEAR DEVELOPMENT PLAN

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CHAPTER 1

GENERAL BACKGROUND

1.1 Pre-Independence Economy

The pre-independence economy of Kenya was basically a colonial plantation economy with coffee, tea and sissal as the major exports. The economy was predominantly dependent on European and Asian immigrants for high level manpower. It exhibited all signs of a dual economy. The agricultural economy was divided into European and African sectors with constrasting characteristics. For example, Africans were prohibited by the Agricultural Ordnance of 1955 from acquiring land in some Scheduled Areas, known as the "White Highlands". Unlike other African countries such as Ghana, Africans could not grow the two export crops of coffee and tea.[1] Furthermore, according to a report of the International Bank for Reconstruction and Development, the European agricultral sector consisted of 3,600 large farms ranging from 20 to 50 acres with a gross income of K£35.9/million (Kenyan pounds) in 1961. In the same year, the African sector had some 950,000 small firms with a gross monetary revenue of K£10.74/million.[2] Other reports indicated that about 80 percent of the value of the marketed agricultural produce came from the European-owned farms and estates.[3]

Some employment statistics provide a further illustration on this dualism in the pre-independence economy. While 20 per cent of the Asians and 33 per cent of the Europeans were employed in the modern sector, only 8 per cent of Africans worked in this sector in 1961. There was also an unequal distribution of wages. Asians formed 6.4 per cent of the total number of employees in 1961 but received 21.5 per cent of the wages. Europeans represented 3.8 per cent of those employed and received 33.7 per cent of the wages.[4] Table 1 suggests that the differences in wage can be explained by Europeans holding top management positions, the Asians, middle level positions and the Africans low-level positions .

TABLE 1

HIGH LEVEL MANPOWER[5] IN 1964

TYPE OF OCCUPATION	European No.	%	Asians No.	%	Africans No.	%
1. Occupations Requiring University or High School Education	3267	50.4	1745	26.9	1476	22.7
2. Professonal Occuçations in Which University Education is not Mandatory	1890	14.7	1229	9.6	9696	25.7
3. Skilled Technicians and Clerical Workers Needing Secondary or Trade School Education	6698	12.0	17840	39.6	20559	45.6
4. Qualified Artisans	97	2.0	796	16.5	3937	81.5
TOTAL	11972	17.2	21610	31.2	35668	51.6

However, the presence of the non-African population, both as producers and consumers provided the needed impetus for industrialization in Kenya. The earliest development in manufacturing was, mainly for the processing of the European settlers' agricultural products. The manufacturing sector became more varied as the size of the market expanded.

It should be stressed that it was not only the European and Asian settlers in Kenya who provided a market for its manufacturing products. Its common market partners of Uganda and Tanganyika (now Tanzania) were also important markets. By the late 1950's Kenya had become the manufacturing centre of the whole of East Africa and was selling about 20 percent of its manufactured outputs to Tanganyika and Uganda. Because Kenya was the headquarters of the whole of the East African railways, harbours and airways, repairs of transportation equipment was an important activity in the 1950's and it accounted for 8 per cent (in constant 1963 price) of the Gross Domestic Product (G.D.P.). The contribution of manufacturing and construction was at least 13 percent of the GDP and an equivalent share was contributed by wholesale and retail trade. Large scale European firms and some Asian firms were actively involved in exporting, importing and distributing domestically manufactured products. Asians were ubiquitously engaged in small-scale retailing.

The presence of the settler population in the banking sector provided another economic benefit. Hazlewood posits that European settlers stimulated "the development of technical, financial and government services to a much greater extent than might have been expected from the low average level of income in the population as a whole".[6] The Europeans demanded public and private services commensurate with their high level of income. Besides, their agricultural practices were similar to those of Europe which were associated with a highly developed structure of marketing and advisory services. By 1955, banking, public administration and services accounted for 16 per cent of the gross domestic product.

It might be right to say that besides being wage earners, Africans played an insignificant role in manufacturing, construction, trade and banking in the pre-independence economy of Kenya. The ownership of industry was divided among Europeans, Asians and multinational corporations. Nevetheless, at the threshhold of independence, Kenya inherited a relatively modern economy with the agricultural sector playing a preeminent role, generating about 40 per cent of the G.D.P..

1.2 Post-Independence Economy

Post-independence economic planning in Kenya was aimed at consolidating the gains made in the pre-independence economy as

well as rectifying the abnormalities with regard to the role of Africans in the economy. The government adopted the economic doctrine of "African Socialism" advocating a degree of state involvement in the economy. It also adopted systematic economic planning as a means of sustaining and improving the economy. Consequently, it has implemented Five Development Plans since independence. Each plan emphasized a different set of goals. The First Development[7] Plan as well as the Second Plan[8] stressed import substitution as the basis of economic growth. The emphasis of the Third Plan[9] was on economic growth and the redistribution of wealth. The 1979-1983 Plan, formulated against the background of the collapse of the East African Common Market in 1977, shifted the emphasis of industrial strategy from production for domestic and regional markets to a search for international ones. The social goal of this Plan was "poverty alleviation" as the following statement illustrates:

> "In this Plan, the efforts of the Government to deal with emerging problems and to take advantage of new opportunities will be organized around the theme of the alleviation of poverty throughout the nation".[10]

The 1984-1988 Plan[11] stressed the regional and district distribution of investment. A common theme of these Plans is regarded as "a certain amount of industrialization is likely to be a necessary condition for successful economic development".[12]

The implementation of these Plans has resulted in certain changes in the economic structure of Kenya. Most notably, as illustrated by Table 2, the composition of the GDP since the First Five-Year Development Plan shows a steady decline in agriculture.

Between 1963 and 1968 the share of agriculture declined from 39.5 per cent of the GDP to 34.8 per cent. The phenomenon can be explained by the effect of the economic strategy of import-substituion emphasized in the 1964-68 Plan. More emphasis was placed on manufacturing than agriculture. Thus, when industrial activities such as manufacturing are considered for the same period, their importance to the economy increased unlike that of agriculture.

Between 1963 and 1968, manufacturing rose from 9.5 per cent of the GDP to 11.4 per cent. While agriculture's share of the GDP decreased by 4.7 per cent within the same period that of manufacturing experienced an increase of 1.9 per cent. The contribution of manufacturing to the GDP showed further increases between 1968 and 1980, with the exception of 1976 when it experienced a slight decrease.

For the most part, the 1970's were a time of rapid economic growth. Despite a marked slowdown in the 1974-1975 period because of the first oil crisis and a prolonged local drought,

TABLE 2

INDUSTRIAL[13] ORIGIN OF GROSS DOMESTIC PRODUCT (G.D.P.)

OF SELECTED YEARS (IN PERCENTAGES)

	1955	1958	1961	1963	1966	1968	1970	1973	1976	1978	1980
1. Agriculture, Forestry and fishing	38.5	38.9	35.7	39.5	37.4	34.8	34.3	32.4	32.2	31.4	28.7
2. Mining and Quarrying	0.7	0.5	0.3	0.5	0.4	0.5	0.5	0.6	0.6	0.6	0.6
3. Manufacturing	8.9	9.1	9.4	9.5	10.9	11.4	13.1	15.2	14.9	16.5	17.2
4. Construction	4.1	3.7	3.2	3.6	4.1	5.1	6.0	6.2	5.1	5.1	5.2
5. Electricity, Gas and Water	0.7	1.1	1.2	2.0	2.0	2.3	2.7	2.7	3.0	3.1	3.2
6. Transportation Storage and Communication	7.8	7.9	8.7	8.1	8.3	8.3	8.5	8.2	8.1	8.1	8.7
7. Wholesale and Retail Trade	13.0	11.8	12.2	10.6	10.2	10.3	10.9	8.6	7.8	7.8	7.8
8. Banking, Insurance and Real Estate	1.1	1.5	1..6	3.4	3.7	3.6	3.7	3.6	4.0	3.8	3.9
9. Public Administration and Defence	9.9	9.1	11.1	11.6	5.6	5.4	5.3	6.0	6.8	6.4	6.8
10. Services	5.2	5.8	5.8	5.3	11.7	12.5	8.3	7.3	7.5	7.2	7.7
11. Other	10.1	10.6	10.8	5.9	5.7	5.8	6.7	9.2	10.0	10.0	10.2
TOTAL GDP	100	100	100	100	100	100	100	100	100	100	100

the 1972-1978 GDP in real terms grew by an average of about 5.0 per cent (Table 3). Gross capital formation accounted, on average, for 24 per cent of the gross domestic product, while nearly 75 per cent of capital expenditure was financed from domestic savings.[15] In 1977, when crop conditions had recovered and world prices for the main export commodities of coffee and tea had risen dramatically, real GDP grew by almost 9 per cent (Table 3). The impetus was sufficient to maintain a growth rate of 6.6 per cent in 1978.

Furthermore, Table 3 shows that between 1963 and 1980 the annual growth rates of manufacturing were generally higher than the growth rates of both agriculture and the economy as a whole. However, there was a reversal in this trend, from 1981 to 1983, when the growth rate of manufacturing lagged behind that of agriculture and the economy. Labour productivity in manufacturing also showed a decline in 1981 and 1982 from its 1980 level as evidenced in Table 4. Output in the construction sector declined by as much as 10 per cent in the same period. The decline in construction reflected inability or unwillingness to begin new projects by both the public and private sectors. The data for 1977-82 show that employment in the private sector increased by only 2.6 per cent. This situation, and Kenya's exceptionally high population growth rate of 3.5 per cent per annum undoubtedly brought pressure on the public sector to become "employer of last resort".

TABLE 3

REAL GROWTH[14] of GDP BY SECTOR 1964-1983

SECTOR	1964-72	1972-78	1977	1978	1980	1981	1982	1983	1976-198
1. Total Traditional Economy	3.9	3.5	4.4	3.0	4.3	2.5	3.4	3.5	3.5
2. Monetary Economy:	6.3	4.4	9.0	6.9	4.2	5.5	3.4	3.9	5.0
(a) Agriculture, Forestry and Fishing	4.7	2.6	10.0	4.2	-1.2	6.2	4.4	4.1	3.7
(b) Manufacturing (Industry)	8.8	10.7	15.9	12.6	4.6	3.7	2.2	4.5	7.3
(c) Electricity & Water	9.2	8.0	11.8	6.0	5.9	8.2	4.5	4.3	8.4
(d) Building & construction	14.4	-0.4	7.4	9.1	-1.6	8.2	-11.7	-4.2	3.6
(e) Trade, Restaurants and Hotels	3.2	3.3	8.3	8.6	1.8	-	-1.8	2.8	4.3
(f) Transport, Storage and Communications	8.1	3.5	6.6	10.4	7.1	1.5	4.6	7.3	6.4
(g) Finance & Real Estate etc.	13.4	10.2	2.4	8.1	-1.9	13.1	11.9	4.9	9.9
(h) Ownership of Dwellings	5.3	5.1	4.2	3.6	6.3	9.4	7.4	3.7	5.7
Real GDP at Factor Cost	6.2	5.0	8.8	6.6	2.4	5.3	3.4	3.9	5.0

TABLE 4

INDICATORS OF LABOUR PRODUCTIVITY IN MANUFACTURING[16]

	1980	1981	1982
Change in manufacturing output %	5.2	5.0	2.7
Change in manufacturing employment (%)	2.1	3.4	0.3
Implicit change in output per worker (%)	3.1	1.6	2.4

There is general agreement in and beyond Kenya as to the main reasons for this deteriorating situation in the general employment conditions. The principal external factor has been a sharp 49 per cent reduction in the terms of trade from 1977 to 1983 (Table 5). Whereas before 1973 Kenya had been a net earner of foreign exchange from its trade in petroleum, by 1982 more than 50 per cent of earnings from domestic exports were required to finance the net costs of petroleum imports. This left less than half of these earnings to finance the imports of essential raw materials, capital equipment, as well as meet the increasing costs of servicing the external debt. The major internal factors have been the excessive dependence of the manufacturing sector on imported components, protection from foreign competition and official concern for consumers' interest at the expense of farm prices.

TABLE 5

EXPORT AND IMPORT PRICES AND TERMS OF TRADE

1973-1983 (1973 = 100)[17]

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Export prices	114	152	175	238	338	286	305	367	405	443	524
Import prices	114	178	225	261	282	298	343	452	574	663	739
Terms of trade(a)	100	85	78	91	120	96	89	81	71	67	71

NOTE: (a) The terms of trade index = $\frac{\text{Export Index}}{\text{Import Index}} \times \frac{100}{1}$. It is an index of the purchasing power of a unit of exports.

The government adopted an expansionary fiscal policy as a remedial action. This policy, in concert with the relaxed monetary attitudes encouraged by the 1977 commodity price boom, quickly led to serious balance of payments difficulties. Between 1981 and 1982, the foreign exchange reserves reached their lowest level ever, providing an import cover of only 1.7 months at the end of 1981, against the normal four-month requirements,[18] and less than one month's cover in 1982.

Another important problem facing Kenya is unemployment, which, until recently, mainly affected primary and secondary school graduates. Recent evidence suggests that unemployment among university graduates is becoming a real concern. According to one source, a large proportion of university

students who completed their degree courses were still unemployed a year after the completion of their education.[19]

To arrest the serious erosion in balance of payments and unemployment conditions, steps were taken to diversify the economy from a primary commodity-economy to a manufacturing-export-oriented one. This emphasis is reflected in the targeted rates of growth in the manufacturing sector established by the 1984-88 Development Plan as shown in Table 6. These high rates suggest that the Government of Kenya hopes to achieve its major economic and social goals, such as decreasing

TABLE 6
GDP GROWTH[20] TARGETS (1982 PRICES)
(percentage)

	1984	1985	1986	1987	1988
Agriculture	4.5	4.5	4.5	4.5	4.5
Manufacturing	3.0	5.4	6.5	7.0	7.5
Government Services	3.5	4.1	4.7	5.0	5.1
Total Monetary Sector	3.9	4.6	5.1	5.4	5.7
Total GDP at Cost	3.9	4.5	5.0	5.3	5.6

SOURCE: Republic of Kenya Development Plan 1984-1988

unemployment, through manufacturing export-led development. In fact this strategy was explicitly stated by the Minister of Finance in his budget speech of June 1984. The Minister hoped

that by offering incentives to manufacturing and other industrial activities he "would revitalize savings and investment and create better job prospects for the 250,000 young people leaving school each year."[21] This arouses an interest in a rigorous examination of the contribution of the manufacturing industry to employment generation in Kenya.

1.3 A Survey of the Literature on the Study

The question of employment generation in the less developed countries has attracted the attention of several economists ever since the publication of Eckaus' article, "The Factor Proportion Problems in Underdeveloped Areas".[22] Eckaus identified the failure of measures of fiscal policy designed to increase employment by stimulating effective demand as a common feature of unemployment in developing countries. He suggested that the difficulties of employment creation in the developing areas were not only due to the lack of effective demand but also due to market imperfections, limited opportunities for the substitution of technical factors as well as inappropriate factor endowments. His analysis was that factor-market imperfections and limited factor mobility, created employment problems in developing areas with low per capita incomes and limited capital resources. According to him, these problems differed more in degree than in kind from those existing in more advanced areas.

The existence of output-employment conflict, the employment conditions in the developing countries and the design of mechanisms to improve these conditions attracted the attention of scholars such as D. Turnham and I. Jaeger,[23] A. Peacock and G.K. Shaw[24], G. Ranis[25] and P. Gregory,[26] to name a few. Turnham and Jaeger maintained that "for an increasing number of countries, employment was emerging as a more serious population problem than the much more widely canvassed question of the adequacy of food supplies".[27] The attention of Peacock and Shaw was attracted to effective fiscal measures designed to promote employment. Their findings suggested that such measures must include: policies to eliminate unemployment by changing the level and composition of aggregate demand; strategies which influence the factor mix by favouring more labour than capital inputs; and measures to change the product mix in favour of more labour-intensive outputs. They cautioned that the implementation of such policies would impose certain costs on the community, such as, adversely influencing the balance of payment equilibrium. Consequently, they concluded that any fiscal policy that increased employment should be accepted as long as its implementation allowed the marginal product of labour to be at least equal to the difference between the consumption level of the employed worker and his subsistence level (consumption level when unemployed).[28]

G. Ranis identified three basic solutions for employment creation in the developing countries.[29] They were: higher growth rates with enough trickle-down effect which achieved full employment; the institution of labour-intensive public works programmes; and the establishment of market-oriented signals which eliminated administered price and import substitution programmes. Edgar Edwards arrived at similar conclusions.[30] According to him, the eventual resolution of the employment problem in the developing areas depended not only on the direct employment effect of the year-to-year choice in development strategies but also on how effectively these strategies widened the field of choice in subsequent years by pressing back inhibiting conditions. He suggested that for any lasting employment solutions, the developing areas must initiate policies to improve their technical, social and political environments.

The findings of Turnham and Jaeger, Peacock and Shaw, and Ranis as well as those of Baer and Hervé led to the popular and professional literature being replete with references to the failure of economic development to provide a sufficient number of new sources of employment to absorb rapidly growing labour forces. Expressions of the fear that a low absorptive capacity would lead to a deterioration in the quality of employment or to an increase in open and disguised unemployment were converted into assertions that employment conditions had been

worsening in the developing countries.[31,32,33,34] However, P. Gregory took an exception to this generally accepted principle.[35]

The focus of the above discussion on the literature is so far centred around employment generation in all developing countries. A voluminous literature has dealt with the issue on a regional basis. To survey it fully would require an extensive examination of monetary theory and the theory of economic growth. It will suffice to identify some of the salient works.

A number of writers have examined the issue of employment generation in South America. For example, O. Wadsted,[36] who examined Northeast Brazil and the works of M. Hassan[37] and M. Chossudovsky[38] which examine Venezuela are of particular interest. Hassan argued that Venezuelan economic planning had given undue emphasis to growth based principally on capital intensive activities at the expense of employment. He advocated that Venezuela should explore the possibility of using more labour intensive techniques.[39]

General employment creation in Kenya has been addressed by several writers. Harris and Todaro posited that potential increases in employment opportunities arising from programmes of accelerated growth were largely negated by the intentional substituion of scarce capital and managerial inputs for the

ever more expensive, although relatively abudant, unskilled manpower.[40,41] Ian Livingstone made an interesting suggestion that employment policies must include population control measures, export oriented policies and a small-scale rural industry development strategy.[42]

Employment creation in the Kenyan manufacturing sector has not attracted a similar research. Nevertheless, the works of Pack and Maitha are of special interest. Maitha observed a slow rate of growth in employment in Kenyan manufacturing industries. He attributed such a growth rate to the substitution of capital for labour.[43] He also developed a short-term employment function for the Kenyan manufacturing industry[44] which was based on the works of Brechling[45], Ball and St. Cyr[46], and Smyth and Ireland.[47] An attempt to replicate Maitha's findings using annual data for the manufacturing sector for the period 1963-1983 is presented elsewhere in this study.

Maitha's regression results indicated that 93.7 per cent of any difference between the logarithms of desired and actual employment is made up during the year".[47] He observed that such a large adjustment coeficient is plausible in a labour surplus economy like that of Kenya's. He concluded that the level of employment in manufacturing was in equilibrium, or very close to it, and that the only way to increase employment

substantially was to make some structural changes. He attributed high growth rates of output and productivity to increasing returns to scale and technical progress.[48]

The conclusions of Pack's studies on the Kenyan manufacturing sector[49] are at variance with Maitha's. His findings suggest that Kenyan production in the manufacturing sector was relatively labour intensive. He argued that:

> "...the initial labour-intensive choice of technique was made out of substantial spectrum of ex ante possibilities. Once this choice was made there was relatively limited post-installation flexibility in labour-machine ratios; for example, a filling machine operated at any positive number of hours will require four workers in attandance. Even if it is used for half of one shift, the same number of men are required."[50]

Such an argument cannot be overlooked. The objective of this study is twofold: first, to replicate Maitha's study using data for the period, 1963-1983; and secondly, to examine rigorously Packs' argument through the generation of the elasticity of employment with respect to output in the manufacturing sector.

CHAPTER 2

THE ADJUSTMENT MODEL

This chapter attempts to update Maitha's empirical work through the use of data for the period, 1963-1983.

The analytical framework employed in this chapter draws heavily upon the theoretical and empirical works of a number of authors including: F.P.R. Brechling;[51,52] D.J. Smyth and N.J. Ireland;[53] R.J. Ball and E.B.A. St. Cyr;[54] and J.K. Maitha.[55] The model contains an underlying employment demand function which relates the desired level of employment to a number of exogenous variables. It also embodies a short-run employment adjustment process which describes the adjustment of actual to desired employment. The specification of the model is best presented through both graphical and mathematical expositions.

2.1 Graphical Exposition

The model assumes that firms operate under imperfect competitive conditions. Consequently, their sales are exogenous in the short-run because advertising and other methods of inducing demand for their products are ineffective in the short-run. To simplify the analysis, the model further assumes that

a firm's output bears a constant relationship to its sales. Based on these assumptions, the output (Q) of a firm is an exogenous variable and hence a determinant of the firm's demand for labour services. Two other exogenous variables included in the model are capital (K) and technology (T). These variables are exogenous because they cannot be readily adjusted to short-run conditions.

The firm's demand function for labour services (E_s) is therefore given by:

$$E_s = f(Q,K,T,) \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

In accordance with conventional microeconomic theory, the demand for labour services (E_s) is expected to rise with that in output (Q) but to fall with a rise in either capital stock (K) or an improvement in the state of technology (T). In other words,

$$\frac{\partial E_s}{\partial Q} > o; \quad \frac{\partial E_s}{\partial K} < o; \quad \frac{\partial E_s}{\partial T} < o$$

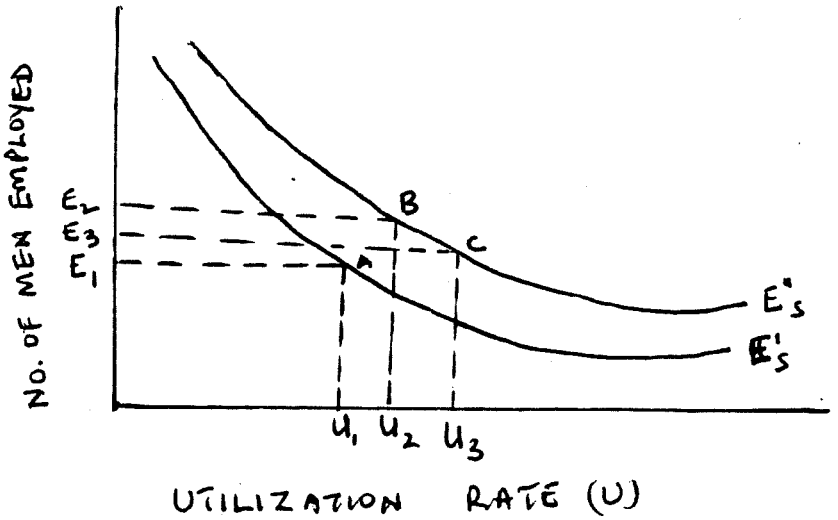
(i) Demand for Labour Services (E_s): A careful examination of equation 1 reveals that it is an inversion of the conventional production function. As Brechling cogently argues, such an inversion does not "change the production

surface".[56] The function explicitly states the often heard notion of the derived demand for labour. It makes the demand for labour services an endogenous variable and output, capital and technology exogenous variables.

It is necessary to examine the employment policy of a typical firm in order to further establish the functional relationships of these variables. First, the firm determines its desired level of labour services (E_s). It then determines the desired number of men (E) to employ and the degree to which they should be utilized (U) to provide the determined desired labour services. This involves a short-term adjustment process as illustrated by Figure 1. Both E'_s and E''_s are iso-quants indicating various combinations of the number of men employed (E) and their utilization rate (U) to give the level of labour services represented by E'_s and E''_s respectively.

FIGURE 1

SHORT-TERM ADJUSTMENT PROCESS OF THE NUMBER OF MEN EMPLOYED BY A FIRM



Assume that the firm minimizes costs in the short-run. The optimal bundle of E and U to provide E'_s is the point of tangency between the iso-cost (price or budget) line and the iso-quant E'_s. The price line is not indicated in Figure 1 because it may have different shapes depending on how the utilization rate (U) is rewarded. For example, price rates, special bonus schemes, overtime rates, etc., will tend to affect the shape of the budget line. For the sake of simplicity, assume that such a point of tangency exists at point A with E_1 and U_1 as the equilibrium number of men employed and their utilization rate respectively.

Suppose the firm's desired level of labour services increases and the new iso-quant is now E''_s with an equilibrium point as B. The number of men employed is E_2 and their utilization rate is U_2. The movement from A to B will not be instantaneous. The firm will have to attract and train new men which will not only take time, but may be very expensive. Furthermore, the firm may not be sure of the permanency of its new desired level of labour services (E''_s), particularly if the rise is sales-induced. Consequently, the firm may not employ more men, for fear of facing the possibility of their early dismissal, creating a poor picture of goodwill. A modest increase in the number of men employed may be preferable. As a result, the firm will employ E_1E_3 more men and increase their utilization rate from U_1 to U_3 by inducing them to

work overtime. A short-run equilibrium is established at C. When the permanency of $E"_s$ as well as the possibility of attracting and training new employees is established, the firm will then increase the number of employees to E_2 (the desired number at its desired equilibrium point of B) and reduce the utilization rate from U_2 to U_3.

The adjustment in the number of men employed from E_1 to E_2 can be conveniently represented by the usual stock adjustment equation stated as:[57]

$$\dot{E} = \alpha(E_t - E_{t-1}) \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where

$\dot{E}$ = the actual change in employment;

α = the proportion of the difference between the desired and actual level of employment which is eliminated in the current period;

E_t = desired level of employment; and

E_{t-1} = actual level of employment.

The works of Neild[58] and Brechling suggest that a relatively long distribution in time lag of employment behind output exists and that there is an adjustment process similar to the above stock adjustment equation. Furthermore, the empirical findings of Smyth and Ireland, and Ball and St. Cyr

confirm that such an adjustment process exists and is about 29.6 per cent in Australian[59] and 25.8 per cent in British[60] manufacturing industries respectively. Also, Maitha indicated that 93.7 per cent[61] of any difference between the logarithms of desired and actual employment in Kenyan manufacturing is made up during the year. These results have made the estimation of the employment demand function through the framwork of an adjustment process an attractive proposition.

As noted earlier, Brechling has shown that if we assume the simplest type of employment demand function where the desired level of employment (E_t) depends only on output (Q_t), then we can generate equation 3, viz:

$$E_t = a_o + a_1 Q_t \qquad \text{.....(3)}$$

where

E_t = the desired level of employment;
a_o = the constant term;
a_1 = the coefficient of output; and
Q_t = the level of output.

If we substitute equation 3 into equation 2, we have an employment function equation. This equation

$$\dot{E} = \alpha a_o + \alpha a_1 Q_t - \alpha E_{t-1} \qquad \text{.....(4)}$$

relates actual change in employment to output and actual level of employment.

(ii) Technical Progress: As expressed in equation 1, technology is one of the exogenous variables. Since there are no data for technology, it can be assumed that technology varies over time. This is represented by the quadratic function of time (t). Incorporating this into equation 4 generates equation 5.

$$\dot{E} = \alpha a_o + \alpha a_1 Q_t - \alpha E_{t-1} - a_2 t - a_3 t^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

The negative signs associated with a_2 and a_3 is in consonance with the condition established in equation 1 that demand for labour will fall with an improvement in the state of technology (i.e. $\frac{\partial E}{\partial T} < 0$).

The t^2 element stands for the acceleration of technical progress over time.

(iii) Capital Stock: Lack of data on capital stock in the sub-sectors of the Kenyan manufacturing industry frustrated the intention of including capital stock in this analysis. Brechling paid considerable attention and exercised much ingenuity in developing an expression for capital in the absence of suitably appropriate data.[62] However, for the purpose at hand it is sufficient to absorb the influence of capital and technical progress by a simple exponential

trend similar to Maitha's approach. Consequently, the basic model employed was:

$$\dot{E} = \alpha a_o + \alpha a_1 Q_t - a_2 t - \alpha E_{t-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Taking the logarithms of both sides of equation 6 gives:

$$\text{Log } E = \alpha a_o + \alpha a_1 \text{Log} Q_t - a_2 t - \alpha \text{Log} E_{t-1} \quad \ldots\ldots\ldots\ldots (7)$$

The omission of the t^2 element (shown in equation (5)) which stands for the acceleration of technological progress over time is evident in these expressions. There are two reasons for this omission. Our regression results of equation 5 turned out as (with the t-values in brackets):

$$\text{Log } E = 3.093 + 0.036t - 0.001t^2 + 0.105Q_t$$
$$\qquad (2.0) \quad (2.4) \quad (-3.2) \quad (0.9)$$
$$R^2 = 0.9907$$
$$\text{D-W} = 1.964$$

According to these results, the coefficient for t^2 is highly insignificant and hence warranted its omission. Besides, the empirical model of Maitha, which we hope to replicate, did not contain a t^2 variable.

2.2 Mathematical Exposition:

The above discussion can be formulated in a more rigorous mathematical expression. Let us regard equation 7 as the demand equation to be estimated. This equation can be derived from two different production functions; by approximating the capital stock and technology by an exponential[63] time trend or by using a constant elasticity of substitution production function.[64] We shall estimate the exponential time trend approach first, by assuming that capital grows at a constant rate and output is determined by the level of employment, capital and the prevailing technology. A short-run production function in this regard is specified as:

$$Q_t = A e^{pt} (Eh_t)^{\alpha} \qquad \text{.....(8)}$$

where

Q_t = production in time t
Ae^{pt} = capital and technology parameter at time t
E = employment (in number of persons)
h = hours worked

If we apply a cost minimization procedure with respect to the number of employees, it can be shown mathematically that the desired number of employees (E^*_t) is given by:

$$E^*_t = b_o e^{-b_1 t} Q_t^{b_2} \qquad \text{..... (9)}$$

Employment is assumed to adjust through time to the desired level in the form of:

$$\frac{E_t}{E_{t-1}} = \left[\frac{E^*_t}{E_{t-1}}\right]^{\lambda} \qquad \text{.....(10)}$$

where:

E^*_t = desired number of employees;
λ = coefficient of adjustment such that
$E^*_t \neq E_t \neq E_{t-1}$

Combining equation 9 and 10 gives equation 11 as:

$$E_t = b_o^{\lambda} \ell^{-} b_1^{\lambda t} Q_t^{b_2 \lambda} \left[\right]_{t-1}^{(1-\lambda)} \qquad \text{.....(11)}$$

Taking the logarithms of both sides generates equation 12 which is of the same form as equation 7:

$$\text{Log } E_t = a_o + a_1 t + a_2 \log Q_t + a_3 \log E_{t-1} \qquad \text{.....(12)}$$

where

$$\lambda = 1 - a_2$$

$$\alpha = \frac{1 - a_2}{a_1}$$

In order to derive the demand equation from the constant elasticity of substitution production function approach, recall equation 8, viz:

$$Q_t = A e^{\beta t} (Eh_t)^{\alpha} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (8a)$$

Let the cost equation for the firm be:

$$C_t = W_h (Eh)_t + F_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (13)$$

where:

C_t = total cost net of material and fuel;
W_h = the effective wage per man hour;
F = fixed costs.

Evidently, the effective wage per man hour (W_h) is not a parameter but a variable. It depends on the number of hours actually worked. This raises a problem because there is a clear distinction between nominal and productive hours worked by an employee. Output is related to the input of productive hours worked, while wage bills are usually related to certain nominal hours. The solution to this problem requires the establishment of the relationship between the effective wage per man hour and the number of productive hours worked. Approximating the relationship between the average wage paid per productive man hour and man-hour worked by its quadratic form, leads to:

$$W_h = - bh + ch^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (14)$$

Substituting (14) into equation 13 generates:

$$C_t = a(E_h)_t - bE_t h_t + cE_t h_t + F \quad \ldots\ldots\ldots\ldots\ldots(15)$$

Solving for h_t from 8, we have

$$h_t = \frac{Q_t^{1/\alpha} e^{-pt/\alpha}}{A^1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(16)$$

where: $A^1 = A^{1/\alpha}$

Substituting 16 into equation 15 gives the cost function as:

$$C_t = \frac{aQ_t^{1/\alpha} e^{-pt/\alpha}}{A^1} - \frac{b}{E_t}\left[\frac{Q_t^{1/\alpha} e^{-pt/\alpha}}{A^1}\right]^2 + \frac{c}{E_t}\left[\frac{Q_t^{1/\alpha} e^{-pt/\alpha}}{A^1}\right]^3 + F \quad \ldots(17$$

Differentiating equation 17 with respect to E, equating to zero and solving for E generates the desired or cost minimizing level of employment as:

$$E^*_t = \frac{2C\, Q_t^{1/\alpha} e^{-pt/\alpha}}{A^1 b} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(18)$$

Brachling as well as Ball and St. Cyr rightly argued that a change in normal hours would affect the desired level of

employment in equation (18) by altering the ratio of the coefficients C and b. If normal hours are reduced, more hours would be paid at overtime rates if the same number of hours of work is performed. The weight given to the squared term would rise, lowering the hours worked at the minimum cost point and so increasing the demand for workers (as shown graphically in Section 1(i)). Consequently, the model has an adjustment process of the form:

$$\frac{E_t}{E_{t-1}} = \left[\frac{E^*_t}{E_{t-1}}\right]^{\lambda} \qquad \ldots\ldots\ldots\ldots\ldots\ldots(19)$$

where: $o<\lambda = 1$

Combining equations 18 and 19 gives us:

$$E_t = \left[\frac{2C}{A^1 b}\right]^{\lambda} Q_t^{\lambda/\alpha} e^{-\lambda p_{t/\alpha}} \left[{}^{(1-\lambda)}_{t-1}\right. \ldots\ldots\ldots\ldots\ldots(20)$$

Taking the logarithms of both sides generates equation 21 as:

$$\log E_t = a_o - \frac{\lambda p}{\alpha} t + \frac{\lambda}{\alpha} \log Q_t + (1-\lambda) \text{long } E_{t-1} \ldots\ldots\ldots(21)$$

where:

$a_o = \log\left[\frac{2C}{A^1 b}\right]$ = constant term.

$a_1 = \frac{\lambda p}{\alpha}$

$a_2 = \frac{\lambda}{\alpha}$

$a_3 = (1-\lambda)$

$\alpha = \frac{1 - a_2}{a_1}$

$p = \frac{-a_3}{a_1}$

Substituting the above values for:

- $\frac{\lambda\rho}{\alpha}, \frac{\lambda}{\alpha}$ and $1-\lambda$ into equation 21 generates equation 22 which is the same as equation 12.

$$\log E_t = a_o + a_1 t + a_2 \log Q_t + a_3 \log E_{t-1} \quad \ldots\ldots\ldots (22)$$

The basic model utilized in the empirical work coincides with the above equation.

2.3 The Data and Method of Estimation

The basic data used in the statistical estimation are set out in Appendix I. As per the Appendix, annual data[66] for the manufacturing sector for the period 1963-1983 were employed. The lack of data prevented the undertaking of an industry analysis using quarterly data. This had an effect of reducing the number of degrees of freedom quite markedly, even though the period covered was considerably longer than the degrees of freedom indicated.

The number of those employed and not their hours worked was used as the data for employment. It could be argued that number of hours worked rather than number of employees should have been used because a large part of the adjustment would thereby disappear. A major reason for choosing employment was that the relationship between output and unemployment is usually measured in men and not in the number of hours worked.

Value-added data were used for the output variable (Q_t). This had the advantage of avoiding double counting and thus provided a balanced assessment of the level of manufacturing activity. The data for value added were not deflated due to lack of a suitable deflator.[67]

Employing the ordinary least square regression method, the data for both the whole manufacturing sector and for selected subsectors were fitted into the demand equation (equation 22). The results generated are presented in Table 7. The numbers in brackets are the t-values.

2.4 Interpretation of the Results:

The employment function used in this study appears not to fit Kenyan manufacturing data and has produced unreasonable results. This is in marked constrast to Maitha's results. The negative coefficient (-0.087) of the output variable ($\log Q_t$) "for all manufacturing" (line 1 of Table 7) is contrary to expectations. It appears that as manufacturing output increases, the number employed decreases. This is not consonant with the argument raised in support of equation 1. Nor does it support the findings of Brechling, Smyth and Ireland, Ball and St. Cyr, and Maitha.

Another shortcoming of the results concerns the t-values. The critical t-value at five per cent level of significance and 16 degrees of freedom is 1.75. The t-value of all but one of the variables in the study (Table 7, line 1) did not approximate the desired level of significance.

TABLE 7

RESULTS OF REGRESSION EQUATIONS

		COEFFICIENTS						IMPLIED VALUE OF		
		Costant	t	Log Q_t	$\log E_{t-1}$					
	INDUSTRY	a_o	$\frac{\lambda\rho}{\alpha}$	$\frac{\lambda}{\alpha}$	$1-\lambda$	R^2	DW	λ	α	ρ
1.	ALL MANUFACTURING	1.991 (1.0)	0.018 (1.1)	-0.087 (-0.7)	0.898 (4.5)	0.9855	1.797	0.102	-1.172	-0.21
2.	MEAT AND DAIRY PRODUCTS	3.554 (1.7)	0.008 (0.8)	-0.081 (-1.1)	0.643 (2.9)	0.4892	2.290	0.357	-4.407	-0.10
3.	CANNED VEGETABLES, FISH OIL AND FATS	1.362 (1.2)	-0.021 (-1.1)	0.117 (2.3)	0.747 (4.7)	0.9472	1.344	0.253	2.163	-0.18
4.	BAKERY PRODUCTS, SUGAR AND SUGAR CONFECTIONery	6.895 (34.)	0.059 (2.6)	0.074 (1.1)	0.066 (0.2)	0.9396	1.698	0.934	19.872	1.26
5.	MISCELLANEOUS FOODS	-0.242 (0.1)	-0.171 (-2.6)	0.820 (3.2)	0.415 1.7)	0.6305	1.605	0.585	0.713	-0.21
6.	BEVERAGES AND TOBACCO	2.654 (1.8)	-0.019 (-0.7)	0.353 (1.5)	0.313 (1.3)	0.8854	1.370	0.687	1.946	-0.05
7.	TEXTILES	5.550 (2.0)	0.012 (0.1)	0.596 (1.3)	-0.188 (-0.8)	0.7565	2.006	1.188	1.993	0.20
8.	WOOD AND CORK PRODUCTS	6.679 (0.6)	0.111 (0.6)	-0.840 (-0.7)	0.830 (0.6)	-0.0725	1.219	0.17	-0.202	-0.13
9.	FURNITURE AND FIXTURES	1.087 (1.2)	-0.016 (-0.6)	0.170 (1.1)	0.720 (5.5)	0.9030	2.670	0.280	1.647	-0.09
10.	PAPER AND PAPER PRODUCTS	2.438 (1.8)	0.024 (0.8)	0.080 (0.5)	0.564 (2.4)	0.9501	1.774	0.436	5.54	0.3
11.	PRINTING AND PUBLISHING	3.424 (2.2)	0.018 (2.1)	-0.103 (-1.3)	0.645 (2.7)	0.6875	1.787	0.355	-3.446	-0.17

TABLE 7 (continued)

RESULTS OF REGRESSION EQUATIONS

INDUSTRY	COEFFICIENTS: Costant a_o	t $\frac{\lambda\rho}{\alpha}$	Log Q_t $\frac{\lambda}{\alpha}$	logE_{t-1} $1-\lambda$	R^2	DW	IMPLIED VALUE OF: λ	α	ρ
12. BASIC INDUSTRIAL CHEMICALS	0.308 (-0.2)	-0.032 (-1.6)	1.156 (6.2)	0.094 (1.0)	0.8569	1.150	0.906	0.784	-0.03
13. CLAY AND GLASS PRODUCTS	2.221 (1.2)	-0.016 (-0.7)	0.397 (1.5)	0.309 (1.4)	0.5234	2.030	0.691	1.741	-0.04
14. METAL PRODUCTS	1.795 (1.3)	-0.007 (-0.3)	0.376 (2.5)	0.421 (2.2)	0.9788	1.451	0.579	1.540	-0.02
15. ELECTRICAL MACHINERY	5.032 (1.0)	0.115 (1.0)	-0.139 (-0.2)	0.397 0.9	0.6601	1.327	0.603	-4.338	-0.83
16. TRANSPORTATION	1.594 (0.9)	-0.001 (-0.1)	0.037 (1.3)	0.802 (4.6)	0.7370	1.855	0.198	5.351	-0.03
17. MISCELLANEOUS	1.808 (2.9)	-0.012 (-1.6)	0.452 (6.7)	0.334 (3.3)	0.9017	1.582	0.666	1.473	0.03

The implied values of the three "structural" coefficients " ", " " and " " are given in the last three columns of Table 7. Recall that " " is the speed of adjustment of employment to its desired level, " " is the elasticity of net output with respect to labour services (productive man hours) and " " is the annual rate of growth of output due to factors other than labour services (e.g., technology). A comparison of the results for these coefficients with similar total manufacturing studies is presented in Table 8. According to this comparison, the results are equally as poor as the value of the coefficient for the output variable. Our value for the adjustment coefficient, " ", is by far the least among the lot. It suggests a very low speed of adjustment of employment to its desired level. It indicates that 10 per cent of any difference

TABLE 8

HIGH LEVEL MANPOWER[5] IN 1964

COUNTRY	λ	α	ρ
Britain	0.48	1.14	2.40
Australia	0.71	1.34	2.66
Kenya (Maitha's results)	0.94	1.11	8.44
Kenya (our results)	0.10	-1.17	-0.21

between the logarithms of desired and actual employment is made up during the year. This is in marked contrast with Maitha's figure of 93.7 per cent. The values for " " and " " are very low and the negative values associated with them present serious difficulties in their interpretation.

2.5 Explanation of the Differences

There are two plausible reasons for the differences between these results and those of Maitha: changed circumstances; and inadequate and poor quality data for the period of study. Structural changes seemed to have occurred and the adjustment process is not as effective as it was when Maitha conducted his studies. Two examples of such changes readily come to mind. First, before independence Kenya developed manufacturing and service industries which served not only its own needs but also those of neighbouring countries, particularly Uganda and Tanzania. Such conditions were reversed in 1977, following the collapse of the East African Economic Community. Besides, Maitha's studies coincided with the first decade after independence. Many Kenyans still remember this period with some nostalgia.[68] This was the time when Kenya achieved recognition both domestically and internationally as a fast-growing economy, coupled with price and balance-of-payments stability. This stability accounted for the main sectors of the economy achieving high rates of growth. This study began in this period and included in the turbulent 1970's

when this trend was reversed, particularly after the oil crisis of 1973. The subsequent high cost of imported energy, world-wide recession and inflationary tendencies wrought havoc in the economy, dominating it for the whole of the second decade after independence, except for the temporary easing in 1976-77 because of a coffeee "boom". Consequently, between 1964 and 1972 while total GDP registered an average annual growth rate of 6.2 per cent, manufacturing 8.5 per cent, government services 10.2 per cent, agriculture 4.75 and GDP per capita 2.7 per cent, the corresponding rates from 1972-1981, were 4.4 per cent, 5.9 per cent, 6.3 per cent, 2.9 per cent and 0.6 per cent respectively.[69]

The last years of this study were particularly difficult. The foreign-exchange position was a particularly binding constraint on the economy. As mentioned in an earlier section, the foreign-exchange reserves reached their lowest levels ever, providing import cover of only 1.7 months at the end of 1981, against the normal four months requirement. By 1982, the import cover was less than one month. This deterioration was largely attributable to the escalating costs of fuel imports which had been consuming more than the total export earnings from Kenya's two main export commodities, coffee and tea. For example, in 1981, the country's net cost of importing fuel and lubricants amounted to K£217.7m against K£170.5m in exports earned from coffee and tea.[70]

This foreign-exchange crisis had a very adverse effect on the economy. For instance, in the 1982/83 period, many industries were unable to obtain their imported raw materials. As a result, the manufacturing sector's growth rate plummeted to a mere 2.0 per cent in 1983, compared with an average annual real growth rate of 8.5 per cent in the period 1964-1972.

Such situations may help explain the marked variance between Maitha's and my results. The most natural reaction during such depressions would have been lay-offs. However, it is conceivable that in an environment with a very small skilled labour force, firms would be wary to do so for fear that their laid-off workers might be employed by other firms, thus forestalling them of their services when the need arose again.

Certain government policies also might have contributed to the variances in the two results. For example, the government created serveral agencies to promote and help finance industrial development. The principal agencies are: the Industrial Commercial and Development Corporation; the Industrial Development Bank; the Development Finance Company of Kenya; and Kenya Industrial Estates. Their main activities are food processing, textiles and clothing, leather and footwear, metal products, transportation equipment, printing and publishing, petroleum refining and chemical products. Beased largely on import substitution and heavily protected, the

industrial sector attracted considerable foreign investment and expanded rapidly for most of the 1960's and 1970's. From 1972-78 output increased by as much as 10 per cent per annum. However, since then, the rate of expansion has steadily declined, to less than 3 per cent in 1982. The decline has been aggravated by drought (reducing supplies for food processing plants and seriously affecting hydro-electric power), the sector's undue reliance on imported raw materials and an over-valued currency. As a consequence, many local products became increasingly import-intensive and many manufacturers became net consumers of foreign exchange, at the same time as the loss of export outlets, particularly in Uganda and Tanzania, confined their markets to Kenya itself.

The quality of the data may be another basic cause of the poor results. The first attempt to reproduce Maitha's results ended in different results, as illustrated by Appendix II. A trend-chart of the various variables was done which indicated that some of the data of the later years of his study appeared to be out of line (See Appendix III). Such data were corrected and another regression was done before his results could be achieved. The trend- charts of the variables and the summary of the equations are presented as Appendices IV and V. The same procedure was utilized in doing the regression of the data for the study but the results were still the same as presented in Appendices VI and VII.

A probable explanation of this phenomenon is that the standard of data collection might have deteriorated because of a rapid growth in the manufacturing industry. For example, the number of establishments in manufacturing experienced an increase of 132 per cent between the last year (1969) of Maitha's study and the last year (1983) of this study. It is conceivable that because of this phenomenal increase in the number of establishments in manufacturing the standard of data collection could have deteriorated.

The only merit in this exercise is that an attempt was made to up date Maitha's empirical work. The ability to apply the technique involved was also demonstrated. However, the results are not useful for policy making purposes. First, there are statistical problems arising mainly from multi-collinearity and the use of a distributed lag model.[71] Second, there are problems of interpretation: for instance, the distinction between returns to scale and returns to labour and that between shifts in capital and in technology. Finally, and most importantly, these results are so poor that they are at best, meaningless.

CHAPTER 3

THE EMPLOYMENT - OUTPUT MODEL

3.1 Background

A common phenomenon observed in developing countries, such as Kenya, is the failure of manufacturing employment to grow rapidly enough to absorb members of the growing urban labour force.[72,73] A voluminous literature[74,75,76] has emerged in an attempt to explain this poor performance and to suggest ways in which it might be improved. Most of it deals with three fundamental and inter-related issues: the conflict between increasing employment and increasing output; the problem of output composition; and the choice of techniques problem.

Three strategies have been proposed to increase employment in industry and throughout the economy. A price-incentive strategy posits that correctly identifying factor, product and foreign exchange prices, and allowing factor endowment to peak are key to increasing labour use. Implicit in this proposition, is the existence of perfect market conditions and the private sector's access to accurate information about future demands, supplies and prices. The interventionists strategy, advocates government intervention to create employment. It postulates that since income distribution is unequal, the government should buy up labour-intensive mass consumption goods and distribute them to the poor at subsidized prices. Existing gaps in communications and suitability

make it necessary for the establishment of Appropriate Technology Institutes. Trade negotiations are needed to remove restrictions imposed by developed countries on imports from developing world. Government decentralisation, special lending institutions and training and technical assistance programmes are needed to help small entrepreneurs overcome their lack of education and business experience.

The radical reformists argue that reform of the political economic system, or outright revolution is a necessary precondition to increasing employment. The rich, powerful minority is not about to legislate an end to its monopoly of economic and political power. Consequently, without a radical redistribution of power and wealth the composition of output will continue to be biased towards inappropriate goods and technological development will continue to be imitative and capital-intensive rather than adaptive.

This chapter presents an empirical study of the Kenyan manufacturing sector, from which employment policies can be generated. The basic hypothesis of this study, is that the elasticity of employment with respect to output, for the period studied, is between zero and one. That is:

$$0 < \frac{\partial E}{\partial Q} < 1;$$

and that the elasticities for earlier periods are greater than those for later periods. In other words, the Kenyan manufacturing industry has been becoming increasingly capital intensive.

3.2 The Model and Its Estimation

The simplest type of employment demand function, as expressed in equation 23, was employed in the study:

$$E_t = a_o Q_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (23)$$

where

E_t = the firm's desired employment,
a_o = the constant term;
Q_t = the level of output.

taking the logarithms of both sides gives:

$$\log E_t = a_o + \log Q_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (24)$$

This is a simple but attractive model, which is not substantially different from that used in the previous chapter. Evidently, equation 24 is equivalent to equation 22 excepting for the trend and lagged terms. Equation 22 is regarded as superior to equation 24 because of the inclusion of these terms. However, the trend term in the extended model (expression 22) is a mere proxy for capital for which there are no available data. This proxy is not satisfactory for several reasons. And the lagged factor, E_{t-1}, did not yield acceptable results.

It should, however, be noted that the omission from the adpoted (model expression 24) of important explanatory variables

such as Capital and technological progress will probably result in an underestimation of the coefficient[77] of the included variable, Q_t. This should be borne in mind when interpreting the results of our empirical investigation.

TABLE 9

SUMMARY OF REGRESSION RESULTS

PERIOD	NUMBER OF OBSERVATIONS	DEGREE OF FREEDOM	CONSTANT	LOG Q_t	R^2	DURBIN-WATSON STATISTIC
1963-1983	20	18	6.290 (27.7) 0.227	0.444 (22.5) 0.020	0.9636	0.492
1963-1973	10	8	4.237 (11.3) 0.375	0.636 (18.2) 0.035	0.9735	1.314
1973-1983	11	9	7.791 (34.0) 0.229	0.320 (16.9) 0.019	0.9662	2.183
1963-1975	12	10	4.749 (13.0) 0.365	0.587 (17.4) 0.034	0.9650	1.575
1975-1983	9	7	8.158 (35.3) 0.231	0.291 (15.5) 0.019	0.9675	2.162

3.3 Data and Interpretation of the Results

Data concerning annual employment (number of employees) and value added for the manufacturing sector, for five time periods with 20, 12, 11, 10 and 9 observations respectively, were fitted to the model. The results are presented in Appendix VIII, and summarized

in Table 9 (with the t-values in brackets and the standard errors underlined). The fit, as judged by the coefficient of determination, R^2, is very good for all the five periods. All the regression coefficients have the expected signs and all the t-values are significant at 99per cent level. The Durbin-Watson statistic for each of the period (except the period, 1963-1983) is close to two, indicating the absence of serial correlation of residuals.

The estimated elasticity of employment for the longest period (1963-1983) is 0.444, suggesting that a ten per cent increase in output would lead to an increase of 4.44 per cent in employment. For the remaining four periods, the elasticities for the earlier periods are higher than those of subsequent periods. For example, the elasticity for 1963-1973 is 0.636 while that for 1973-1983 is 0.320. Similarly, the elasticity for 1963-1975 is 0.587 and 0.291 for 1975-1983. These results strongly suggest that employment in the Kenyan manufacturing sector has been increasingly less responsive to output. It can be concluded that there exist increasing capital intensive modes of production. While this conclusion differs from Pack's,[78] it reinforces the findings of Turnham and Jaeger.[79] Also, it supports the conclusions that the failure of fast growth in employment is due to growing capital intensity[80] of output and that employment conditions have been worsening in the developing countries.[81]

CHAPTER 4
POLICY IMPLICATIONS

The main objective of this study was to examine rigorously the generation of employment in the Kenyan manufacturing sector between 1963 and 1983 through the use of two models. The short-term employment function model was used in an attempt to replicate an earlier study, using data for a later period. The second model, the employment-output model, was used to generate the elasticity of employment in the manufacturing sector.

The short-term employment function model appeared to be a poor fit for the data. The coefficients for both the trend and output terms did not have the expected signs. For example, the coefficient for the output variable (logQt) was -0.087, suggesting an inverse relationship between employment and output. This did not make any sense and it also failed to support similar empirical results. The t-values of all but one of the variables did not approximate the desired level of significance at the 95 per cent level. Two plausible reasons advanced for the poor fit of the model were: changed circumstances; and inadequate and poor quality data. Maitha's study on the Kenyan manufacturing sector coincided with a fast-growing economy coupled with price and balance-of-payments stability. The current study included periods of high cost of imported energy, inflationary tendencies and a deteriorated foreign-exchange position in Kenya. Also, the Kenyan manufacturing sector experienced a phenomenal growth since the previous study leading to the suggestion that data keeping was not as accurate as it was in earlier periods.

The results of the second model were more meaningful than those of the first. The fit, as judged by the coefficient of determination, was very good for all the five periods. All the regression coefficient had the expected signs. The t-values were highly significant at the 99 per cent level. These results suggested that the creation of employment in Kenyan manufacturing had lagged behind output for the period studied. A conclusion of this is that if the trend continues, unemployment in Kenya will become increasingly more serious. Consequently, the results of the model are of interest to Kenyan policy makers. Kenya may have to pursue certain policies if the situation is to be improved and the following suggested policies may be relevant.

The emphasis of Kenya's Third Development Plan was on the redistribution of income. However, this was not spelt out in terms of policy instruments. Employment creation should have been emphasized. Such a policy is a better means for achieving increased equity than welfare transfers for several reasons.[82] In many developing countries the balance of political power is related partly to the pre-tax income distribution. The established power groups oppose policies which would allow redistribution of increased output and income. Even if there is a political will to use fiscal or other instruments to improve the income distribution (as was the case in Kenya) such an action may not be feasible administratively. Also, the sense of frustration and lack of human dignity associated with unemployment make employment creation worthy of special attention.[83] Furthermore, income redistribution in favour of the

poor appears to increase the demand for agricultural products and decrease the demand for services. Although agricultural production is generally labour intensive in developing countries and almost 85 per cent of Kenya's population depends on agriculture for their livelihood, in the long run, limited arable land makes the induction of domestic demand for agricultural products an unattractive policy.

It can be extrapolated from the results that there exists high and rising capital intensity in Kenyan manufacturing. These trends reflect previous policies which made capital relatively cheaper than labour. Consequently, entrepreneurs may be stock piling capital and using it at less than maximum potential. Policies should be enacted to encourage more intensive use of the existing capital stock. For example, working in two or three shifts, instead of one, should be encouraged. The subsequently increased need for maintenance would increase further the total employment of labour.

The promotion of small firms should be encouraged through a small business loan scheme. The spirit of entrepreneurship already exists in Kenya because of its long (by African standards) tradition of a free market economy. Most of the available evidence suggests that small firms do tend to utilize more labour-intensive techniques of production than their larger competitors.[84] Such firms tend to be faced with factor prices which are much closer to scarcity-prices than those facing large firms.

Educational expansion should be planned and co-ordinated with employment creation to avoid "intellectual unemployment".[85]

Technical training should be emphasized and production enterprises should be managed by people with technical background. Such managers understand the performance of current operations and the possibility of using other methods. It is possible for them to envisage a production flow which takes output from a high speed processor and divides it among several manual operations. Consequently, instead of the demonstrated-effect-mode of production, they are able to make small, but important, adaptations which allow a more labour-intensive process to function properly.

Finally, there is a need to increase diversification in the economy. Diversification should be carried out within the individual sectors. For example, the industrial sector, which has so far concentrated on the production of consumer-goods, should diversify into producing some of the inputs needed in the economy.

In summary, major changes in policies (e.g. fiscal incentives and restructuring of education and training) are needed to reverse the trend of decreasing labour-output ratio in the Kenyan manufacturing sector. Promotion of small firms, reduction in capital intensity and emphasis on technical education will be required. Also, Kenya will have to emphasize employment creation to promote redistribution of income. Above all, the growth of manufacturing industry alone cannot be expected to solve the employment problem if the population continues to grow at the phenomenal rate of 3.5 per cent per annum.

APPENDIX I(a):

NUMBER OF PERSONS EMPLOYED

INDUSTRY	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1. MEAT AND DAIRY PRODUCTS	3238	3238	3384	3553	3220	3259	3294	3662	4177	4135	4137	4176	4206	6317	4816	5188
2. CANNED VEGETABLES, FISH, OIL AND FATS	1061	1446	1365	1422	1648	1799	2051	1661	1771	2081	2811	3302	3663	4501	4568	5001
3. GRAIN MILL PRODUCTS	1393	1403	1424	1457	1479	1705	1761	2080	2285	1893	2094	2166	2365	2974	2583	2600
4. BAKERY PRODUCTS, SUGAR AND SUGAR CONFECTIONERY	2012	2664	2393	2889	2576	2986	3226	3471	3854	4403	5173	5296	5551	5994	6064	6053
5. MISCELLANEOUS FOODS	749	929	1035	980	1007	931	937	1021	1107	5426	5609	6127	6557	11367	9743	10593
6. BEVERAGES AND TOBACCO	3658	3388	3249	3484	3213	3202	3320	3336	3697	4102	4403	5032	5354	5441	5688	5996
7. TEXTILES	1790	2318	2546	3735	3569	4489	6479	6627	7621	8932	11589	11928	12232	13230	14643	16673
8. WOOD AND CORK PRODUCTS	4928	3921	4115	3838	3858	3928	4451	4990	5383	5932	6350	6666	6862	7030	6975	7557
9. FURNITURE AND FIXTURES	176	214	460	467	549	722	870	905	1243	1576	1493	1586	1527	1278	2009	2152
10. PAPER AND PAPER PRODUCTS	539	742	787	682	814	801	1262	1427	1535	1858	1958	1996	2369	3040	3131	2840

APPENDIX I(a): (continued)

NUMBER OF PERSONS EMPLOYED

INDUSTRY	1979	1980	1981	1982	1983
1. MEAT AND DAIRY PRODUCTS	4655	4282	3865	3570	3420
2. CANNED VEGETABLES FISH, OIL AND FATS	5147	2614	4161	4175	4420
3. GRAIN MILL PRODUCTS	2813	3270	4039	3231	3324
4. BAKERY PRODUCTS SUGAR AND SUGAR CONFECTIONERY	9631	8453	8237	8322	8103
5. MISCELLANEOUS FOODS	11685	12739	12650	12958	1321
6. BEVERAGES AND TOBACCO	6350	4709	5080	6300	6411
7. TEXTILES	18520	18085	22098	23037	26721
8. WOOD AND CORK PRODUCTS	7905	8064	9112	9026	1013
9. FURNITURE AND FIXTURES	2228	1643	1764	1506	1709
10. PAPER AND PAPER PRODUCTS	3418	3347	3496	3448	3721

APPENDIX I(a): (continued)

NUMBER OF PERSONS EMPLOYED

INDUSTRY	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
11. PRINTING AND PUBLISHING	1760	1946	1939	2030	2046	2109	1834	2075	2290	2221	2359	2567	2762	3284	2604	2499
12. BASIC INDUSTRIAL CHEMICALS	638	589	710	623	610	732	718	818	824	1576	1584	2052	2086	2692	1706	1972
13. CLAY AND GLASS PRODUCTS	633	695	710	895	945	980	596	740	929	1152	747	748	742	813	949	1063
14. METAL PRODUCTS	2267	2536	2548	2363	2611	2752	3038	4047	4673	5486	5587	6204	6413	6757	7378	7378
15. ELECTRICAL MACHINERY	1725	1333	1388	1036	1079	1246	3193	3645	4145	3826	4234	4396	4419	4368	4963	4991
16. TRANSPORTATION	11680	11812	11889	11598	12425	13592	13688	17925	18851	22562	18163	16522	15467	15444	17011	16478
17. MISCELLANEOUS MANUFACTURING	356	528	562	541	569	643	847	1190	1312	1487	855	906	936	808	1002	1122
18. TOTAL MANUFACTURING	46079	48069	48422	50501	51671	54971	59389	69277	76336	880084	91131	94530	97846	110398	112863	118169

APPENDIX I(a): (continued)

NUMBER OF PERSONS EMPLOYED

INDUSTRY	1979	1980	1981	1982	1983
11. PRINTING AND PUBLISHING	3418	3347	3496	3448	3721
12. BASIC INDUSTRIAL CHEMICALS	2456	2399	2404	2777	2871
13. CLAY AND GLASS PRODUCTS	2024	2482	2855	2773	2714
14. METAL PRODUCTS	1077	1068	1184	1336	1424
15. ELECTRICAL MACHINERY	8896	10808	11223	9920	10909
16. TRANSPORTATION	5738	5659	6056	6472	6765
17. MISCELLANEOUS MANUFACTURING	1239	1569	1008	1104	1207
18. TOTAL MANUFACTURING	130494	130603	139734	141452	141325

APPENDIX I(b):

INPUT (K£000)

INDUSTRY	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
1. MEAT AND DAIRY PRODUCTS	9719.5	5973.7	9858.3	11174.3	12358.3	12411.9	11568.9	13453.2	17934.3	20067.8	22485.0	22791.0	25047.0
2. CANNED VEGETABLES, FISH, OIL AND FATS	847.7	1107.3	941.7	1064.7	1032.3	977.1	1151.0	1264.9	1837.8	1900.0	7373.0	10824.0	16438.0
3. GRAIN MILL PRODUCTS	5321.5	5856.0	5924.0	6510.1	7065.3	6473.3	8107.7	9700.9	10889.4	10676.0	13209.0	19326.0	26689.0
4. BAKERY PRODUCTS, SUGAR AND SUGAR CONFECTIONERY	1936.5	1782.7	1481.9	2516.4	3930.8	5274.9	6322.8	6626.2	6551.8	8530.6	10094.0	13608.0	18408.0
5. MISCELLANEOUS FOODS	10923.4	9969.8	12852.5	13670.2	14935.7	10403.5	13459.0	15134.5	16966.1	24640.0	45617.0	55265.0	50056.0
6. BEVERAGES AND TOBACCO	42647.1	4770.9	4642.1	4851.2	5241.9	5544.8	6358.0	7701.1	9894.1	13097.9	12488.0	18561.0	21312.0
7. TEXTILES	956.1	1073.7	1295.0	2598.2	2521.8	3354.6	5618.9	4779.9	5917.6	6956.2	11549.0	17403.0	17914.0
8. WOOD AND CORK PRODUCTS	440.7	635.8	650.8	824.4	1051.6	1335.6	1601.5	2084.0	2387.1	2709.3	3158.0	4521.0	5077.0
9. FURNITURE AND FIXTURES	174.3	290.3	394.2	477.8	660.0	848.8	854.8	1008.4	1400.9	1805.8	1582.0	3198.0	3495.0
10. PAPER AND PAPER PRODUCTS	637.6	913.1	1360.2	1368.1	2101.3	2215.7	3120.9	3721.0	4434.5	5423.2	5353.0	9055.0	11645.0

APPENDIX I(b): (continued)

INPUT (K£'000)

INDUSTRY	1976	1977	1978	1979	1980	1981	1982	1983
1. MEAT AND DAIRY PRODUCTS	36085.0	43444.0	38632.0	34606.0	42889.0	61236.0	70256.0	82200.0
2. CANNED VEGETABLES FISH, OIL AND FATS	20772.0	32044.0	35012.0	33802.0	34832.0	35478.0	40340.0	5391.0
3. GRAIN MILL PRODUCTS	35939.0	38719.0	39723.0	37342.0	48505.0	81606.0	88223.0	84572.0
4. BAKERY PRODUCTS SUGAR AND SUGAR CONFECTIONERY	22451.0	24950.0	35574.0	33172.0	56183.0	86854.0	77936.0	86575.0
5. MISCELLANEOUS FOODS	147612.0	247489.0	185239.0	150637.0	159338.0	234051.0	248927.0	353376.0
6. BEVERAGES AND TOBACCO	25795.0	33650.0	34421.0	43615.0	43546.0	45185.0	49089.0	56899.0
7. TEXTILES	20082.0	33052.0	37218.0	45726.0	51753.0	60689.0	60931.0	58614.0
8. WOOD AND CORK FIXTURES	6236.0	8780.0	12389.0	13872.0	14206.0	12908.0	11900.0	17539.0
9. FURNITURE AND FIXTURES	3520.0	5452.0	5358.0	8514.0	7701.0	9166.0	8266.0	7014.0
10. PAPER AND PAPER PRODUCTS	14827.0	17631.0	16961.0	19373.0	25182.0	24594.0	33423.0	40529.0

APPENDIX I(b): (continued)

INPUT (K£'000)

INDUSTRY	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
11. PRINTING AND PUBLISHING	1154.6	1308.5	1544.5	1694.7	2114.1	2220.2	2009.9	2616.9	3401.2	3674.6	4644.0	6475.0	8872.0
12. BASIC INDUSTRIAL CHEMICALS	1178.7	7969.6	10097.7	10004.3	10097.8	10740.0	11000.0	12503.0	14650.6	19477.8	9326.0	17470.0	19680.0
13. CLAY AND GLASS PRODUCTS	223.0	266.4	262.9	282.6	372.5	431.7	462.0	634.5	884.0	907.0	1176.0	1522.0	1836.0
14. METAL PRODUCTS	2954.4	3892.5	4134.9	3884.0	4198.1	4449.8	5211.0	7568.3	8512.3	11109.1	16331.0	245460.0	28154.0
15. ELECTRICAL MACHINERY	462.3	529.5	632.5	672.7	1042.5	1905.8	2783.1	4044.8	3953.4	3050.9	6350.0	7615.0	11163.0
16. TRANSPORTATION	4671.8	4247.6	5522.8	4575.1	4687.4	5715.6	6465.8	7122.0	9091.5	10283.2	4530.0	6876.0	7051.0
17. MISCELLANEOUS MANUFACTURING	166.2	308.2	350.6	371.9	452.9	472.7	721.3	1343.2	1657.5	1991.8	788.0	1308.0	1906.0
18. TOTAL MANUFACTURING	78822.3	90971.6	102161.6	112181.6	124245.0	130302.2	148198.0	174767.8	204729.6	252889.6	309369.0	463009.0	505466.0

APPENDIX I(b): (continued)

INPUT (₦'000)

INDUSTRY	1976	1977	1978	1979	1980	1981	1982	1983
11. PRINTING AND PUBLISHING	8322.0	8750.0	8983.0	10136.0	17191.0	21179.0	27732.0	34196.0
12. BASIC INDUSTRIAL CHEMICALS	13529.0	4034.0	14712.0	19943.0	31349.0	32120.0	45750.0	50570.0
13. CLAY AND GLASS PRODUCTS	1969.0	1356.0	3395.0	3988.0	4017.0	4408.0	4717.0	5939.0
14. METAL PRODUCTS	32619.0	41938.0	53932.0	59485.0	75527.0	83694.0	85811.0	107084.0
15. ELECTRICAL MACHINERY	13354.0	14946.0	19619.0	21608.0	24657.0	28197.0	49876.0	48569.0
16. TRANSPORTATION	11069.0	23548.0	43063.0	42723.0	50588.0	62833.0	69882.0	15243.0
17. MISCELLANEOUS MANUFACTURING	1452.0	2701.0	3705.0	4943.0	4356.0	1902.0	1433.0	1936.0
18. TOTAL MANUFACTURING	823839.0	937474.0	977324.0	1042035.0	1242544.0	1548228.0	1716358.0	1969414.0

APPENDIX I(c):

GROSS OUTPUT (K£'000)

INDUSTRY	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
1. MEAT AND DAIRY PRODUCTS	11262.5	5973.7	11849.6	13372.4	14015.6	14509.6	14233.6	16598.3	20418.4	22966.6	26566.0	27633.0	28714.0
2. CANNED VEGETABLES, FISH, OIL AND FATS	1093.5	1524.4	11898.7	1333.5	1266.1	1268.0	1611.0	1606.2	2485.5	2661.1	9959.0	14373.0	22345.0
3. GRAIN MILL PRODUCTS	6704.4	7322.0	7516.0	7778.9	8300.4	7654.8	9696.3	11648.3	12952.0	12629.3	15423.0	21707.0	29510.0
4. BAKERY PRODUCTS, SUGAR AND SUGAR CONFECTIONERY	2655.1	2745.0	2573.6	3805.2	5116.7	6783.6	8006.9	8964.5	8950.4	10848.1	14516.0	18687.0	25271.0
5. MISCELLANEOUS FOODS	11422.1	10518.4	13339.0	14166.8	15706.1	11112.2	14466.6	16264.9	18188.7	29011.5	51887.0	65276.0	62265.0
6. BEVERAGES AND TOBACCO	8496.3	9468.4	9128.9	9662.2	10137.8	10622.4	12543.8	14381.1	17875.2	22188.2	23403.0	31487.0	37373.0
7. TEXTILES	1313.8	1497.8	1789.1	3471.2	3499.5	5205.1	8049.1	7034.9	9060.1	11075.1	18200.0	24189.0	25079.0
8. WOOD AND CORK PRODUCTS	916.8	1223.0	1276.3	1560.8	1865.4	2239.6	2623.9	3250.4	3649.6	4178.0	5143.0	6612.0	7704.0
9. FURNITURE AND FIXTURES	248.0	406.9	584.5	713.1	848.9	1144.8	1273.4	1476.3	2065.2	2598.3	2237.0	4311.0	4497.0
10. PAPER AND PAPER PRODUCTS	1106.8	1465.7	2088.4	2325.7	2771.8	2804.3	4353.2	5192.8	6006.5	7195.8	7884.0	12914.0	15234.0

APPENDIX I(c): (continued)

GROSS OUTPUT (K£'000)

INDUSTRY	1976	1977	1978	1979	1980	1981	1982	1983
1. MEAT AND DAIRY PRODUCTS	39350.0	47725.0	44913.0	40244.0	50377.0	69435.0	79532.0	92380.0
2. CANNED VEGETABLES FISH, OIL AND FATS	31791.0	41646.0	42796.0	42088.0	38505.0	69435.0	79532.0	92380.0
3. GRAIN MILL PRODUCTS	38941.0	42646.0	42796.0	42088.0	60634.0	86280.0	93476.0	90337.0
4. BAKERY PRODUCTS, SUGAR AND SUGAR CONFECTIONERY	122791.0	36639.0	51182.0	58685.0	77123.0	104906.0	104020.0	115202.0
5. MISCELLANEOUS FOODS	175245.0	267720.0	209687.0	171126.0	179403.0	258387.0	273399.0	379720.0
6. BEVERAGES AND TOBACCO	46791.0	55286.0	58349.0	73391.0	73375.0	81506.0	90343.0	102175.0
7. TEXTILES	27775.0	43545.0	51632.0	62660.0	71912.0	85168.0	86487.0	88737.0
8. WOOD AND CORK PRODUCTS	8953.0	12562.0	17024.0	19839.0	20664.0	19461.0	20867.0	27380.0
9. FURNITURE AND FIXTURES	4503.0	7127.0	7279.0	9192.0	10174.0	11903.0	10991.0	10005.0
10. PAPER AND PAPER PRODUCTS	22078.0	26287.0	25831.0	28123.0	37366.0	40376.0	47886.0	56402.0

APPENDIX I(c): (continued)

GROSS OUTPUT (K£'000)

INDUSTRY	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
11. PRINTING AND PUBLISHING	2457.0	2704.7	3046.5	3510.7	3967.3	4093.9	3677.8	4493.2	5392.7	5910.1	7466.0	10117.0	12139.0
12. BASIC INDUSTRIAL CHEMICALS	1580.3	10011.4	12376.0	12337.1	12767.9	13365.4	13938.4	15232.0	18152.6	24106.8	11184.0	21018.0	24370.0
13. CLAY AND GLASS PRODUCTS	494.2	614.6	788.5	738.6	819.4	851.7	949.8	1185.9	1597.7	1836.3	2052.0	2240.0	2709.0
14. METAL PRODUCTS	4112.3	5247.2	565.4	5634.7	6262.9	6837.8	7841.6	11314.7	12504.4	16058.6	23313.0	34711.0	26266.0
15. ELECTRICAL MACHINERY	1566.7	1693.2	1919.2	2174.4	2757.3	3832.5	5224.4	7109.4	7109.4	7170.2	6476.0	12816.0	15713.0
16. TRANSPORTATION	9282.3	9940.9	10605.7	9872.8	11182.4	13372.6	13670.6	14886.9	17524.5	19029.9	8770.0	12857.0	14004.0
17. MISCELLANEOUS MANUFACTURING	308.5	527.3	595.2	667.5	707.6	829.1	1199.9	2036.8	2539.4	2927.2	1167.0	1789.0	2498.0
18. TOTAL MANUFACTURING	55890.7	63603.2	72242.8	79224.4	90009.3	91721.8	103911.8	124094.0	147045.1	182021.4	222778.0	354479.0	414098.0

APPENDIX I(c): (continued)

GROSS OUTPUT (K '000)

INDUSTRY	1976	1977	1978	1979	1980	1981	1982	1983
11. PRINTING AND PUBLISHING	12313.0	21834.0	13401.0	15212.0	24641.0	29694.0	36584.0	43911.0
12. BASIC INDUSTRIAL CHEMICALS	19739.0	6888.0	19860.0	26155.0	39514.0	42538.0	5592.0	61732.0
13. CLAY AND GLASS PRODUCTS	2855.0	2426.0	5048.0	5240.0	5440.0	6054.0	6607.0	8013.0
14. METAL PRODUCTS	42110.0	53564.0	67843.0	74718.0	93847.0	1047696.0	104827.0	127954.0
15. ELECTRICAL MACHINERY	22721.0	22168.0	29991.0	32295.0	43610.0	52121.0	69422.0	74021.0
16. TRANSPORTATION	16859.0	53457.0	57819.0	58369.0	67655.0	81303.0	91698.0	98037.0
17. MISCELLANEOUS MANUFACTURING	1918.0	3588.0	4923.0	6657.0	5885.0	2581.0	2243.0	2825.0
18. TOTAL MANUFACTURING	689759.0	767152.0	774989.0	810183.0	983007.0	1247786.0	1398559.0	1622294.0

APPENDIX I(d):

VALUE ADDED (K '000)

INDUSTRY	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
1. MEAT AND DAIRY PRODUCTS	1543.0	3211.5	191.3	2199.1	1657.5	2097.0	2664.7	3145.1	2484.1	2898.8	4081.0	4842.0	3667.0
2. CANNED VEGETABLES, FISH, OIL AND FATS	245.8	417.1	257.0	268.8	233.8	290.9	460.0	341.3	647.7	761.1	2586.0	3549.0	5907.0
3. GRAIN MILL PRODUCTS	1382.9	1466.0	1574.0	1268.8	1235.1	1181.5	1588.6	1947.4	2062.6	1953.3	2214.0	2381.0	2821.0
4. BAKERY PRODUCTS, SUGAR AND SUGAR CONFECTIONERY	728.6	962.5	1091.7	1288.8	1185.9	1508.7	1684.1	2338.3	2398.6	2317.5	4422.0	5079.0	6863.0
5. MISCELLANEOUS FOODS	489.7	548.6	486.5	496.6	770.4	708.7	1007.6	1130.4	1222.6	1371.5	6270.0	10011.0	12209.0
6. BEVERAGES AND TOBACCO	1849.2	4697.5	4486.8	4811.0	4895.9	5077.6	6185.8	6680.0	7981.1	9090.3	10915.0	12926.0	16061.0
7. TEXTILES	357.7	424.1	494.1	873.0	977.7	1850.5	2429.2	2255.0	3142.5	4118.9	6651.0	6786.0	7165.0
8. WOOD AND CORK PRODUCTS	476.1	587.2	625.5	736.4	813.8	904.0	1022.4	1166.4	1262.5	1468.7	1985.0	2091.0	2627.0
9. FURNITURE AND FIXTURES	73.7	116.6	190.3	235.3	188.9	296.0	418.6	467.9	664.3	792.5	655.0	1113.0	1002
10. PAPER AND PAPER PRODUCTS	469.2	552.6	728.2	957.6	670.5	588.6	1232.3	1471.8	1572.0	1772.6	2531.0	3859.0	3589.0

APPENDIX I(d): (continued)

VALUE ADDED (K '000)

INDUSTRY	1976	1977	1978	1979	1980	1981	1982	1983
1. MEAT AND DAIRY PRODUCTS	3265.0	4281.0	6281.0	5638.0	7488.0	8199.0	9276.0	1018.0
2. CANNED VEGETABLES, FISH, OIL AND FATS	11019.0	9602.0	7784.0	8286.0	13673.0	33857.0	39192.0	38470.0
3. GRAIN MILL PRODUCTS	3002.0	3927.0	3073.0	4746.0	48505.0	4674.0	5253.0	5765.0
4. BAKERY PRODUCTS, SUGAR AND SUGAR CONFECTIONERY	10340.0	11689.0	15608.0	25513.0	20940.0	18052.0	26084.0	28627.0
5. MISCELLANEOUS FOODS	27633.0	20231.0	24448.0	20489.0	20065.0	24336.0	24472.0	24144.0
6. BEVERAGES AND TOBACCO	20996.0	21636.0	23928.0	29740.0	29829.0	36321.0	41254.0	45276.0
7. TEXTILES	7693.0	10493.0	14414.0	16934.0	20159.0	24479.0	25556.0	30123.0
8. WOOD AND CORK PRODUCTS	2717.0	3782.0	4635.0	5967.0	6458.0	6553.0	8967.0	9841.0
9. FURNITURE AND FIXTURES	983.0	1675.0	1921.0	678.0	2473.0	2737.0	2725.0	2991.0
10. PAPER AND PAPER PRODUCTS	7251.0	8656.0	8870.0	8750.0	12184.0	15782.0	14463.0	15873.0

APPENDIX I(d): (continued)

VALUE ADDED (K '000)

INDUSTRY	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
11. PRINTING AND PUBLISHING	1302.4	1396.2	1502.0	1816.0	1853.2	1873.7	1667.9	1876.3	1991.5	2235.5	2822.0	3642.0	3267.0
12. BASIC INDUSTRIAL CHEMICALS	401.6	2041.8	2278.1	2332.8	2670.1	2625.4	2938.4	2729.0	35)2.0	4629.0	1858.0	3548.0	4690.0
13. CLAY AND GLASS PRODUCTS	271.2	348.2	525.6	456.0	446.9	420.0	485.8	551.4	713.7	929.3	876.0	718.0	873.0
14. METAL PRODUCTS	1157.9	1354.7	1521.5	1750.7	2064.8	2388.0	2630.6	3746.4	3992.1	494.5	6982.0	9251.0	8112.0
15. ELECTRICAL MACHINERY	1104.4	1163.7	1286.7	1501.7	1714.8	1926.7	2441.3	3064.6	3216.8	3425.1	6466.0	8098.0	9014.0
16. TRANSPORTATION	4610.5	5693.3	5082.9	5297.7	6495.0	7657.0	7204.8	7764.9	8433.0	8746.8	4240.0	5981.0	6953.0
17. MISCELLANEOUS MANUFACTURING	142.3	219.1	244.6	254.7	356.4	478.6	693.6	881.9	435.4	379.0	481.0	592.0	466.0
18. TOTAL MANUFACTURING	22931.6	27368.4	29918.8	32957.2	34235.7	38580.4	44286.2	50673.8	57684.5	70868.2	86591.0	108530.0	91368.0

APPENDIX I(d): (continued)

VALUE ADDED (K '000)

INDUSTRY	1976	1977	1978	1979	1980	1981	1982	1983
11. PRINTING AND PUBLISHING	3991.0	7251.0	8656.0	8870.0	12184.0	15782.0	14463.0	15873.0
12. BASIC INDUSTRIAL CHEMICALS	6210.0	2854.0	5148.0	6212.0	8165.0	10418.0	10170.0	11162.0
13. CLAY AND GLASS PRODUCTS	886.0	1070.0	1653.0	1252.0	1423.0	1646.0	1890.0	2074.0
14. METAL PRODUCTS	9491.0	11626.0	13911.0	15233.0	18320.0	21102.0	19016.0	20870.0
15. ELECTRICAL MACHINERY	9367.0	7222.0	10372.0	10687.0	18953.0	23924.0	19546.0	25452.0
16. TRANSPORTATION	5790.0	9909.0	14756.0	15646	17067.0	18470.0	21816.0	22794.0
17. MISCELLANEOUS MANUFACTURING	446.0	887.0	1218.0	1714.0	1529.0	679.0	810.0	889.0
18. TOTAL MANUFACTURING	134080.0	170322.0	202335.0	231852.0	259537.0	300442.0	317799.0	347120.0

APPENDIX II

SUMMARY OF EQUATIONS

EQ.(1) OLSQ LOG(E) = - 3.197 CST - 0.027 T + 0.329 LOG(GO) + 0.978 LOG(E(-1))
                       -0.7   -1.6   1.8   3.2

NOBS= 15 NDF= 11 SEE= 0.3482E-01 RBSQ= 0.6625
DW= 1.955 F(3/ 11)= 10.1606

EQ.(2) OLSQ LOG(E) = + 3.319 CST + 0.002 T + 0.019 LOG(VA) + 0.676 LOG(E(-1))
                         0.9   0.2   0.2   2.2

NOBS= 15 NDF= 11 SEE= 0.3950E-01 RBSQ= 0.5656
DW= 1.170 F(3/ 11)= 7.07561

EQ.(3) OLSQ LOG(E) = + 5.046 CST - 0.019 T + 0.002 T*T - 0.146 LOG(GO)
                         1.2   -1.5   3.3   -0.7
                       + 0.686 LOG(E(-1))
                         2.9

NOBS= 15 NDF= 10 SEE= 0.2525E-01 RBSQ= 0.8225
DW= 2.619 F(4/ 10)= 17.2171

EQ.(4) OLSQ LOG(E) = + 4.492 CST - 0.024 T + 0.002 T*T - 0.093 LOG(VA)
                         2.2   -3.3   4.9   -1.8
                       + 0.674 LOG(E(-1))
                         3.9

NOBS= 15 NDF= 10 SEE= 0.2242E-01 RBSQ= 0.8601
DW= 2.297 F(4/ 10)= 22.5110

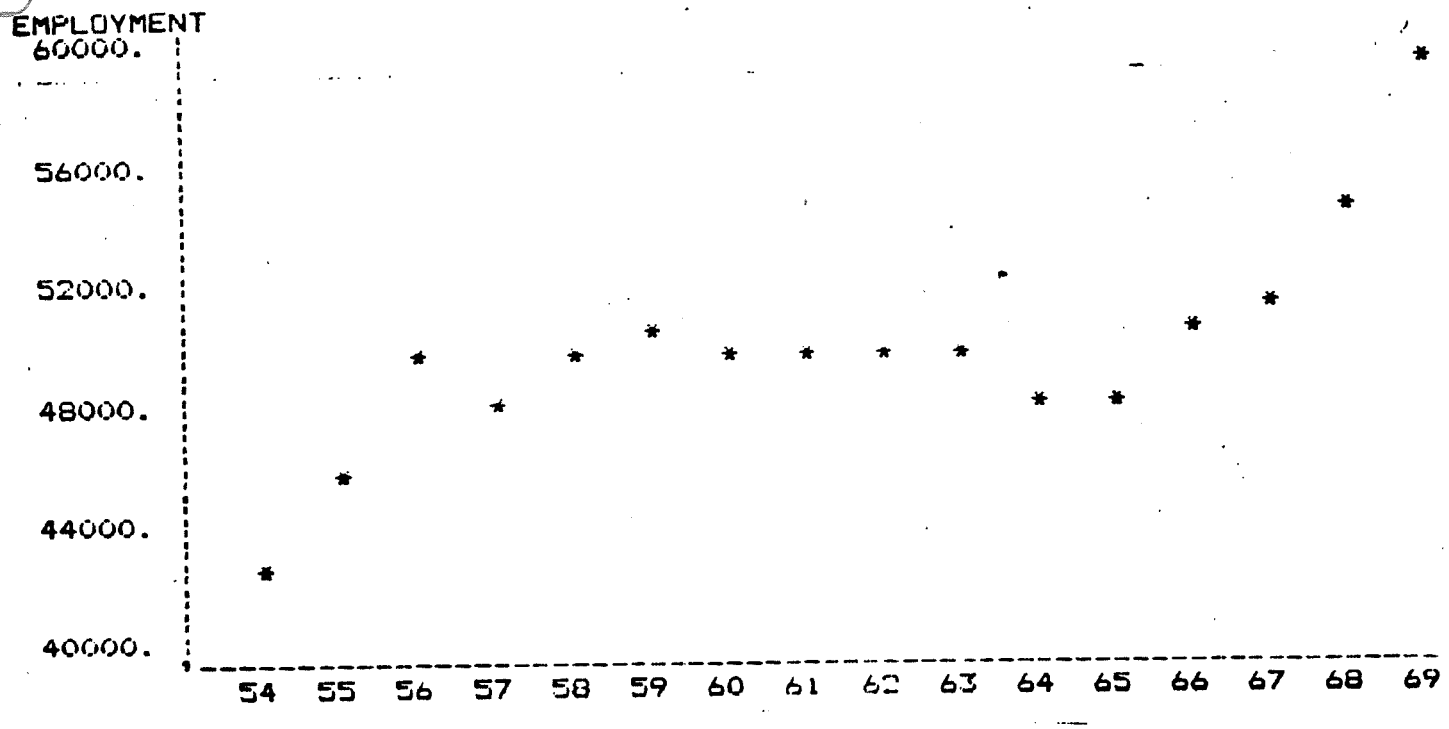
APPENDIX III

MAITHA'S DATA

	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
MPLOYMENT	42853	45991	49607	48184	49805	50752	49705	49846	49829	49997	48069	48422	50501	51671	54971	59389
ROSS OUTPUT (K '000)	35783.0	48852.0	50220.0	48185.0	51566.0	53452.0	65521.0	68295.0	74803.0	78822.3	90971.6	102161.6	112181.6	124245.0	130302.2	148198.0
NPUT (K '000)	25048.0	32707.0	35711.0	33012.0	39427.0	41521.0	45752.0	48919.0	52238.0	55890.7	63603.2	72242.8	79224.4	90009.3	91721.8	103911.8
ALUE ADDED K '000)	10735.0	16145.0	14509.0	15173.0	12139.0	11931.0	19769.0	19376.0	22565.0	22931.6	27368.4	29918.8	32957.2	34235.7	38580.0	44286.2
									(69579)							

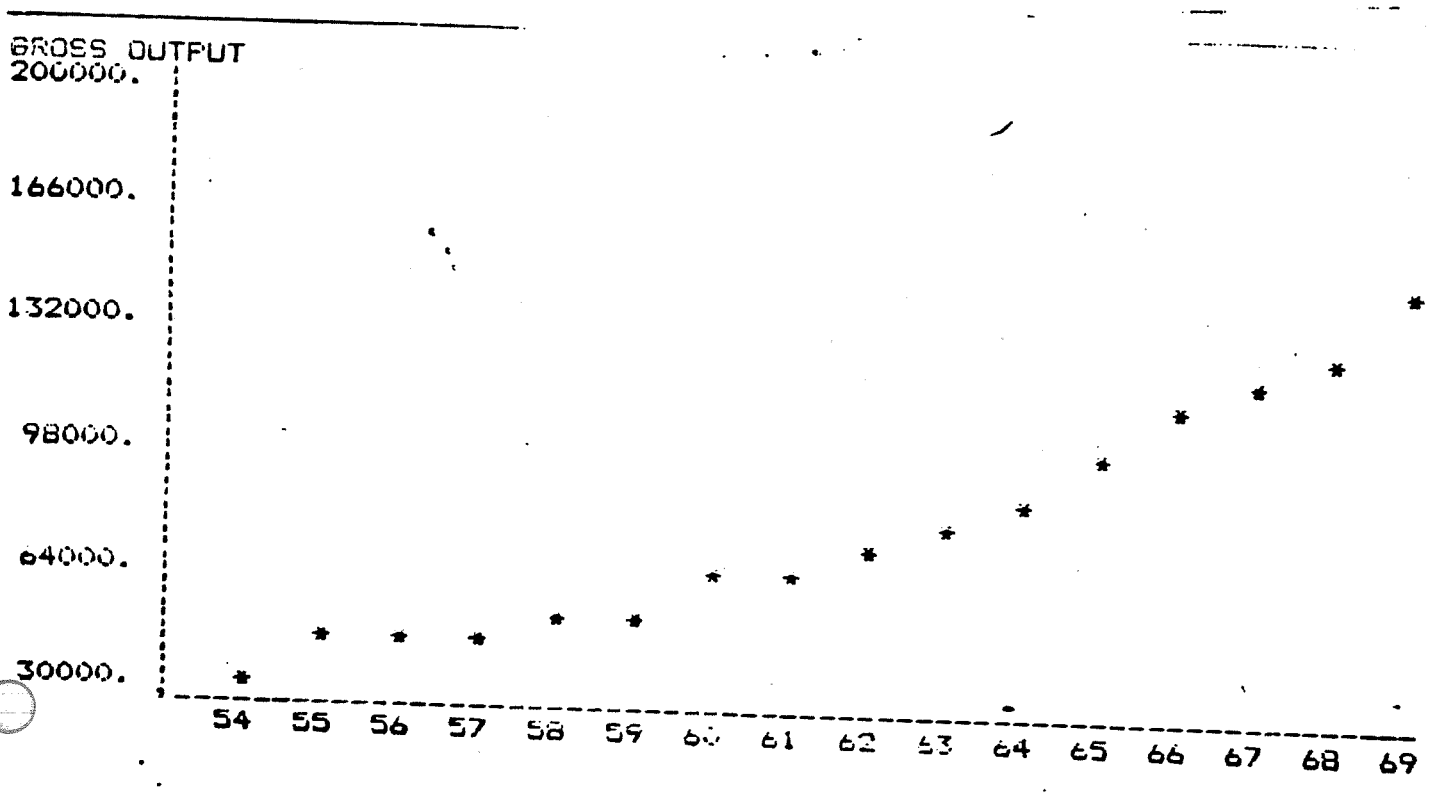
APPENDIX IV(a)

TREND CHART OF EMPLOYMENT (ORIGINAL DATA)



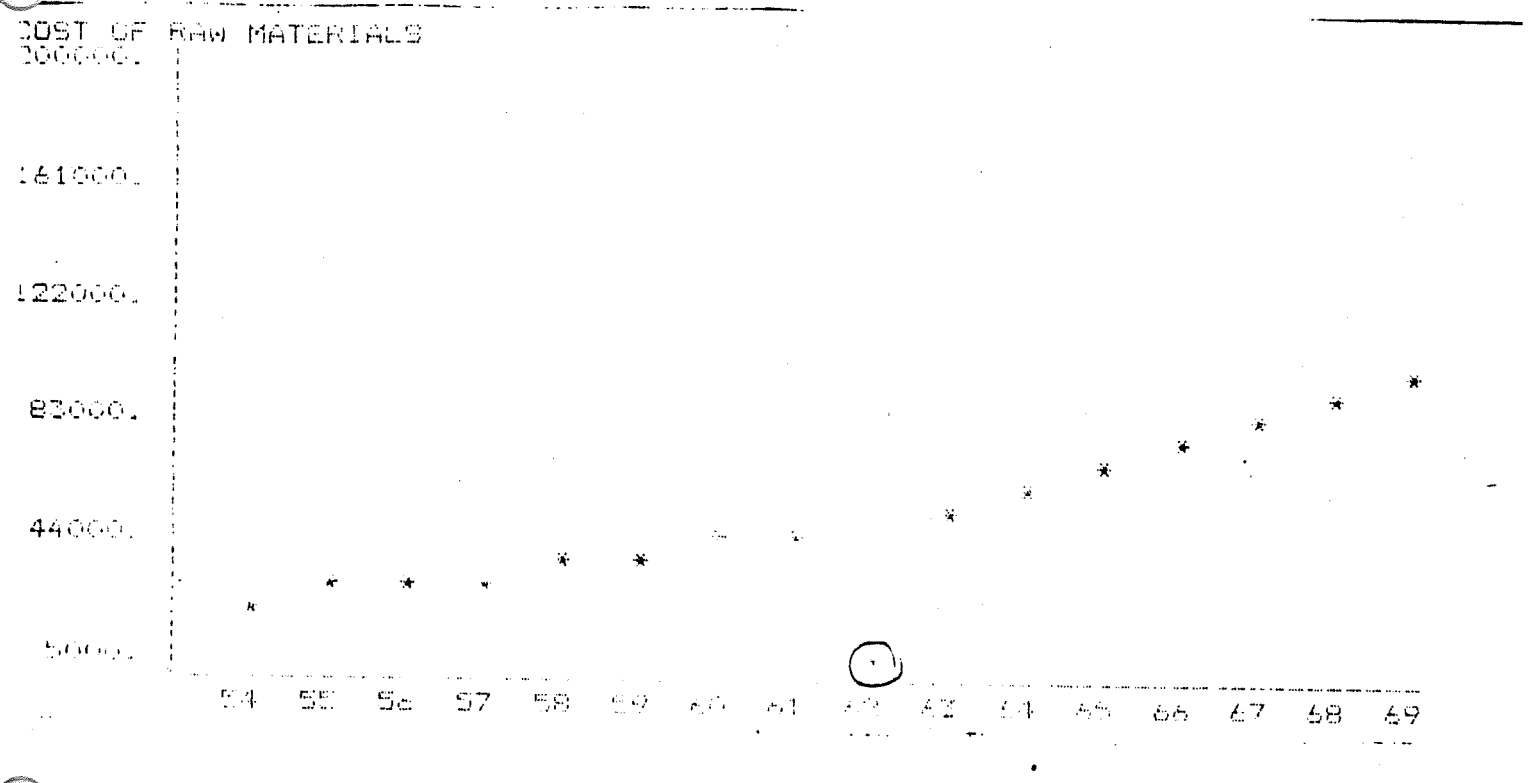
APPENDIX IV(b)

TREND CHART OF GROSS OUTPUT (ORIGINAL DATA)



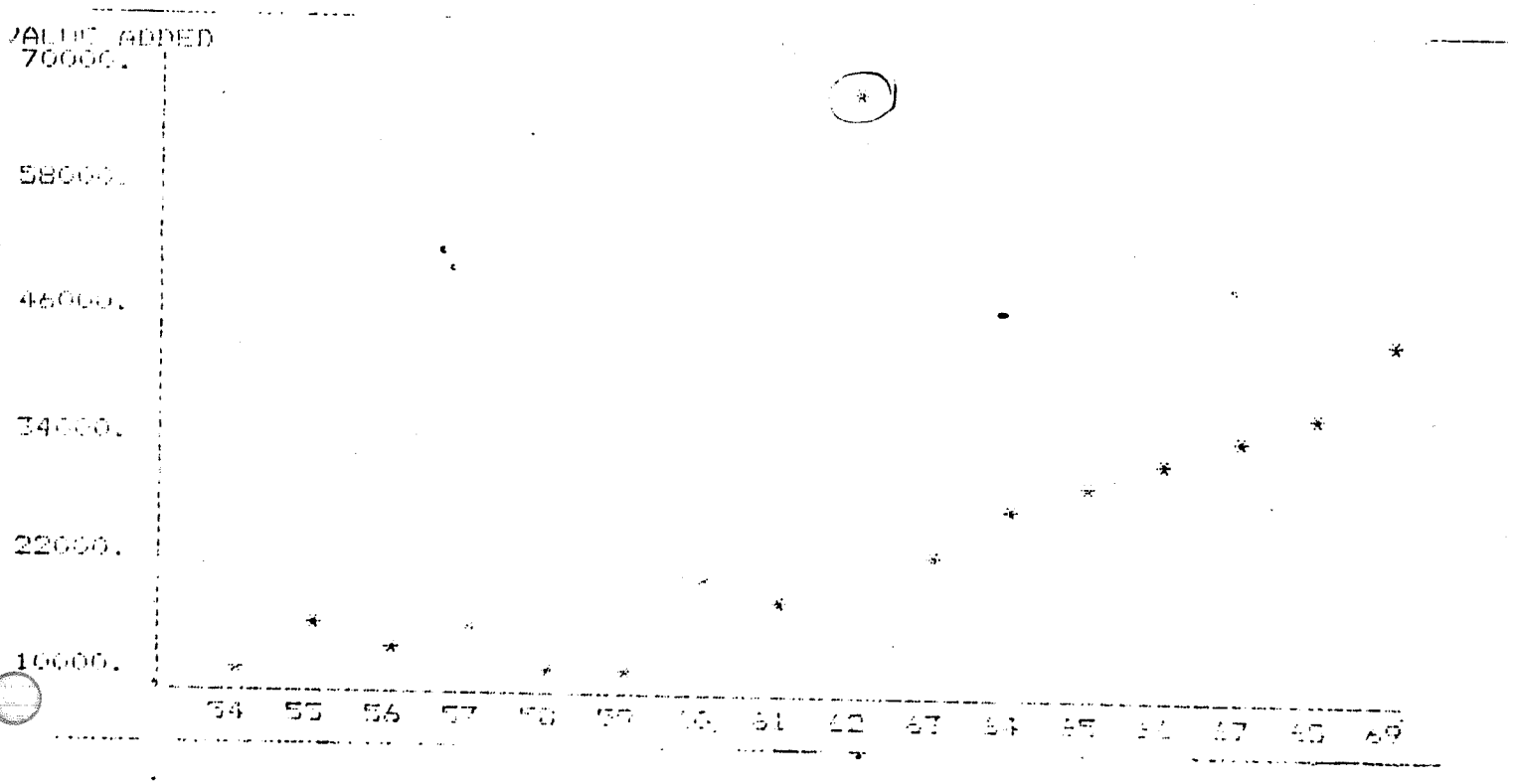
APPENDIX IV(c)

TREND CHART OF INPUT (ORIGINAL DATA)



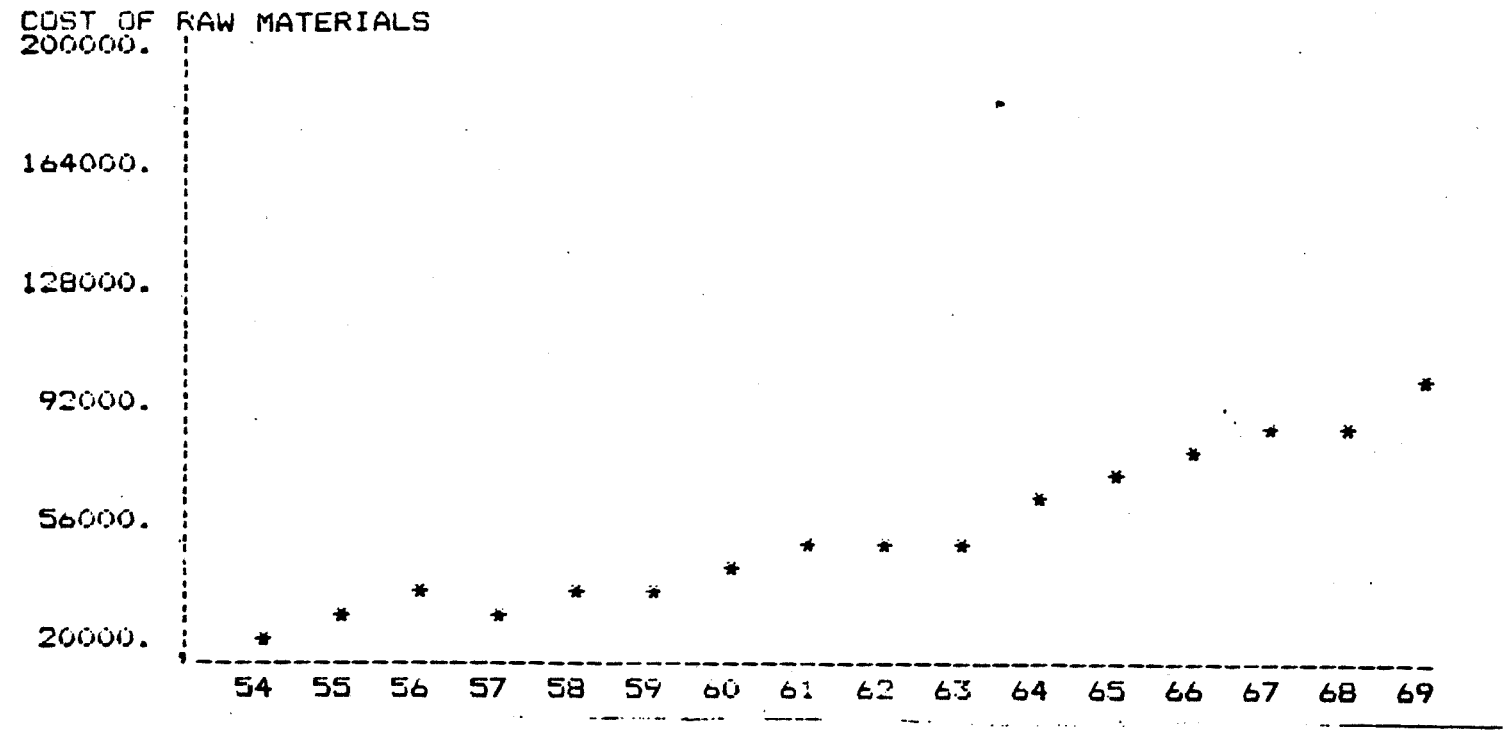
APPENDIX IV(d)

TREND CHART OF VALUE ADDED (ORIGINAL DATA)



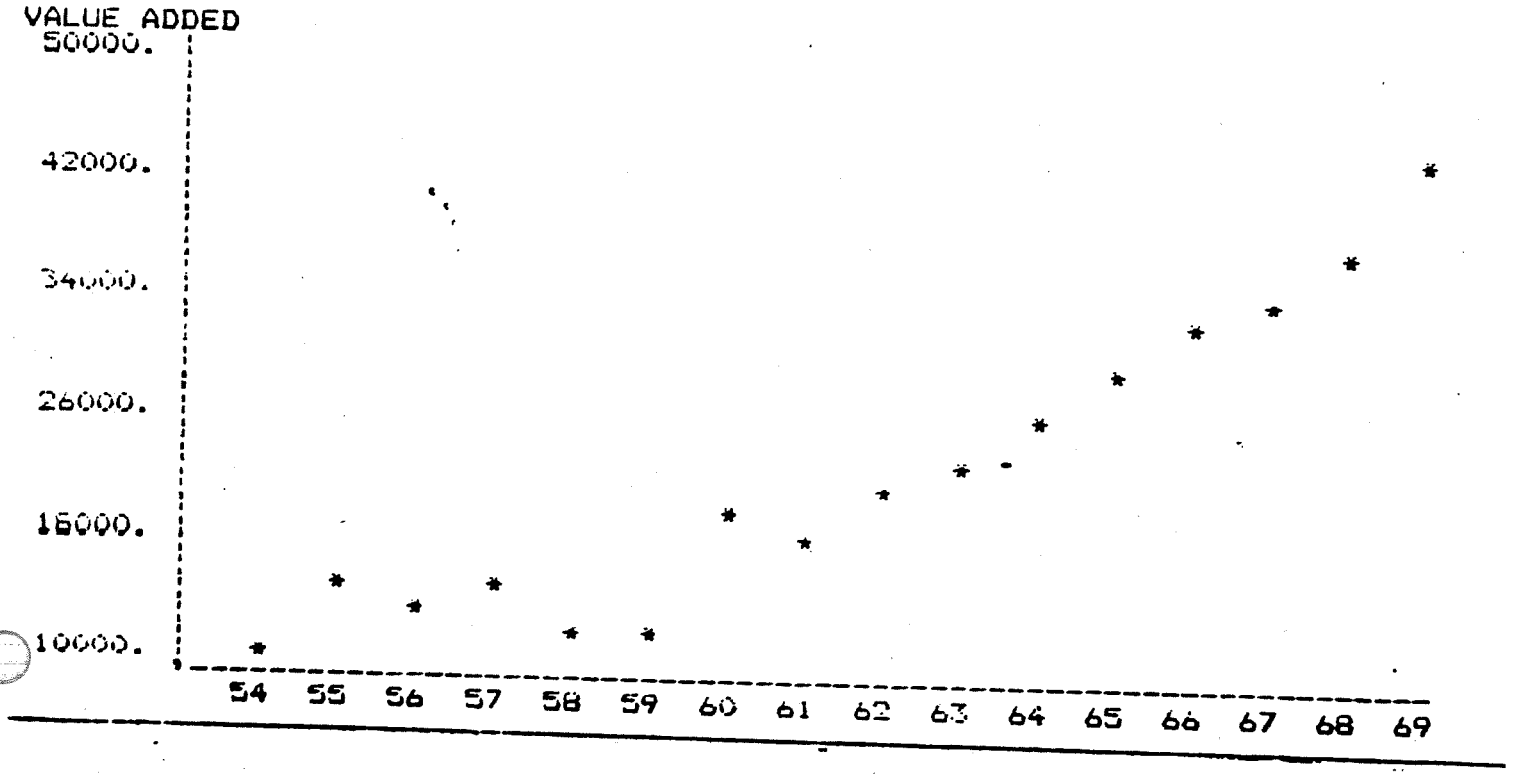
APPENDIX V(c)

TREND CHART OF INPUT (CORRECTED DATA)



APPENDIX V(d)

TREND CHART OF VALUE ADDED (CORRECTED DATA)



APPENDIX VI

SUMMARY OF MAITHA'S EQUATION

ARY OF EQUATIONS :

1) OLSQ LOG(E) = - 3.224 CST - 0.027 TREND + 0.329 LOG(GO) + 0.978 LOG(E(-1))
-0.7 -1.6 1.8 3.2

NOBS= 15 NDF= 11 SEE= 0.3402E-01 RBSQ= 0.6625
DW= 1.955 F(3/ 11)= 10.1606

2) OLSQ LOG(E) = + 1.420 CST - 0.071 TREND + 0.841 LOG(VA) + 0.063 LOG(E(-1))
2.9 -3.127 3.354 0.252

NOBS= 15 NDF= 11 SEE= 0.3950E-01 RBSQ= 0.6781
DW= 2.170 F(3/ 11)= 7.07561

APPENDIX VII

SUMMARY OF EQUATIONS:

SUBSECTORS OF THE MANUFACTURING INDUSTRY

EQ.(1) OLSQ LOG(MDPE) = + 3.554 CST + 0.003 TREND - 0.681 LOG(MDPVA) + 0.643 LOG(MDPE(-1
1.7 0.3 -1.1 2.9

NOBS= 20 NDF= 16 SEE= 0.1269 RBSQ= 0.9892
DW= 2.290 F(3/ 16)= 7.06665

EQ.(2) OLSQ LOG(CVE) = + 1.362 CST - 0.021 TREND + 0.117 LOG(CVVA) + 0.747 LOG(CVE(-1)
1.2 -1.1 2.3 4.7

NOBS= 20 NDF= 16 SEE= 0.1134 RBSQ= 0.9872
DW= 1.344 F(3/ 16)= 114.639

EQ.(3) OLSQ LOG(BPSE) = + 6.895 CST + 0.059 TREND + 0.047 LOG(BPSVA) + 0.066 LOG(BPSE(-1
3.4 2.6 1.1 0.2

NOBS= 20 NDF= 16 SEE= 0.1111 RBSQ= 0.9396
DW= 1.698 F(3/ 16)= 99.5829

EQ.(4) OLSQ LOG(PME) = - 0.242 CST - 0.171 TREND + 0.920 LOG(PMVA) + 0.415 LOG(PME(-1)
-0.1 -2.6 3.2 1.7

NOBS= 20 NDF= 16 SEE= 0.5543 RBSQ= 0.6305
DW= 1.605 F(3/ 16)= 11.9066

EQ.(5) OLSQ LOG(BTE) = + 2.654 CST - 0.019 TREND + 0.353 LOG(BTVA) + 0.313 LOG(BTE(-1)
1.8 -0.7 1.5 1.3

NOBS= 20 NDF= 16 SEE= 0.9847E-01 RBSQ= 0.9854
DW= 1.370 F(3/ 16)= 42.9372

EQ.(6) OLSQ LOG(TEE) = + 5.550 CST + 0.012 TREND + 0.596 LOG(TEVA) - 0.188 LOG(TEE(-1)
2.0 0.1 1.3 -0.8

NOBS= 20 NDF= 16 SEE= 0.3997 RBSQ= 0.7563
DW= 2.006 F(3/ 16)= 20.6800

EQ.(7) OLSQ LOG(WCPE) = + 6.879 CST + 0.111 TREND - 0.340 LOG(WCPVA) + 0.830 LOG(WCPE(-1
0.6 0.6 -0.7 0.6

NOBS= 20 NDF= 16 SEE= 0.5084 RBSQ= -0.0725
DW= 1.219 F(3/ 16)= 0.572135

EQ.(8) OLSQ LOG(FFE) = + 1.087 CST - 0.016 TREND + 0.170 LOG(FFVA) + 0.720 LOG(FFE(-1)
1.2 -0.6 1.1 5.5

NOBS= 20 NDF= 16 SEE= 0.1945 RBSQ= 0.9030
DW= 2.670 F(3/ 16)= 59.9478

APPENDIX VII (continued)

EQ.(9) OLSQ LOG(PPPE) = + 2.438 CST + 0.024 TREND + 0.080 LOG(PVAP) + 0.564 LOG(PPPE(-1)
1.8 0.8 0.8 2.4

NOBS= 20 NDF= 16 SEE= 0.1352 RBSQ= 0.9501
DW= 1.774 F(3/ 16)= 121.681

EQ.(10) OLSQ LOG(PPE) = + 3.424 CST + 0.010 TREND - 0.103 LOG(PPVA) + 0.645 LOG(PPE(-1))
2.2 2.1 -1.3 2.7

NOBS= 20 NDF= 16 SEE= 0.8475E-01 RBSQ= 0.6875
DW= 1.787 F(3/ 16)= 14.9229

EQ.(11) OLSQ LOG(DICGO) = - 0.308 CST - 0.032 TREND + 1.156 LOG(DICVA) + 0.094 LOG(DICGO(-1
-0.2 -1.6 6.2 1.0

NOBS= 20 NDF= 16 SEE= 0.2210 RBSQ= 0.9549
DW= 1.150 F(3/ 16)= 38.9390

EQ.(12) OLSQ LOG(CGPE) = + 2.221 CST - 0.016 TREND + 0.397 LOG(CGPVA) + 0.389 LOG(CGPE(-1)
1.2 -0.7 1.5 1.4

NOBS= 20 NDF= 16 SEE= 0.1621 RBSQ= 0.5234
DW= 2.030 F(3/ 16)= 7.95512

EQ.(13) OLSQ LOG(METE) = + 1.795 CST - 0.007 TREND + 0.376 LOG(METVA) + 0.421 LOG(METE(-1)
1.3 -0.3 2.5 2.2

NOBS= 20 NDF= 16 SEE= 0.7944E-01 RBSQ= 0.9798
DW= 1.451 F(3/ 16)= 293.466

EQ.(14) OLSQ LOG(EME) = + 5.032 CST + 0.115 TREND - 0.139 LOG(EMVA) + 0.397 LOG(EME(-1))
1.0 1.0 -0.2 0.9

NOBS= 20 NDF= 16 SEE= 0.5351 RBSQ= 0.6661
DW= 1.327 F(3/ 16)= 13.2783

EQ.(15) OLSQ LOG(TPTE) = + 1.594 CST - 0.001 TREND + 0.037 LOG(TPTVA) + 0.802 LOG(TPTE(-1)
0.9 -0.1 1.3 4.6

NOBS= 20 NDF= 16 SEE= 0.9541E-01 RBSQ= 0.7370
DW= 1.855 F(3/ 16)= 18.7460

EQ.(16) OLSQ LOG(MME) = + 1.900 CST - 0.012 TREND + 0.452 LOG(MMVA) + 0.334 LOG(MME(-1))
2.9 -1.6 6.7 3.3

NOBS= 20 NDF= 16 SEE= 0.1062 RBSQ= 0.9917
DW= 1.592 F(3/ 16)= 59.0751

APPENDIX VIII

SUMMARY OF EQUATIONS
THE EMPLOYMENT OUTPUT MODEL

RY OF EQUATIONS :

1) OLSQ LOG(E) = + 6.290 CST + 0.444 LOG(VA)
27.7 22.5

NOBS= 20 NDF= 18 SEE= 0.7519E-01 RDSQ= 0.9836
DW= 0.492 F(1/ 18)= 504.535

2) OLSQ LOG(E) = + 4.237 CST + 0.636 LOG(VA)
11.3 18.2

NOBS= 10 NDF= 8 SEE= 0.4007E-01 RDSQ= 0.9735
DW= 1.314 F(1/ 8)= 331.322

3) OLSQ LOG(E) = + 7.791 CST + 0.320 LOG(VA)
34.0 16.9

NOBS= 11 NDF= 9 SEE= 0.3029E-01 RDSQ= 0.9662
DW= 2.183 F(1/ 9)= 287.070

4) OLSQ LOG(E) = + 4.749 CST + 0.587 LOG(VA)
13.0 17.4

NOBS= 12 NDF= 10 SEE= 0.5252E-01 RDSQ= 0.9650
DW= 1.575 F(1/ 10)= 303.979

5) OLSQ LOG(E) = + 8.158 CST + 0.291 LOG(VA)
35.3 15.5

NOBS= 9 NDF= 7 SEE= 0.2339E-01 RDSQ= 0.9675
DW= 2.162 F(1/ 7)= 239.356

FOOTNOTES

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6. Hazlewood, A., Op. Cit.

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FOOTNOTES (continued)

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30. Edwards, E.O. Employment in Developing Countries, Ford Foundation, New York, august 1973, p. 34.

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FOOTNOTES (continued)

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FOOTNOTES (continued)

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53. Smyth, D.J. and Ireland, N.J., Op. Cit., pp. 537-538.

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61. Maitha, J.K. Op. Cit., p. 71.

62. Brechling, F.P.R., Op. Cit., pp. 196-200.

63. See Smyth, D.J. and Ireland N.J., Op. Cit., p. 537.

FOOTNOTES (continued)

64. See Ball R.J. and St. Cyr, E.B.A. Op. Cit., p. 182-183.

65. Equation 13 is equation 8 restated differently.

66. The data was obtained from the Statistical Abstracts published by the Government of the Republic of Kenya.

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71. For a detailed discussion of this, see Griliches, Z., "Distributed Lags: A Survey", Econometrica, Vol.35, No.1, January 1967, pp. 16-49. See also Klein, L.R., "The Estimation of Distributed Lags", Econometrica, Vol.27, 1958, pp. 553-565; and Varzandesh, J., "An Exposition of the Box-Jenkins Transfer - Function for Estimating Koyck and Pascal Distributed Lags", Journal of Economics, Vo. VII, February 1981, pp. 111-115.

72. For a useful concise summary of many of the issues, see International Affairs, July 1970.

73. Morawetz, D., "Employment Implications of Industrialization in Developing Countries: A Survey", The Economic Journal, Vol.84, No.35, September 1974, pp. 491-542.

74. Stewart, F., "The Choice of Techniques in Developing Countries", Journal of Development Studies, Vol.9, No.1, october 1972, pp. 99-121.

75. Ahluwalia, M., "Taxes, Subsidies and Employment", Quarterly Journal of Economics, Vol.87, No.3, August 1973, pp. 393-409.

76. Cooper, C., "Science, Technology and Production in the Underdeveloped Countries: An Introduction", Journal of Development Studies, Vol.9, no.1, october 1972, pp. 1-18.

FOOTNOTES (continued)

77. The correct specification is:

$E^*_t = a_o + a_1Q^*_t + a_2K^*_t + a_3T^*_t + U^*$
where * denotes the logarithms of the variables. The omission of K^*_t and T^*_t results in mis-specification bias:

$[E(\hat{a}) - a_1] = a_2b_1 + a_3b_2$

where b_1 is the coefficient of the regression of omitted variable K^*_t on the included variable Q^*_t, and b_2 is the coefficient of the regression of the omitted variable T^* on Q^*_t (see Koutsoyiannis, A., Theory of Econometrics, 2nd edition, MacMillan Publishers Ltd., London, 1977, pp. 254-255.

Given that $a_2 < 0$, $b_1 > 0$, it follows that $(a_2b_1) < 0$. Furthermore, given that $a_3 < 0$, $b_2 > 0$, the term (a_3b_2) will also be negative. Thus, there may be two sources of underestimation of the coefficient a_1 of Q_t.

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79. Turnham, D. and Jaeger, I., Op. Cit., p. 11.

80. Mehmet, O., Economic Planning and Social Justice in Developing Countries, Croom Helm Ltd. London, 1978, p.83.

81. International Labour Office (ILO), The World Employment Programme, Reports ILC/Ill and ILC 56/IV, Geneva, 1969.

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83. Thorbecke, E., "The Employment Problem: A Critical Evaluation of Four ILO Comprehensive Country Reports", International Labour Review, Vol.107, No.5, May 1973, pp. 393-423.

84. Shetty, M.C., "Small-Scale and Household Industries in a Developing Economy", Asia Publishing House, Delhi, 1963.

85. Mehmet, O., Op. Cit., p. 89.