PN-ABB-052

AGENCY FOR INTERNATIONAL DEVELOPMENT
PPC/CDIE/DI REPORT PROCESSING FORM

6

ENTER INFORMATION ONLY IF NOT INCLUDED ON COVER OR TITLE PAGE OF DOCUMENT

1 Project/Subproject Number

2. Contract/Grant Number: DAN-5426-A-00-3047-00

3. Publication Date: June, 1988

4. Document Title/Translated Title: Impact of Economic Policies on Technological Choice and Development in Tanzania Industry

5. Author(s)
1. S. M. Wangwe
2. M.S.D. Bagachwa
3.

6. Contributing Organization(s): Appropriate Technology International

7. Pagination: 47p.

8. Report Number:

9. Sponsoring A.I.D. Office: Bureau for Science and Technology

10. Abstract (optional - 250 word limit)

This paper examines the role of macro-policies on technology choice and development. It briefly reviews developments in the level and structure of Tanzanian industry in the last three decades and presents the evolution of national policy objectives in general and in industry in particular. Finally, the factors which have influenced the choice of technology are examined with a view to linking them to macro-policies.

11. Subject Keywords (optional)
1. macro-policy
2. Tanzania
3.
4.
5.
6.

12. Supplementary Notes

13. Submitting Official: Nancy Tresp

14. Telephone Number: 202-875-2906

15. Today's Date: Oct. 7, 1988

DO NOT write below this line

16. DOCID

17 Document Disposition: DOCRD [ ] INV [ ] DUPLICATE [ ]

DRAFT FORM

IMPACT OF ECONOMIC POLICIES ON TECHNOLOGICAL CHOICE AND DEVELOPMENT IN TANZANIA INDUSTRY

By

Prof. S.M. Wangwe
Economics Department and
University of Dar es Salaam
Tanzania

M.S.D. Bagachwa
Economic Research Bureau
University of Dar es Salaam
Tanzania

JUNE 1988

This paper is prepared as part of a project financed by Appropriate Technology International, Washington, D.C., U.S.A.

IMPACT OF ECONOMIC POLICIES ON TECHNOLOGICAL CHOICE AND DEVELOPMENT IN TANZANIAN INDUSTRY

1.0 Introduction

This paper examines the role of macropolicies on technology choice and development. Following the analytical framework developed by Stewart (1987) the macropolicies are divided into four categories i.e. those affecting objectives, resources, markets and technology. According to this framework, macropolicies exert their influence by affecting the microlevel choice in respect of objectives of various units, availability and access to resources, scale and type of markets and technology. Alternatively macropolicies may affect the balance of choice in the economy as a whole by altering the composition of units in the economy. In section 2 the paper briefly reviews developments in the level and structure of industry in the last three decades while section 3 presents the evolution of national policy objectives in general and in industry in particular. Section 4 examines the factors which have influenced the choice of technology with a view to linking them to macropolicies. Section 5 is the conclusion.

2.0 Development in the Level and Structure of Industry

2.1 Level of Industrial Development 1961-86

At independence (1961) the level of industrial

development was very low. In terms of number of establishments there were only 220 of them employing 10 persons or more and owning fixed assets worth Shs. 20,000 or more. These manufacturing sector establishments employed a total of 20,000 persons which for a population of about 9 million people catered for the livelihood of about one percent of the families. In terms of output the manufacturing sector contributed about 4 per cent to the Gross Domestic Product. (GDP). The rate of industrial growth has been more rapid than the rate of growth of the whole economy in the 1960's and early 70's up to 1972. Between 1964 and 1972 manufacturing value added more than double with an average annual rate of growth of more than 10 per cent. Although even during this period the actual growth rate fell below the planned growth rate of 13 per cent, by any standards the performance was impressive.

From 1973 onwards (except in 1976 and 1978) industrial growth was generally lower than overall economic growth. The year 1973 marks the beginning of the oil crisis which precipitated a shortage of foreign exchange for the importation of capital goods and intermediate inputs for industry. The coffee boom of 1977 facilitated a relatively adequate allocation of foreign exchange to industries following the improvement in the balance of payments position. The coffee boom is reflected as a boom in industrial production whereby manufacturing value added increased by 24% between 1977 and 1978. In 1978 the balance of payments deteriorated (and up to the time of writing (1988) it has not improved) reflecting itself in negative

industrial growth from 1979 as indicated in greater detail by Skarstein and Wangwe (1986).

In terms of share of value added the manufacturing sector improved its share from a low of 4% in 1961 to a peak of 12.3% in 1978. Following the deterioration of balance of payments and the consequent decline in foreign exchange allocation for the importation of intermediate inputs capacity utilization declined. This situation was worsened by allocation of foreign exchange and foreign finance in favour of new projects rather than utilization of existing projects. Causes of capacity underutilization in the manufacturing sector have been examined in greater detail by Wangwe (1977, 1983) and Ndulu (1986). This situation resulted in declining share of manufacturing value added from 12.3% in 1978 to 9% in 1984 and 7.6% in 1986 at 1976 prices (Economic Survey 1986). The share of manufacturing value added in 1986 had fallen below the 1964 share of 8.25% (statistical series 1951-85). Although new capacities continued to be created in industry in the 1970's and 1980's such investments were not realized in terms of additional output of industrial goods in the 1980's (Wangwe 1983 and Ndulu 1986). However, to the extent that new investment was taking place choice of technology continued to be exercised, a phenomenon which will be explained in section 4.

2.2. Structure of Industry 1961-87

The structure of industry had evolved along two main fronts. First, the need to process primary products for export either to increase the value added or reduce their weight. Second, the move

to carry out import substitution in response to the growth and pattern of the domestic market. This led to the predominance of simple consumer goods mainly for the small urban population.

On the spread of industrial establishments in 1961 the figures given by Rweyemamu (1973) indicate that 25 per cent of all the establishment were manufacturing food products, beverages and tobacco and about 30 per cent were in sisal decorticating and cotton ginning. The rest were mainly engaged in wood and furniture (15%) and in repair of machinery and transport equipment (16%). In the group of processing industries the main activities were ginning, sisal decorticating, saw milling, vegetable oil extraction, tobacco curing, coffee curing and wattle extract. Within the manufacture of consumer goods the most important activities were canned beef, textiles and clothing, footwear, beer, sugar, soft drinks and soap-manufacturing.

2.2.1. Sectoral Composition of Output

The history of industrialization has shown that as the economy develops the capital and intermediate goods sectors normally increase their contribution to industrial output. Because of the dynamism inherent in the capital goods sector, it has become common to expect the externalities of technical advance to become more important as this sector grows. Thus if technological choice is to incorporate effects of technological development one would expect a substantial increase in the share of the capital goods sector in total industrial output. Stated

otherwise, the correct identification of the appropriate composition of output is a perquisite towards the choice of appropriate techniques.

In the case of Tanzania, as shown in Table 1, the composition of manufacturing output has altered to some extent for the past two decades. The consumer goods sector still predominates in production while the share of capital goods sector still accounts for less than 10% of the total industrial output, when measured in domestic prices. In fact, according to the World Bank estimates the share of consumer goods for 1984, is even more perverse when measured in world prices as it exceeds that of 1965 by about 20% (World Bank, 1986).

Table 1: **Structural Change in Manufacturing**

(Percentages)

	1961	1965	1969	1974	1977	1984
Consumer Goods	74	59	60	56	56	48
Intermediate Goods	23	37	34	35	37	43
Capital Goods	3	4	6	9	7	9
Total	100	100	100	100	100	100

Source: Economic Surveys (various), Survey of Industrial Production; the 1961 figures have been taken from UNIDO: The Potential for Resources Based On Industrial Development in the Least Developed Countries No. 3: The United T Republic of Tanzania, Feb. 1982.

However the relatively low shares of value added for the capital and intermediate goods sectors do not imply the absence of significant investments into the two sectors Rather, these shares highlight on the gross inefficiency in the use of inputs by the two sectors (e.g. capacity underutilization as indicated in the previous section). In fact, as the World Bank (1986) study reveals, the share in total gross output of the two sectors was 60% in 1984 and in terms of installed capacity the two sectors also accounted for two-thirds of the total installed capacity in industry. Within the specific groups new industrial activities have been introduced in the economy even if this may not be reflected in change in sectoral shares of the specific activities.

The food, beverages and tobacco sector has not changed to any significant level structurally although in scale the activities have increased. The textile and leather sector has grown with textile mills, tanneries, the canvas mill, and a number of sisal-based products being introduced in the post-independence period. In the chemicals sector major activities were introduced in the sixties and seventies. The oil refinery, tyres and tubes, fertilizer, pharmaceuticals, polysacks and cassava starch were introduced during this period the last three having been introduced in the post 1978 period. Notable structural changes have also taken place in the basic metals sector where the steel rolling mill, steel casting (from scrap metal), foundries, farm implements, radio assembly, farm, implements, transformers and switch gears, batteries (cells and

for motor vehicles), bicycles and machine tools were established from the late sixties onwards.

The industrial structure has therefore changed in favour of intermediate and capital goods. On the basis of the nine industrial groups, some structural change has been shown, but except for metals and chemicals which have clearly increased their share, and wood products whose share has declined, the changes have not been very conspicuous. Within the groups, however, many new activities have been introduced into the economy. Although the effects of these structural changes, and new activities in particular, may have been mitigated somewhat by the increase in the degree of capacity underutilization after the mid-seventies, they are still quite substantial, as argued by Skarstein and Wangwe (1986).

2.2.2. Market Orientation of Output

Tanzania has relied on domestic demand growth and import substitution as the basis for her industrial development. As Table 2 shows, an estimated 60% of Tanzania's domestic manufacturers in 1987 was produced locally, 35% was imported while 5% was exported. The corresponding figures in 1961 were approximately 30% (domestic production) 62% (imports) and 8% (exports). As is to be expected import substitution industrialization has encouraged the use of capital intensive and import intensive production technologies.

Table 2. **Market Shares for Manufactured Products (%)**

Source of Manufacturing Supply	1961	1965	1971	1978	1984	1987
Production for Domestic Market	29.6	36.0	35.4	46.7	53.9	60
Production for Exports	8.2	7.8	10.5	3.7	5.	3
Manufactured Imports	62.2	56.2	54.1	49.6	41.1	35
Total	100	100	100	100	100	100

Source: World Bank (1986) Table 1.6, p. 9 for figures up to 1984, and SADCC estimates for 1987.

2.2.3. Pattern of Resource Use

From the resource input side, the structure of industrial production in Tanzania has been characterized by an increasing large scale production, deepening capital intensity and intensification of import dependence. Increasing centralization in production has not only occurred in higher technology industries, which might have been more susceptible to scale economies (as is the case with the Mufindi Southern Paper Mill), but also in leather processing, sugar processing (James, 1983), shoes, grain-milling (Bagachwa, 1987) and even in bread-baking (Coulson, 1979). At the sectoral level increasing capital intensity in industry has been revealed by the consistent rise in the incremental capital-output ratio which more than doubled between 1968 and 1979 and became negative thereafter (Skarstein and Wangwe, 1986: 106; World Bank, 1986:5).

Resource usage has also tended to be import-oriented and

import dependency, as measured by the ratio of imported input costs to total input costs rose from 15.1% in 1961 through 52% in 1984 to 70% in 1987, when evaluated at domestic prices. When provision is made for the overvaluation of the local currency, the import dependency ratio for 1984 rises to 70 percent. The implied total direct foreign exchange consumption of the manufacturing sector in 1984 has been estimated to be US$365 million which is about six times the value of the sector's export earnings of about US$ 65 million (World Bank, 1986:11).

2.2.4. Enterprise Organization

In response to the principles stipulated in the Arusha Declaration, the government became involved in public sector industrial development through nationalization of the major industrial enterprises which were existing then and through the establishment of new industrial enterprises with full or majority ownership by the state. In Tanzania these public sector industrial enterprises are more commonly referred to as parastatal enterprises or simply parastatals. Development of the industrial parastatal sector started off under one major parastatal holding, the National Development Corporation (NDC), which was established in 1965 but had to expand very fast in 1967/68 to cope with the pace of nationalization.

In view of the growing size and complexity of industrial activities in the public sector it became necessary to rationalize the institutional organization of these activities along sectoral lines. The share of the public sector

manufacturing value added and employment has increased considerably since 1966. The sharp increase of the share of the public sector in the late sixties seems to have started to level off in 1975-77 (about 40% of MVA and 48% of employment); after 1979 the share of parastatal sector has tended to increase to about 50-56% of MVA and employment in the 1980's.

The extent of public ownership of industry and the consequent role of the public sector in industrial development varies from one industrial activity to another. Within the metal based industries the public sector is dominant in basic metals, metal construction materials (except nails), metal containers, farm implements and spares and components. The manufactures of household metal products, nails, assembly of transport and electrical equipment are predominantly private sector activities. Within the group of chemical based industries the public sector is dominant in the manufacture of tyres and fertilizer, starch and pharmaceuticals while the private sector dominates in the manufacture of soap, cosmetics, paints, plastics, mosquito coils and pesticides. The textile, leather, cement and paper industries are mainly public sector owned. In the textile sector the public sector accounts for 83 per cent of all output. In leather manufacturing the public sector has a monopoly in the tanning of leather, while its shoe manufacture accounts for 60 per cent of total output. Cement production is wholly within the public sector, while in paper products the public sector accounts for 74 per cent of total output.

While the overall share of the public sector in

manufacturing shows a rising trend it is notable that the dominance of the public sector has been most pronounced in the industrial activities which are central in effecting structural change. For instance chemicals, basic metals, cement, paper, textiles, leather and publishing and printing are basic industries in which the public sector has its stronghold. This equips the public sector with a foundation which could bring about a qualitative change in the structure of industry. The public sector expansions which are underway also point to the increasing role of public industrial enterprises in the basic industries. The major expansions are notable in steel rolling, transport equipment, glass and ceramics, farm implements, textiles and chemicals which are all central (at least potentially() in effecting structural change in the industrial sector, as indicted by Skarstein and Wangwe (1986).

The proliferation of public sector enterprises in almost every sector of the economy has been accompanied by a host of economic regulatory measures which range from centralized control of investment, administrative allocation of foreign exchange, price and wage controls to absolute confinement in the production of specified products and service. Undoubtedly these must have affected technological choices at both macro and micro levels although since 1984 many of these regulations have been relaxed somewhat.

3.0 National Objectives and Policies

3.1 Goals, Objectives and Strategies 1961-67

At independence a three year plan (1961-64) was launched. The main emphasis of the plan was on growth. It set out to lay foundations for more rapid growth of the economy. In terms of industrial development the growth objective implied that investments would be made in projects which were capable of yielding quick and high returns in the near future (TYP 1961-64). The implied industrial strategy based upon reports by Arthur D. Little and World Bank entailed import substitution mainly in simple consumer goods. Although the government gave some financial assistance to industry through the Tanganyika Development Corporation it was generally taken for granted that foreign private capital would flow into the country if favourable conditions were created. The government made attempts to create the favourable conditions for foreign capital by offering tariff protection, guaranteeing foreign investors against nationalization, publishing existing investment opportunities and by designing a tax incentive structure (Rweyemamu 1973).

The First Five Year Plan (1964-69) proposed a more ambitious programme of industrial development without essentially changing the inherited strategy. The plan identified the main constraints to industrial development as the size of the market and the availability of capital. The market constraint was to be tackled by changing the rules of the East African Common market to allow for the introduction of a transfer tax system which would provide some protection to the industries of the less

developed partners and by setting up an industrial licensing procedure which reserved to each of the partner states the specific industries which depended on the entire regional market. The capital constraint was to be tackled through encouragement of private investment (local and foreign). In fact about 75 per cent of total industrial investment was expected to come from the private sector over the plan period FFYP (1964-69).

Although the FFYP (1964-69) proposed a wider range of industrial investments along the policy of import substitution, it remained silent on the significance of the product-mix, specific ownership patterns, choice of technology, linkage effects, external economies and structural transformation as indicated in Skarstein and Wangwe (1986). The specific policy instruments which were designed to achieve desired investment targets included accelerated depreciation allowances, tariff protection and guarantees for the repatriation of capital. But as Rweyemamu (1973) argues, protection tariffs were not set by the government on its own initiative but by a negotiation process which guaranteed sufficient protection to the (foreign) investor. Normal tariff rates varied among industries but usually ranged between 20 and 50%. Generally, however, tariffs were low for capital and intermediate good imports and higher for final consumer goods products resulting in effective rates of protection ranging from negative to well over 500%.

The impact of the broad development policies and the specific economic policies on the choice of technique and technological development during these early years of

independence, have been empirically analysed by Rweyemamu (1973). At the sectoral level, the strategy inhibited the development of the capital goods sector, and as a result intersectoral linkages were found to be weak. Furthermore, the alleged benefits of foreign investment i.e. automatic transfer of capital, management and technical know how were minimal and in fact negative in the long run since as Rweyemamu has documented between 1961 and 1968 capital outflow exceeded capital inflow by Tz.Shs. 3,732 million. At the enterprise level many foreign owned firms were found to be relatively more capital intensive than locally owned firms. Moreover, to the extent that the bulk of the industrial firms were foreign owned, and protected, the development of an indigenous entrepreneurial class was stifled in the bud as the relatively cheap protected foreign sector further reduced the markets for the local firms and hence their capacity for self sustained growth.

3.2 The Arusha Declaration (1967) and the Second Five Year Plan

The Arusha Declaration of 1967 charted out a new course of development. It contained two main principles; socialism and self-reliance. The policy of socialism implied the eradication of exploitation of man by man, the consolidation of democracy and the ownership of the major means of production and exchange by peasants and workers. These major means of production and exchange were identified as land, forests, minerals, water, oil and electricity, news media, communications, banking and

insurance, export-import trade, wholesale trade and major industries.

While the Arusha Declaration was specific on the issue of ownership it was not as specific on the issue of priority industrial activities. In the light of the Arusha Declaration major industries were owned by the public sector and subsequent new investments largely occurred in the public sector. It was now admitted that foreign investment could not act as the principal agent of industrial investment, not only on account of the unreliability of foreign capital inflow but more important on the grounds that it was inconsistent with the principles of socialism and self-reliance. Furthermore, the Arusha Declaration brought to the fore the objectives of employment creation and equity (interpersonal and inter-regional).

The Second Five Year Plan (1969-74) reflects the impact of the principles of the Arusha Declaration. On the ownership of industry the SFYP (1969-74) came out with arguments explicitly in favour of the expansion of the public sector and elaborated on the need to consolidate the institutional foundations for socialist development. As a reflection of the equity objective the SFYP explicitly mentioned the link between industrial development and rural development, it gave a place for the development of small scale industries.

The establishment of a parastatal known as SIDO (the Small Industries Development Organization) in 1973 was a reflection of the thrust to assist and promote small-scale industries. A statement by the ruling political Party emphasized that SIDO

should assist and promote the establishment of units which employed simple, labour intensive technologies which utilize locally available human and material resources. The Second Five Year Plan also provided for the decentralization of industry whereby nine growth towns (Dar es Salaam was not one of them) were identified for purposes of implementing the decentralized industrial development. The explicit encouragement of the use of labour intensive techniques is a reflection of the pursuance of equity and the employment objective.

For the first time there was mention of the need to effect structural change for sustained growth. In terms of the product-mix it was proposed that the element of manufacture in export products be increased and that the range of manufactured products be increased to include not only consumer goods but also intermediate and capital goods. In spite of the concern about the product mix the task of defining a long-term industrial strategy was to be undertaken during the plan period so that this could provide the framework for the Third Five Year Plan (TFYP 1976-81), See Skarstein and Wangwe (1986).

3.3 The Long Term Industrial Strategy (1975-95)

The long-term industrial strategy was charted out taking into account national goals. In this context seven national goals were identified. These are industrial growth. structural changes, employment generation, increased equality of income distribution, increased equality of regional development, worker participation in industry and increased self-reliance.

These goals were used as a guide in the formulation of the long-term industrial strategy.

In the process of formulation the long-term industrial strategy at least five alternative strategies were considered. These are the maximum growth strategy, basic industry strategy, small scale rural strategy, East African strategy and the mixed strategy. In terms of structural change and self-reliance the basic industry strategy emerged superior to the other strategies. It was therefore recommended and adopted.

Under the basic industry strategy resources would be channeled into the manufacture of a broad range of consumer, intermediate and capital goods essentially for the domestic market. Exports of manufactured goods would be seen as an extension of the home market. This meant that the export market would develop after the home market had been fully developed and catered for. The basic industry strategy represented a significant shift towards the development of domestic resources to meet domestic needs whereby most of the materials required for industrial development would be produced in the country. The proposed strategy differed from the pattern then in which local resources were largely allocated to the production of exports and of simple consumer goods, while intermediate inputs and capital goods were largely imported.

The basic industry strategy therefore lays emphasis on two sets of industrial activities. The first set consists of industries which meet the basic needs of the people. Important

components of the selected industrial activities in this set include food processing, textiles, clothing, footwear, building materials, materials and facilities, to meet the requirements of education, health services transportation and water supply. The second set of industries consist of activities which can use domestic resources to produce and supply intermediate inputs and capital goods to industries in the first set. In satisfying the basic needs using local resources it is possible to identify a core group of industries whose products are consumed by most other industries (Thomas 1974). This core group which constitutes the base of industrial production consists of industries like iron and steel, metal-working and engineering, industrial chemicals, paper, textiles, leather, construction materials and electricity. In this context, for instance, the metal-working and engineering industry receives considerable emphasis for its capacity to supply machinery and equipment, while iron and steel is a priority industry in its capacity as a supplier of inputs into metal-working and engineering industries. Further details on the formulation and implementation of the Basic Industry Strategy are given in Skarstein and Wangwe (1986).

3.4 The Basic Industry Strategy and Technology Policy

The development of a local capital goods sector is an important component of technological development. The formulation of the basic industry strategy incorporated an element of developing the local capital goods sector. It was argued that the local capital goods sector would contribute to

greater self-reliance and desired structural change in the economy. It was suggested that in order to reduce dependence on foreign technology it would be necessary to put the bulk of manufacturing investment into industries with simple technologies which can be incorporated in capital goods production in developing countries. It was argued that attempts to produce capital goods locally require the development of the metal-engineering industry and this would reduce dependence on foreign technology.

As regards training in technomanagerial skills it was pointed out that in the early stages there would be a marked increase in the need for foreign technical assistance and a corresponding delay in control by Tanzanian managers and technicians. To overcome this disadvantage, it was argued, it would be necessary to establish powerful and effective planning institutions which can ensure that the necessarily heavy commitment to training is successfully undertaken. Under present conditions this danger is apparently more pronounced than it was in the early seventies in the Tanzanian context. Nevertheless, there is no evidence that the proposed stringent control has really been effected as pointed out by Skarstein and Wangwe 1986).

As regards scale of production, while it was accepted that both large and small industries should have a role to play in the process of industrialization, the precise role of these and the link between them remained unclear and vague. The proposal that small industries should be established in activities where they

compete reasonably well in price an quality with large-scale industries carries more of a competitive than a complementary tone. It was further proposed that when information on comparative costs and products quality is available, SIDO should work together with the relevant parastatals and ministries to frame a plan for the development of small-scale production in designated industries.

Choice of technology was not taken up as an explicit policy issue in discussions of the basic industry strategy. Having recommended the adoption of the BIS whereby industrial activities were selected mainly to achieve the structural change and self-reliance objectives, the role of choice of technology was to ensure that within the framework of the selected industrial activities the objectives of growth, employment and regional equality were achieved as much as possible. While the choice between capital and labour intensive technology would mainly influence employment generation, to choose between large and small scale industries would influence employment and regional dispersion of industries (especially the footloose industries).

The choice of technology was basically viewed in the context of factor intensity and scale of operation. Although further questions were posed (e.g. sacrifices in terms of cost and quality, consumer choice, speed of implementation, organizational demands and information about techniques of production) it seems that answers to these questions were not provided unambiguously.

4.0 Factors Influencing Choice of Technology in Industry

4.1 Source of Foreign Finance

Foreign investment during the 1961-66 period was encouraged through a system of tariff protection, tax incentives (such as accelerated depreciation and tax holidays and the offering of guarantees for the repatriation of capital. This as already observed resulted in increased capital and import intensities in industry favouring the production of consumer goods. After the Arusha Declaration foreign private investment was discouraged and the policy regime increasingly relied on central planning and administrative controls in the regulation of the economy. Over time, however, Tanzania has become more dependent on foreign finance, in particular from aid donors. More importantly however, throughout the 1970'S external aid has increasingly become tied to specific donor supported projects. Foreign assistance has encouraged the parastatal sector to continue to invest in new large scale, capital and import-intensive plants and machinery, despite prevalence of excess capacity in the existing plants. This happens partly because donors prefer the financing of new projects to funding of rehabilitation and recurrent costs in existing projects, but also partly because such capital intensive projects would guarantee importation of technology from the donor country. This tendency is also exacerbated by a number of domestic institutional weaknesses at the planning and project implementation stages. One such weakness is the lack of seriousness in aid coordination and scrutiny on the part of the government which

tends to approve any public project which has been assured of foreign financial support whether it falls within the nation's priority category of investment or not. The source of finance has tended to direct the sourcing of technology from a specific country (or countries) or from a specific technology supplier. The first type of confinement (by country) allowing choice among alternative technologies in the financing country has often occurred under circumstances where funding is by foreign governments. James (1983), for instance has referred to sugar projects (Kagera and Kilimbero) indicating that in the case of Kagera sugar project tenders of technology supplies were floated only in India because it was known that finance was available from the government of India, while in the case of Kilombero project turnkey tenders were floated in Denmark and Holland, countries which were providing external finance (75% tied to procurement in these two countries). A similar tendency is exemplified by the automatic bakery (Coulson 1979) and several projects under the Capital Development Authority Mihyo 1981 among others. The second type of tying often associated with the integration of finance to contractors and/or technology suppliers leaves no room for the choice of technology. For instance, James (1983) has indicated that in the case of the Musoma Textile Mill, the feasibility study was done by the same French contracting company which identified a consortium of financiers and machinery suppliers. This also resulted in inflating the cost of the project about 2-1/2 times those of a similar (size and timing) textile project (expansion of Mwanza textiles). Further evidence

of the phenomenon is indicated by Coulson (1979), Mihyo (1981), Dolman et. al. (1981), UNCTAD (1981), Perkins (1983), Williams (1975, 1976) and James (1983). In merchant milling, Bagachwa (1987) has demonstrated a close connection between the source of foreign finance and choice of technology whereby three British manufactured rollers were financed by suppliers' credit from Britain and three German made rollers have been financed by suppliers' credit from W. Germany.

Most of the evidence on the influence of foreign financing on the choice of technology refers to the public sector industrial enterprises. The little evidence which is available on the private sector choice of technology indicates that although private enterprises had some technology preferences based on the profitability criterion, the degree of freedom in the actual selection of technology was limited by the availability of foreign financing (James 1983). The nature of this limitation, as indicated by James, takes the form of forcing these enterprises to move down their technology preference list according to the availability of foreign financing.

The rise of the influence of foreign finance on choice of technology has been explained by Williams (1976) on the basis of his "bureaucratic-man hypothesis". According to this hypothesis the environment in the parastatal system in Tanzania (cost-plus pricing, replacement of market forces by government controls and weak incentives to management) deprives the managers of any incentive to minimize costs. This induces managers to turn to other goals that appear to offer greater scope for advancement in

the eyes of their superiors in the planning hierarchy. In particular, Williams (1976) continues to argue, the manager tries to initiate as many projects as possible. Because projects with foreign finance are likely to be approved more easily by the planning system and therefore move faster the manager's attention shifts towards foreign finance mobilization for projects. For this reason, Williams argues, choice of technology is effectively eliminated from parastatal investment decision making.

The influence of foreign finance on the choice of technology can be explained by two forces. First, foreign finance has a preference for projects rather than programmes or support for intermediate inputs (Wangwe 1983). this preference will often be reflected in the relative emphasis on the provision of initial investment resources rather than on economic and technological implications at the operation stage of the project. However, in our view, it is the latter which are important in transfer of technology and technology development issues. Second, the planning system itself leaves much to be desired. For example, we may ask: if investment finance especially in foreign exchange is such a critical constraint why is it that the foreign exchange costs of initial investment (e.g. the case of Musoma Textiles where the project was probably overpriced by 2-1/2 times) and the foreign exchange cost of the technologies were not made an explicit criterion of project planning? This problem has been explained in terms of the weak link between macrolevel and microlevel planning with a deficiency in the planning system (Wangwe 1983). The same resource (foreign exchange) whose

scarcity has contributed to calling for foreign finance with its influence on choice of technology, has in turn been leaked away in the process (through technology contracts, overpriced projects and transfer pricing).

One recent policy stance which may influence the role of foreign finance in this context is the deliberate effort to shift the form of foreign finance from project aid to programme aid. This policy is very recent so a conclusive evaluation of it cannot be made at this stage.

4.2 The Managerial and Technical Skills Constraint

The shortage of managerial and technical manpower has influenced the choice of technology in at least three ways.

(i) The managerial and technical manpower constraint has led to the option of joint ventures in investments which require new and/or relatively complex technology. Joint ventures have often been between the parastatals and foreign partners, the latter being expected to provide the technical and managerial component in the project in addition to holding the minority equity shares. The main reason for the joint ventures has primarily been technological rather than equity sharing and this explains why joint ventures with local capitalists have not taken place. Under joint ventures the foreign partner has provided the technical management skills (e.g. the Fertilizer Company, Metal Box Ltd., General Tyre Co., Mwanza Textiles).

(ii) Secondly, this skills constraint has tended to encourage packaged turnkey projects. The argument here has been that in order to minimize the local technical and managerial manpower requirements for supervising and managing the designing, planning, execution, implementation and to some extent the actual management of the project, it is preferable to opt for a fully packaged turnkey project. James (1983) for instance has indicated that these arguments were used in choosing large scale projects to avoid managerial and supervisory problems associated with too many plants, in the case of Morogoro oil processing project when the project tender specified that tenders must be responsible for the whole package (design, installation and commissioning) and in the case of Morogoro Shoe to avoid the managerial requirements of many small plants. On this point Perkins (1983) has added that the parastatal holding companies usually prefer projects with economies of scale in terms of the involvement of their headquarters' management. Often these are the fully packaged turnkey projects.

(iii) The managerial and technical skills constraint often resulted in the engagement of foreign technical and management teams by agreements or contracts in an attempt to fill this gap. It has ordinarily been hoped that after the expiry of such contracts (usually lasting 5-10 years) local technical and managerial manpower would be sufficiently developed and the foreign technical and managerial personnel would be phased out accordingly. The engagement of foreign technical and management teams has tended to "free" local manpower from taking part in

making decisions on technological choices. The choice of technology decisions have essentially been vested in the technical management teams or foreign consultants. This has meant that the consultants and the technical management teams would recommend the technologies they themselves have experience with. In cases where the technical management teams are also technology suppliers or linked to technology suppliers in some way they have preferred to recommend those technology suppliers. The overwhelming influence of these teams/consultants on the choice of technology has been documented for instance by Mihyo (1981) in the case of the Silos and the Fertilizer factory and by James (1983) in the case of the printing ink factory.

In all the above three senses in which the technical managerial manpower constraint has influenced the choice of technology, the available evidence suggests that while local technical managerial manpower requirements may have been minimized at the time of making the technology choices, the same technologies have systematically hindered the process of relaxing this same skills constraint overtime through training and learning by doing. That the training and learning effects of such technologies have been limited is evidenced by Eze (1977) in the case of multinational enterprises, Mihyo (1981) in the case of Mwanza Textiles and several CDA projects, by UNCTAD (1981) in the case of technical management agreements and their failure to implement local manpower training programmes, by Dolman et. al. (1981) on the limitations of learning by doing and the effect of the tendency to avoid experimentation. Mlawa's (1983) study on

the textile sector in Tanzania, quite clearly exposes this weakness. He points out that when establishing Urafiki and Mwatex textile mills, in the late 1960's, all services (i.e., feasibility studies, civil engineering works, production start ups etc.) and all machinery supplies were imported. The responsibility for the supply of all buildings and infrastructure also lay with foreign contractors. This situation did not change significantly and in the late 70's when Mwatex was being expanded, and Musoma, Tabora, Ubungo, Mbeya and Morogoro textile mills were being installed, the only Tanzanian participation was limited to the sub-contracted components in building tasks (e.g., roofing and electrical installation). Bagachwa (1987) has examined the issue of participation by Tanzanian experts in investment decisions at the NMC and found that in all cases of rehabilitation and expansions the foreign financing agency identified, selected and negotiated with the project engineering agency. Indeed there was no active local expertise involvement in key technological decisions.

4.3 Product Quality and Consumption Technology

A number of studies have shown that the product quality (or the acquired consumption technology) has influenced the choice of technology. In the case of food manufacturing high standards of hygienic requirements on the product have led to the choice of particular production technologies as has been indicated by Green (1982) in the case of the Automated Bakery in Dar es Salaam, and by James (1983) in the case of Morogoro Oil

Processing and Tanga Flour Milling. It is conceivable that there are cheaper ways of attaining desired hygienic standards but these case studies indicate that production technology was presumably sought as the only means available for the purpose of attaining the required hygienic standards. In the case of Monooro oil-processing James (1983) has indicated that in order to ensure product quality and uniform colour on the product, a more expensive continuous refining process was selected because of its independence of human operation and human error in this sense.

One of the criticisms of import substitution industrialization has been its pursuance of high consumption technologies commensurate with the imports they replace without the corresponding process of capital accumulation and technological development (Rweyemamu 1980). Arguing that consumers have been used to the acquired taste of previously imported products, producers of import substitutes have tended to replicate those same tastes and this has featured in the choice of production technology. For instance, in the case of detergents manufacture in Tanzania the most popular important brand was known as OMO. When a decision was being made to produce locally a substitute for OMO, tenders were floated to prospective technology suppliers. James (1983) has indicated that the tender document specified that the desired quality of the detergent to be produced must be the same quality as or even better than the previously imported OMO and tenderers were required to send samples of their brands. It is not surprising

that the winner of the contract happens to be the same supplier of plant and machinery to Unilever of Kenya (the manufacturer of OMO). The influence of consumption technology on choice of technology has been documented in several other cases by James (1983) in the case of printing ink, sugar and shoes and by Perkins (1983) in the case of sugar, cement, beer and flour milling.

There has been very little government intervention on this matter. However, Bagachwa (1987) has pointed out that in grain milling the government banned the production of sembe superior (flour of abut 80% extraction rate) in order to encourage the public to consume sembe standard (about 98% extraction rate). This was done in 1979 at the time when there was grain shortage in the country. As regards choice of technology this policy indirectly favours the choice of custom mills rather than merchant roller mills. To that extent the composition of units could be altered away from roller mills.

4.4 Foreign Exchange Market

The foreign market in Tanzania has been characterized by excess demand for foreign exchange and an increasingly overvalued exchange rate. The overvaluation of the official exchange rate was excacerbated by the escalating domestic rates of inflation (which averaged abut 15% and 28% per annum during the 1970's and 80's respectively), deterioration in the terms of trade (and the subsequent increasing current account deficits), and increasing debt accumulation. It is thus estimated that the real effective exchange rate appreciated by 56% between 1970-78

and by 120% between 1979-85.

The government through the Central Bank of Tanzania (BCT), and the people's Bank of Zanzibar, has, since 1970-84 relied on a system of foreign exchange rationing through administrative allocation and import licensing as the major means of containing excess demand. On paper the system is quite elaborate with broad guidelines on how to prioritize sectoral demands (using various criteria such as the extent of linkages, basic consumer needs, revenue generation, foreign exchange earning etc.). In practice, however, the system is vulnerable to the lobbying strength of the applicant, the crisis nature of the application and overall foreign exchange available and other political considerations.

On the whole although the system of foreign exchange rationing has spread imports thinly across sectors thus contributing to capacity utilization in most sectors, the beneficiaries of the system have been the large scale parastatal sector. Because of their political and economic power, parastatal enterprises have been receiving a disproportionate share of allocations of foreign exchange not only through the budget and external project aid, but also since a984 through the export retention scheme. In addition, given the overvalued exchange rate, the relatively high rates of domestic inflation, low real interest rates and the concessional nature of project aid, the structure of protection provides an implicit subsidy to direct large scale public sector importers at the expense of the private and small scale industrial sectors. The technological implications of the system of import rationing as far as product

choice is concerned is that due to increasing budgetary pressures, firms generating fiscal revenues (especially beer and cigarettes and to some extent soft drinks) have been allocated the largest proportion of foreign exchange (Osoro, 1987, World Bank, 1987). This has reinforced the bias against the development of a capital goods sector.

Another and most probably unexpected technological effect arising out of limited accessibility and/or availability of foreign exchange is that there have been some shifts in production lines from import dependence towards increased use of domestic resources. Although the scarcity of foreign exchange is widely reported to be the major cause of capacity underutilization in manufacturing sector in Tanzania (URT) Economic Survey, 1986; Ndulu, 1976; Wangwe 1979, 1983) the subsequent raw material shortages have stimulated the search for alternatives. This search has taken various forms:

(i) Active search for local raw materials to substitute for imported materials in the production of existing products (e.g. Fabrication and Wire Products Manufacturers (FAWPMA) based in Arusha; Afro Cooling Systems which substituted local brass and bronze fittings for imports).

(ii) Increased efficiency in the utilization of imported inputs (e.g. FAWPMA).

(iii) Development of new products that economize on imported inputs (e.g. Sunguratex have reduced production of Khangas in favour of more profitable and less import dependent bedsheets; Bora Shoe Company has reduced output of rubber sandals in favour

of higher priced shoes using local leather; some textiles have also changed production lines from those relying on synthetics to those using local cotton).

(iv) Rationalization in process, product and industrial engineering. A number of firms have instituted preventive maintenance and rehabilitation programmes, standardization of designs and the manufacturing of in house spares to solve the problem of scarcity of spares (Examples in this category include Afro Cooling Systems Ltd. which manufacture car radiators of high quality and has standardized the designs for radiator tubes and structures; Auto Mech Ltd. which rehabilitates automotive engines, gearboxes, differentials and electricals).

4.5 Effects of Economic Policies on Factor Markets

In a competitive setting, the cheapening of capital inputs relative to other inputs will tend to encourage the use of more capital intensive technologies. Policies influencing relative factor prices have therefore been instrumental in influencing the direction of technological choice. The most important policies that have influenced the price and availability of capital in Tanzania include a system of (1) credit rationing, (ii) interest rate ceilings, (iii) tariff protection and other forms of quantitative restrictions on imports; and (iv) tax incentives.

(i) Effects of Credit Policies

In the first case it is quite clear that the domestic capital market has been heavily subsidized by the high rates of domestic inflation and low interest rates. The banking sector in

Tanzania is exclusively government controlled with interest rates on loans and structure of loans being controlled by the government through the (Central) Bank of Tanzania (BOT). Credit allocation is also carried out quantitatively according to government policy priorities as specified by the Finance and Credit Plan.

Though this arrangement is intended to channel credit to the "high priority" sectors it has led to two undesirable side effects. One, is that credit rationing has led to the bulk of loanable funds being allocated to the large scale public sector firms which are both the most politically and economically adept of the eligible recipients. The small scale industry (SSI) sector, which is predominantly privately owned, has thus been discriminated from the institutional market for credit on grounds of higher risks and administrative lending costs. The bulk of small scale establishments are therefore forced to rely on informal self-financing (which is nevertheless not sufficient to satisfy the major capital needs) and informal sources where the rates of interest are higher than official interest rates (Bagachwa, 1983).

Moreover, to the extent that credit policies result in interest rates which are below the opportunity cost of borrowing domestic capital, they may have as a second side effect, biased choice of technology towards greater capital intensity. The BOT which maintains ceilings on deposit rates as well as floors and ceilings on commercial lending rates has almost maintained fixed nominal rates between 1966 and 1982. At the same time, prices

rose at an average annual rate of about 5% between 1966-73 and accelerated to about 22% per annum between 1978-83. Thus the real cost of borrowing has been declining over time and has become negative since 1978. This has not only affected the capital intensity of production but also has resulted in reduced domestic savings and incentives for capital flight. Although one objective of the Economic Recovery Programme is to raise interest rates to real positive levels this has yet to be achieved. However, over the 1986-88 period the extent of negativity of real interest rates has been reduced.

(ii) **Tariff Structure**

Tariff protection was used extensively during the 1961-66 period to cushion foreign investors from the wind of domestic and international competition. Over time, however, the government has increasingly relied more in import licenses, administrative allocation of foreign exchange and the confinement system to protect domestic industry. With the partial liberalization of these quantitative controls (through own-funds importation) and devaluation since 1986 the potential role of tariffs has tended to increase over time.

Generally, since independence up to date, Tanzania's tariff structure has not changed significantly. Most intermediate and capital good imports are subjected to a 20% tariff or less while for the majority of consumer imports, the applicable tariff rate is about 60% on the average. Since most finished consumer goods are subjected to a higher tariff rate of between 60-120% compared to intermediate and capital goods, and given the

overvalued exchange rate, domestic producers of intermediate and capital goods products have the incentive to import capital rather than search for domestic alternatives.

The structure of protection in Tanzania has also tended to over-protect (and hence channel large resources to) large scale inefficient firms at the expense of small scale efficient firms who are in a sense being penalized. The World Bank study has revealed that while a small scale firm employing less than 25 workers has an effective rate of protection below 10% the large enterprise which employes over 250 workers enjoys a rate of effective protection well over 2,000%. This is so despite the fact that the economic rate of return on capital is normally positive for firms less than 25 workers as opposed to the larger firm with a highly negative economic rate of return (World Bank, 1986:55).

The capital-based tax benefits of accelerated depreciation not only tend to encourage capital intensity in production but also do not accrue to smaller firms. This is because most small firms escape the official tax net and at times their capital inputs are mistakenly classified as consumer goods and hence subjected to higher tariff rates.

Since the 1983/84 Budget, a provision was made for the semi-liberalization of imports under the own-funds import scheme. Under this scene, importers use own generated foreign exchange (earned through private remittances, direct investments, parallel market proceeds and returning capital) to import commodities without declaring sources of such funds. Own-funds imports have

doubled between 1984 and 86 having increased their share from about 20.4% of the total imports in 1984, to about 41% in 1986 (Osoro, 1987). Own imports have affected the structure of output in favour of intermediate and capital goods products which have accounted for abut 56%. On the positive side own imports have induced some quality improvements and some price reductions in similar domestic items.

(iii)**Effects of Policies on Labour Markets**

Policies such as minimum wage legislation, mandated fringe benefits and public sector wage policy, have, in some countries been instrumental in pushing up the price of labour. In Tanzania, prices, wages and income policies have been used as means of reducing income disparities among workers and between urban and rural sectors of the economy. Consequently the freeze in wages has been accompanied by a progressive income tax structure. The acceleration of inflation since the late 1970's (at abut 25.5% p.a. between 1979-84) has caused a significant drop in real wages. At the same time, the output supply constraint on the economy broadly, manifested in underutilization of capacity in the industrial sector, has resulted in falling value added. Consequently the share of the wage bill in value added has remained more or less constant. However due to the government directive which restricts the authority of employers to lay off workers when production declines, the expected wage costs per unit of value added have risen. This acts as a disincentive to the employment of labour and tends to promote capital intensive technology.

4.6 Policies Affecting the Development of Small Industries

4.6.1 Agricultural Policies

There are normally strong potential production and income linkages between agricultural and industrial activities. This is particularly more so for rural small scale industries where the primary demand for their products stems from the rural sector. Since the evidence available suggests that generally, foremost developing countries, rural households' income elasticity of demand for rural industrial goods is positive and that agriculture generates the largest share of rural incomes, policies designed to increase agricultural output and income would tend to bolster up demand for products of small firms (Liedholm and Mead, 1987; Stewart 1987).

In Tanzania the agricultural pricing and marketing policies have, to a significant extent, contributed to the agricultural sector's poor performance particularly before 1985. These policies have resulted in declining real producer prices and the marketing arrangement has been characterized by high collection, administrative and transportation unit costs (Odegaard, 1985). In this context it may be argued that agricultural policies in Tanzania have not promoted the development of Small Scale Industries.

4.6.2 Special SSI Promotional Programs

In principle Tanzanian industrial strategy places an important weight on the role played by the Small Scale Industry (SSI) sector in the process of industrialization. The National

Small Scale Industry Corporation was formed as early as 1965 to promote Small Scale Industries. This was superceded by the Small Scale Industry Development Organization (SIDO) in 1973. SIDO has been entrusted with the overall coordination of all policies and programs (e.g., in project preparation, financing, basic infrastructure consultants services etc.) intended for promotion of SSI.

To that effect, SIDO has designed and implemented a number of promotional programs including (i) provision of 16 industrial estates with 154 sheds (ii) provision of financial support at relatively subsidized (8% interest) rates through its Rural and Urban Hire Purchase Scheme (iii) Promotion of technological transfer through the Sister Industry programme whereby Swedish firms (senior sisters) provide training facilities for local firms (junior sisters) and help to select machinery and raw materials. By 1984, 24 firms employing 600 persons were involved in the sister industry programme. Technological transfer has also been effected through the Indo Tanzanian programme which began in 1977 and supported 48 Tanzania firms through provision of materials and training; (iv) provision of extension and training services and (v) supporting and promoting handcrafts.

Reasonably modest success has been achieved by SIDO through these programs. The implicit effects of these programmes in relation to technological choice and development have been discussed in detail by Havnevik et.al. Briefly the industrial estate programme has always been confined to urban regional headquarters apparently because of lack of basic infrastructure

in the rural areas. They are also heavily capitalized. Secondly, over two-thirds of SIDO's assisted investments are located in urban areas. In fact by June 1984 SIDO's loan approvals stood at Tz.Shs. 53.3 million, compared to Tz.Shs. 256.5 million set for urban schemes. Thirdly, preponderance of foreign finance in SIDO's aided projects has not only tended to direct investments towards urban areas but also to encourage capital and import-intensive techniques (as was the case with the Sister Industry programme as pointed out by Alange (1987)). Lastly, in most SIDO-foreign donor negotiation, the recipient local entrepreneur is not usually involved in the early but crucial stages of product design and technology selection (Alange, 1987). Such a development is likely to stifle the development of indigenous entrepreneurship by denying it the necessary training and learning by doing effects.

5.0 Conclusion

Starting from a very low initial level, the growth of industry was quite rapid in the 1960's and the 1970's. Industrial output, however, faced absolute declines since 1979 following the failure to utilize reasonably the capacity which had been created from large investments of the 1970's. Capacity expansion, however, continued in the 1970's and 1980's in spite of the problems of capacity underutilization. In this sense choice of technology continued to be relevant even in this period of decline.

The structure of industry has been altered somewhat in favour of intermediate goods and capital goods although it

remains predominantly consumer goods oriented. The absence of a strong local capital goods sector is still quite conspicuous. While industrial output has increasingly been domestic market oriented (rather than export oriented) import intensity of industrial production has tended to increase.

The basic industrial strategy (1975-95) was formulated as a replacement of the hitherto implemented conventional import substitution industrialization policy. The BIS placed high priority on basic industries notably capital goods and intermediate goods. However, it was not quite clear on the place of scale of output and choice of technology. Its implementation seems to have been distorted by deteriorating balance of payments position and the consequent overdependence on foreign finance which ultimately had a considerable say on which projects would be implemented and at what speed.

The source of foreign finance is a most important factor influencing choice of technology in Tanzania's industry. Sourcing of technology has largely been made in favour of the country providing foreign finance and/or in favour of the technology supplier who is also providing supplier's credit or other form of financing. The influence of foreign consultants (who are often tied to source of finance) has tended to reinforce the influence of source of finance on choice of technology. This influence takes this form partly because foreign finance has preference for projects rather than programmes or recurrent expenditure support and partly because the planning system does not deliberately counter this influence.

The shortage of managerial and technical manpower has influenced choice of technology in an attempt to respond to this constraint. The tendency to opt for joint ventures with foreign partners, and the option for turnkey projects and technical and management agreements with foreign agents. The measures used to handle the manpower constraint have deprived local manpower of the opportunity to upgrade their skills through learning by doing. The training effects of these arrangements have been minimal. This reflects the absence of a government policy to encourage participation of technomanagerial manpower in investment decisions and in various project implementation tasks.

Product characteristics have influenced choice of technology in the direction of replication of the imports they replace and towards capital intensity. In general government policy has been silent on the appropriateness of products or their product characteristics. In one case, however, the government banned the milling of sembe superior; a decision which favours custom mills rather than merchant roller mills.

The overvalued exchange rate tended to favour imported capital intensive technologies while the foreign exchange allocation system favoured the large scale often capital intensive technologies in the parastatal sector. Although the import squeeze has forced some import substitution activities these have emerged in an ad hoc rather than systematic manner.

Credit allocation has favoured large scale public sector firms while the negative real interest rates charged on capital have tended to favour capital intensive technologies.

The structure of industrial protection in Tanzania is found to favour large scale enterprises at the expense of small scale firms.

The governments restriction on laying off of workers when production declines have tended to act as a disincentive to labour employment and a promoter of capital intensive technology.

There is no doubt that agricultural incomes are closely related to the successful development of small rural industries. The fact that the agricultural sector has stagnated in the past decade suggests that the would be demand-driven small industries could not be promoted.

Even the small scale industry programme has tended to be urban biased, highly dependent on foreign finance, capital intensive and import intensive. These characteristics have been observed in the case of the industrial sector as a whole (small and large firms).

References

1. Alange, S., "Acquisition of Capabilities Through International Technology Transfer: The Case of Small Scale Industrialization in Tanzania." Ph.D. Dissemination, Chalmers University of Technology, Gothenburg, 1987.

2. Bagachwa, M.S.D., "Small Scale Industry Technology and Resource-Use in Manufacturing: Evidence from Tanzania." Third World Seminar Publications No. 38. 1983.

3. Bagachwa, M.S.D., "Choice of Technology in Grain-milling Industry in Tanzania." University of Dar es Salaam (Mimeo) 1987.

4. Coulson, A., "The Automated Bread Factory", in Coulson (ed): African Socialism in Practice: the Case of Tanzanian Experience. Nottingham: Spokesman Books 1974.

5. Havnevik, K.J., R. Skarstein and S. Wangwe "Small Scale Industry Sector in Tanzania:, Report to Ministry of Industry and Trade, 1985.

6. James, J., "Bureaucratic Engineering and Economic Man. Decision Making for Technology in Tanzania's State-Owned Enterprises." World employment Programme Working Paper No. 125, Geneva: ILO. 1983.

7. Liedholm, C. and Mead D. "Small Scale Industries in Developing Countries Empirical Evidence and Policy Implications." MSU International Development Papers No. 9. Michigan State University 1987.

8. Mihyo, P.M., "Bargaining for Technology in Tanzania's Public Enterprises: Some Policy Issues." Dar es Salaam, University of Dar es Salaam (Mimeo) 1981.

9. Mlawa, M.M., "The Acquisition of Technological Capability and Technical Change: A Study of Textile Industry in Tanzania." Ph.D. Dissertation University of Sussex. 1983.

10. Ndulu, B.J., Investment, Output Growth, Capacity Utilization in an African Economy. The Case of Manufacturing Sector in Tanzania. Eastern African Economic Review (New Series) Vol. 2, pp 14-30, 1986.

11. Odegaard, K., "Cash Crop Versus Food Crop Production in Tanzania: An Assessment of Major Post- Colonial Trends: Lund Economic Studies No. 33. 1985.

12. Osoro, N., "The Impact of Foreign Exchange Allocation Management on the Performance of Manufacturing Sector in Tanzania." Paper Presented at IDRC Workshop, Nairobi 7-11 December 1987.

13. Perkins, F.C., "Technology Choice Industrialization and Development Experiences in Tanzania." Journal of Development Studies. vol. 19, pp. 213-143. 1983.

14. Rweyemamu, J.F., Underdevelopment and Industrialization in Tanzania. Oxford: Oxford University Press 1973.

15. SADCC., "Trade and Industry In SADCC Region." Dar es Salaam (Mimeo). 1988.

16. Skarstein, R. and S. Wangwe., Industrial Development in Tanzania: Some Critical Issues. Uppsala and Dar es Salaam; Scandinavian Institute of African Studies and Tanzania Publishing House. 1986.

17. Stewart, F. (Ed), Macro-Policies for Appropriate Technology in Developing Countries. Westview Press/Boulder and London 1987.

18. UNCTAD. "Technology Policy in Tanzania" Unpublished Report. 1981.

19. United Republic of Tanzania - Hali ya Uchumi wa Taifa Katika Mwaka 1986. Dar es Salaam, Government Printer. June 1987.

20. United Republic of Tanzania: Selected Statistical Series 1951-85. Bureau of Statistics. Ministry of Finance, Economic Affairs and Planning. June 1987.

21. Wangwe, S.M., Factors Influencing Capacity Utilization in Tanzanian Manufacturing. International Labour Review Vol. 115 No. 1, Jan/Feb 1977.

22. Wangwe, S.M., "Capacity Utilization and Capacity Creation in Tanzania with Special Reference to the Engineering Sector." Unpublished Ph.D Thesis, University of Dar es Salaam. 1979.

23. Wangwe, S.M., "Industrialization and Resource Allocation in a Developing Country, the Case of Recent Experiences Tanzania." World Development Vol.II No. 16 , pp. 483-492. 1983.

24. Williams, D., "National Planning and the Choice of Technology. The Case of Textiles in Tanzania" ERB Paper No. 75.12, Dar es Salaam 1975.

25. Williams, D., "Choice of Technology and National Planning: The Case of Tanzania." Unpublished DBA Thesis, Boston: Harvard University. 1976.

26. World Bank. "Tanzania Country Economic Memorandum". Report No. 5019-TA Washington, D.C. 1984.

27. World Bank. "Tanzania: An Agenda For Industrial Recovery." Report No. 6357-TA, Washington, D.C. 1986.

28. World Bank. "Parastatals in Tanzania Towards a Reform Program". Report No. 7100-TA. 1988.