MACRO-POLICIES FOR APPROPRIATE TECHNOLOGY IN ZIMBABWEAN INDUSTRY

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ABBREVIATIONS USED IN THE TEXT

AFC	-	Agricultural Finance Corporation
ARDA	-	Agricultural and Rural Development Authority
CTF	-	Coal Tar Fuel
ELCC	-	External Loans Co-ordinating Committee
FIC	-	Foreign Investment Committee
GDP	-	Gross Domestic Product
IDC	-	Industrial Development Corporation
IPC	-	Industrial Projects Committee
ISIC	-	International Standard Industrial Classification
SEDCO	-	Small Enterprise Development Corporation
TNDP	-	Transitional National Development Plan
UDI	-	Unilateral Declaration of Independence
ZDB	-	Zimbabwe Development Bank
ZESA	-	Zimbabwe Electricity Supply Authority
ZISCO	-	Zimbabwe Iron and Steel Company

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I. Introduction

Government macro-policies have a wide scope of influence and application in Zimbabwe's economy in general and in the industrial economic sectors in particular. Historically, Zimbabwe has had a fair share of macro-economic policies and policy instruments that have influenced the pace, structure and location of industrial enterprises. These policies have affected the taking of decisions by industrial units either directly or indirectly.

The government policies in vogue are mainly focused on the environment immediately affecting the formal industrial sectors: mining and quarrying, manufacturing, construction and energy. In terms of value added these sectors contributed on average 38 per cent to GDP in the 12 year period from 1974-1985. During the same period the four sectors contributed 25 per cent to total average formal employment. Through this is less than the agricultural employment (26.6 per cent), there is greater potential for growth and employment generation in the country's industrial sectors.

Like in many other countries, decisions about technology among Zimbabwean firms take place at the level of micro-units of firms and organizations. These include multinational corporations, domestic corporate and small-scale family firms in the private sector, public sector enterprises (parastatals and

state corporations) and small-scale informal-sector firms. Whatever the size of the firm, decisions are taken at the micro-level in the light of each firm's own objectives and resources. However, as shown in this paper, each of these decisions are strongly influenced by the external environment and macro-economic policies of the central government.

In the Zimbabwean case the government has explicit policies and objectives that are meant to influence the environment affecting appropriate technology. The two national development plans that have been published since Zimbabwe's independence in 1980 (the Transitional National Development Plan 1982/83 - 1984/85 and the First Five-Year National Development Plan 1986-1990) spell out the role of restructuring the industrial sector in order to meet the changing patterns of demand for industrial products, increasing employment through the adoption of labour intensive technologies, encouraging geographic decentralization, etc.

The government policies to assist small and medium-scale enterprises and the decentralization exercise are implemented by two institutions, the Small Enterprise Development Corporation (SEDCO) and the Industrial Development Corporation (IDC). However, in spite this articulation of policy by government, the implementation of the objectives has not been successful. About 90 per cent of SEDCO's supported projects are in the commercial sector. Productive enterprises are not the priority of SEDCO. The IDC is still completely involved in medium to large-scale manufacturing enterprises and has not yet started financing small-scale-emerging businesses in Zimbabwe.

The most important category of institutional macro-economic policies that influence the environment in which firms make their technological decisions are the financial resource mobilisation instruments and controls which were developed during the UDI period. Foreign exchange allocation system is probably the most important policy instrument that influences the long-term and short-term decisions of Zimbabwean enterprises. This financial resource mobilization instrument is also geared o the needs of the formal sector enterprises. Small-scale and especially informal sectors firms are invariably by-passed by these macro-economic policy instruments.

It is, therefore, clear that the latent appropriate technology domain in the small-scale and informal sectors of both urban and rural areas has not been brought near the ambit of the official macro-policies that influence the environment in which industrial units make their decisions.

2. The Scope and Characteristics of Appropriate Technology in Zimbabwe's Industrial Sector

For purposes of describing government policies and macro-economic policies that have influenced the adoption or rejection of appropriate technologies I shall define industry broadly as consisting of divisions 1 to 5 of the International Standard Industrial Classification (ISIC), namely: mining and quarrying (division one), manufacturing (divisions two and three), construction (division four) and electricity, gas, water and sanitary services (division five).[1] Though this is an attempt to

cover as wide a spectrum as possible under official statistical definition of the industrial sector, the present classification still excludes a small but growing set of industrial products made in the informal sector. In the Zimbabwean case, classified manufacturers are registered companies that submit returns to the Central Statistical Office, and the requirement for this is a minimum initial capital outlay of Z$30,000 (US$ 18,3000). This means that in the Zimbabwean case, small formal and informal industrial activities are excluded from the statistical definition.

There is yet another justification for including mining in the industrial sector in the discussion of appropriate technology. In the definition of the manufacturing sector used in official Zimbabwean statistics, the demarcation between what is a mining operation and manufacturing is somewhat blurred. The definition of the manufacturing sector states that "Establishments operating on a mining site as refiners/smelters of non-ferrous or precious metals are ... excluded".[2] On the other hand excluded from the definition of mining are "mines and quarries operated by manufacturers as a source of their raw materials, such as limestone mines operated by cement manufacturers. These form part of the manufacturing sectors".[3] It is, therefore, obvious that a single treatment of these sectors will contribute more light to the formulation of a combined strategy for appropriate technology.

In terms of value added, mining and quarrying, manufacturing, electricity and water, and construction

contributed on average 38 per cent to gross domestic product (GDP) in the 12 year period, 1974-1985 (cf. Table 1). During the same period, the manufacturing sector, which is the single most important sector in terms of its output to the national economy contributed on average 23.4 per cent of GDP, over 8.5 per cent higher than the next important sector, agriculture, which averaged 14.6 per cent over the same period.

However, in terms of contribution to employment, agriculture has by far the largest impact in the national economy. The agricultural sector's overall contribution to employment is larger than the four industrial sectors combined. In the 20 year period, 1965-1984 agricultural employment averaged 279,100 contributing 26.6 per cent to total formal average employment (Table 2). During the same period the four sectors (mining and quarrying, manufacturing, electricity and water, and construction) had a combined average employment of 240,675 a year, contributing 25 per cent to total average formal employment.[4] Stated as it is, this picture, however, does not express the dynamics of the development and future prospects of employment generation in Zimbabwe. I shall therefore, argue that although agriculture has up to now dominated as the largest employer, the role of manufacturing and that of other industrial sectors as a source of employment need to be emphasized. In the 15 year period, 1965-1979, agricultural employment averaged 324,333 per year which was 23.3 per cent of total average formal sector employment. During the same period, manufacturing employment averaged 122,900- only 8 per cent of total average formal sector

Table 1. GDP at Factor Cost by Industry of Origin (% shares) - Constant 1980 Prices

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Mining and quarrying	41.1	40.9	39.3	39.2	37.9	39.5	38.6	36.2	46.0	36.6	35.7	35.4
Manufacturing	9.4	9.6	10.5	10.7	10.2	10.1	8.8	7.4	7.8	8.0	8.3	7.6
Electricity and water	23.5	23.3	22.1	22.7	22.0	24.1	24.9	24.2	24.1	24.2	23.0	23.4
Construction	2.9	3.0	2.7	2.0	2.5	2.2	2.2	1.9	1.7	1.9	2.0	2.1
	5.3	5.0	4.0	3.8	3.2	3.1	2.7	2.7	12.4	2.5	2.4	2.3
Agriculture and forestry	15.6	14.7	16.5	14.0	15.5	15.3	14.2	13.6	13.7	13.3	13.6	16.1
Transport and communication	6.7	6.3	6.1	5.7	5.8	6.0	6.5	6.6	6.3	6.5	6.3	6.5
Distribution, hotels & restaurants	12.3	12.1	11.4	11.7	8.4	11.7	14.0	14.5	11.1	10.5	10.7	15.4
Total material production	75.7	73.9	73.3	70.6	70.8	72.4	73.3	71.0	68.9	67.5	66.3	68.4
Finance	4.5	6.1	6.2	6.7	6.0	5.1	4.9	5.7	6.6	6.0	5.6	5.1
Real estate	3.0	2.6	2.3	2.3	1.9	1.7	1.3	1.4	1.2	1.2	1.2	1.1
Public administration	5.6	6.3	7.1	8.5	9.7	9.6	9.0	9.2	9.1	9.5	10.2	9.8
Education	4.1	4.3	4.3	4.8	4.4	4.4	5.2	6.5	7.8	8.8	9.4	9.1
Health	1.9	2.0	2.0	2.4	2.3	2.3	2.2	2.4	2.4	2.6	2.7	2.5
Domestic services	2.4	2.4	2.4	2.5	2.2	2.2	2.0	1.7	1.7	1.7	1.7	1.5
Other services	5.4	5.4	5.3	5.7	5.7	5.7	5.4	5.1	5.6	6.1	6.1	5.5
Total non-material production	26.8	29.0	29.6	32.7	32.5	31.0	30.0	32.0	34.3	35.9	37.2	34.7
imputed banking charges	-2.5	-2.9	-2.9	-3.3	-3.3	-3.4	-3.3	-3.0	-3.2	-3.4	-3.5	-3.1
Total GDP	100	100	100	100	100	100	100	100	100	100	100	100

Source: Socio-Economic Review 1980-1985, Zimbabwe, Ministry of Finance, Economic Planning and Development 1986.

Table 2. Employment in Manufacturing, Agriculture and the National Economy (thousands)

Year	Agriculture	Per Cent Total	Manufacturing	Per Cent Total	Total Formal Sector Employment
1965-69	289.5	37.5	89.5	11.6	771.7
1970-74	334.6	19.5	131.5	7.7	1,718.6
1975-79	348.9	12.8	147.7	5.4	2,731.9
1980	327.0	32.4	159.4	15.8	1,009.9
1981	294.3	28.2	173.2	16.7	1,037.7
1982	274.3	26.2	180.5	17.3	1,045.9
1983	263.5	25.4	173.4	16.8	1,033.9
1984	271.2	26.2	166.3	16.1	1,035.4

Source: Quarterly digest of statistics, June 1986, Monthly Digest of Statistics, December 1984, Central Statistical Office and unpublished data provided by the Central Statistical Office.

employment per year. By the post independence period (after 1980), 1982-84 agricultural employment had dropped to an average of 269,667 a year (7%) compared to the 1965-69 yearly average, now contributing 26 per cent to total average formal employment and one-and-a half times the 173,400 figure for manufacturing (cf. Table 2).

Both the formal commercial and communal agriculture declined in relative importance since 1969, while the formal non-agricultural sector grew substantially and informal sectors nearly tripled in relative size.[5] The latter largely results from the historically strong linkages of seasonal and permanent migration between rural populations in communal areas and non-agricultural formal wage sectors.

The mining and quarrying, energy and water development and construction sectors are potential areas for appropriate technology in various ways but particularly in terms of orientation towards small-scale operations, making more use of local materials and resources and more labour-using technologies and producing an appropriate product that is designed for lower income groups. The latter two characteristics are particularly relevant for the construction and housing sector. In the Transitional National Development Plan (TNDP) a target of 115,000 housing units had been set over the three-year period, only 15,500 units were completed (only 13.4 per cent). During the First-Five-Year National Development Plan 1986-1990 the government set for itself the following objectives:

(i) reduction in cost of building materials and construction;

(ii) increasing government participation in the sector;

(iii) improvement of the quality of houses in communal, resettlement, mining and commercial farming areas; and

(iv) modernization of equipment and expansion of production capacity in the sector.[6]

The government introduced innovative financing programmes and technologies that were meant to reduce the cost of houses to levels within the reach of the majority of the people. The investment programme for the construction sector amounted to Z$1,040 million (US$634.4 million) or 15 per cent of total investment in fixed assets, which is the second largest in the plan.

Through its Public Sector Investment Programme (PSIP), the government has allocated for the housing programme for the five year period an estimated Z$812 million (US$495 million). The private sector is also financing the low cost housing programme through a stipulated proportion of building societies' funds tied by law to financing low cost housing schemes.

From the view point of supply, the government's appropriate technology strategy is being achieved through:

(a) encouraging distributors of building materials to set up outlets in rural areas in order to facilitate availability of materials at reduced transport costs;

(b) employers being encouraged to provide decent accommodation for their workers;

(c) local authorities to commit a greater proportion of their revenues from generating income projects to provision of housing;

(d) upgrading of building brigades and establishing of building co-operatives to facilitate speedier provision of housing.

The appropriateness of technology in production and utilization of the end products has also been targeted in conformity with the macro-development objectives, namely:

(i) to achieve, as far as possible, self-sufficiency in energy supply thereby reducing the degree of dependence on imported fuels;

(ii) to increase the amount of energy produced from conventional sources such as coal and hydropower;

(iii) to increase the use of coal and electricity in rural areas, thus raising the quality of life of the rural population, and at the same time reducing the degradation of environment caused by the destruction of forests; and

(iv) the development of water supplies for rural and urban areas.[7]

For the manufacturing sector, the government proposed a programme for converting of industrial furnaces from diesel to gas and coal tar fuel (CTF) derived from coal. From the research results of the author, the conversion to CTF was already under way in 1983/84 for most of the large firms in the metal working

industries. The sudden increase of electricity prices in 1982 caused the shift from electric heating to CTF for furnace heating.[8] Also during the plan period Zimbabwe has introduced two types of efficient waste-material burning stoves for rural and urban households. About 60,0 per cent of rural households are expected to have adopted this type of a fuel efficient wood stove by end of the planning period in 1990. Also to be introduced are efficient coal-burning stoves in rural households and institutions such as schools and hospitals.

20 per cent of Zimbabwe's motor fuel is already blended with ethanol produced from sugar and there are plans underway to increase this to 25 per cent. However, on the generation of electricity the government adopted an inappropriate technology with the construction of the Hwange Thermal Power Station Phases I and II. The inappropriateness of the project was in terms of utilizing more expensive thermal power to generate electricity in spite of the existing cheaper excess capacity of hydro-power in both Zambia's Kafue dam and Mozambique's Kahora basa dam.

As shown in this section the potential for the application of appropriate technologies in Zimbabwe's industrial sector is tremendous and there is a lot of room for its exploitation. The mining, manufacturing, construction and water and energy sectors have not yet been exploited to the full in terms of growth and employment generation.

For instance, because of the historical neglect of infrastructural activities related to the masses of the population in both urban and rural areas by the colonial regimes,

there is a lot of scope for low cost housing and other social infrastructure. The use of building brigades, and building co-operatives offers further opportunities for production by the masses as opposed to mass production by the large-scale companies, low capital investment per worker thereby creating greater labour participation rates and encouraging people's participation which improves the quality of life at the local and community level. These appropriate technology activities will complement formal sector investment that are undertaken by medium to large-scale firms.

3. The Ownership Structure and Characteristics of Zimbabwean Enterprise

In 1985 the ownership structure of the manufacturing sector consisted of the following sub-categories: private companies - 85.5 per cent, parastatals - 10 per cent, government controlled companies (by more than 50 per cent shareholding) 4 per cent and local authorities - 0.5 per cent.[9] Central government and parastals have an influence in three major sub-sectors of the manufacturing sector: foodstuffs where the Cold Storage Commission and the Dairy Marketing Board together contributed 25 percent of total turnover; textiles where the Cotton Marketing Board contributed 38 per cent of total turnover and the metals and metal products subsector where ZISCO STEEL, Lancaster steel and F. Issels together contributed some 17 per cent to total output of the subsector.[10]

Central government and local authorities have full control

over electricity, water and sanitary services, through the Zimbabwe Electricity Supply Authority (ZESA) and local authorities. In the transport equipment subsector the government contributed 10 per cent of total output as a result of the influence of Willovale Motor Industries, 100 per cent owned by the Industrial Development Corporation.

In all other sectors, private companies controlled in excess of 90 per cent of total turnover. In the manufacturing sector, the only significant contribution by local authorities was in drink and tobacco, being municipal beer production. A recent UNIDO estimate of the position of the domestic versus foreign capital for the manufacturing sector puts 48 per cent of capital as foreign owned and 52 per cent as domestically-owned.[11] There is also a high degree of local ownership of the textiles subsector and overall domestic control of foodstuffs, clothing and footwear and transport equipment subsectors. On the other hand, four subsectors have a high degree of foreign ownership, namely drink and tobacco, paper, printing and publishing, and chemical products.

As shown above because of statistical definition adopted by the Central Statistical Office the only people or groups who are classified as manufacturers are registered companies and to be accepted as a registered company requires an initial capital outlay of Z$30,000. This seriously under estimates and ignores specific areas of manufacturing and is particularly inadequate when it comes to small-scale, informal and part-time manufacturing. A recent sample study of informal sector

activities found 194 firms engaged in some 16 types of manufacturing activities in just four urban and three rural areas of the country. This is compared with official statistics which record only 46 units with an annual turnover of less than $20,000 engaged in manufacturing in 1982. The official statistics explicitly exclude establishments with a gross output of under Z$2,000.[12] Clearly then policy recommendations for small-scale manufacturing cannot be based on the official statistics available.

The position is more or less the same in the other sectors of the industrial sector with the exception of the mining and quarrying sector enterprises which must be registered by law. The small-scale and informal sector building firms are not included in the number of registered building and construction firms.

4. Structural Features of the Macro-Economic Policy Framework

The structural features of Zimbabwe's macro-economic policy framework that influence the choice of technology are divided into two parts: (a) those general policies enunciated in national development plans and other policy documents which affect technology and market access more or less directly; (b) those institutionalized macro-economic policies such as supply of financial resources, for example, foreign exchange allocation, public expenditure levels, budget deficits, and so on. In this section I shall discuss the empirical and analytical aspects f these two broad structural features of macro-economic policy

affecting choice of technology by micro-economic units.

4. Policies and Objectives Affecting Appropriate Technology as Enunciated in National Development Plans

In the Transitional National Development Plan (TNDP) 1982/83-1984/85, Zimbabwe's first three-year proclaimed plan period the government promised to undertake measures for increasing the labour absorption capacity of industry and to rationalize and transport the industrial sector by reorienting it towards external markets. The government's objectives in the industrial sector were the following:

(i) expansion and restructuring the sector to enable it to meet the growing and changing patterns of demand for industrial products;

(ii) promotion of further linkages with other sectors such as agriculture, mining and the informal sector;

(iii) increasing the export capacity and potential of the sector;

(iv) increasing employment through the utilisation (where appropriate of labour intensive techniques;

(v) encouraging further import substitution where this can be economically justified (such as in energy and fertilizer production);

(vi) encouraging and promoting the training, development and upgrading of the Zimbabwean labour force at all levels including managerial, technical and skilled;

(vii) encouraging geographical decentralization of industries;

(viii) encouraging more participation, ownership and control of industries by Zimbabweans or by the state; and

(ix) encouraging and promoting the establishment of small and medium agro-industrial enterprises in rural areas.[13]

In order to achieve these objectives the government set about to establish institutions that could encourage local private and state participation in the industrial sector with a view to utilize more local content, further import substitute and encourage the decentralization of industry. The objective of achieving small-scale production and commercial units and decentralization was to be achieved by the establishment of the Small Enterprise Development Corporation (SEDCO). The objectives of the latter were:

(i) to encourage and assist in the establishment of co-operatives and small commercial or industrial enterprises;

(ii) to provide assistance to small and medium-scale commercial and industrial enterprises;

(iii) to promote local participation in the development of the following industries in rural areas and small towns: textiles, metal fabrication, furniture making, brick making, leather industry, tin and black smith, establishing poultry dressing, broom and brush making; and

(iv) to encourage labour-intensive technology in the industries established under (iii)[14]

The policy to assist small and medium scale enterprises engaged in processing and manufacturing activities especially outside of the major cities, Harare and Bulawayo was to be implemented by SEDCO, the Industrial Development Corporation (IDC), Ministry of Industry and Technology, Ministry of Finance, Economic Planning and Development and ultimately the Cabinet. Most directly connected with the implementation of the policy of decentralisation is SEDCO and the IDC, but to date they have not yet effectively implemented this policy. SEDCO's programme is dominated by commercial rather than manufacturing and processing projects. The latter are few, if any.[15] So far the IDC has not yet started financing small-scale manufacturing and processing enterprises to be undertaken and executed by the so-called emerging business men, although such programme has been articulated in policy statements. The Zimbabwe Development Bank (ZDB) also finances medium to large-scale manufacturing projects.[16]

Besides the financial assistance given by SEDCO, the post independence government has also encouraged some redirection of resources through the partial reorientation of the Agricultural Finance Corporation (AFC) which specifically funds agricultural enterprises, i.e. small-scale peasant farmers.

The resolution of the question of industrial location and decentralization is central to the appropriate technology discussion in view of the highly concentrated industrial activity in Zimbabwe. In 1982 the capital city, Harare (including Chitungwiza) with only 11 per cent of the country's population,

accounted for 51 per cent of manufacturing output and 46 percent of manufacturing employment (Table 3). Bulawayo, the second largest city with five per cent of the total population, accounted for 23 per cent of manufacturing output and 28 per cent of manufacturing employment and Kwekwe-Redcliff industrial complex (ZISCO STEEL site) accounted for seven per cent of manufacturing output and five per cent of total manufacturing employment. Together these three centres contributed 82 per cent to total manufacturing output and 79 per cent to overall manufacturing employment.

Despite clearly articulated government objectives, at least in national development plans, geographic concentration of industries has not dropped, on the contrary it seems to have increased. In the five-year period 1977-1982 there has been a slight increase in industrial concentration in Harare, Bulawayo and Kwekwe-Redcliff, although with a fall of the Kwekwe-Redcliff share. In the First Five-Year National Development Plan 1986-1990 the government further promised taking institutional and other measures to establish small-scale industries and industrial co-operatives capable of using locally available raw materials as well as indigenous technology or a diffusion of foreign and local technology.[17] The plan suggested that this policy would be implemented through the Industrial Development Corporation (IDC), SEDCO and local authorities. The rationale of government policy was that co-operates and small-scale industries would play a considerable role in industrialization, particularly as sub-contractors of components to large companies and as producers of

Table 3. Geographical Concentration of Manufacturing Industry, 1977 and 1982

Location	1977 Gross Output[a]	1977 Per Cent	1977 Numbers Employed	1977 Per Cent	1982 Gross Output[a]	1982 Per Cent	1982 Numbers Employed	1982 Per Cent	Change in Output %	Change in Employment $
Harare	655,228	47.8	63,920	45.3	1,667,983	51.6	80,849	45.9	155	26
Bulawayo	299,184	21.8	40,711	28.8	748,198	23.1	50,078	28.4	150	23
Masvingo	18,444	1.3	1,147	0.8	32,501	1.0	1,247	0.7	76	9
Kadoma[b]	45,789	3.3	3,735	2.6	71,268	2.2	4,355	2.5	56	17
Gweru	60,377	4.4	6,779	4.8	129,330	4.0	8,550	4.9	114	26
Redcliff/Kwekwe	120,169	9.4	8,320	5.9	229,447	7.1	8,844	5.0	78	6
Mutare	43,539	3.2	4,962	3.5	99,861	3.1	7,882	4.5	129	59
Other	117,817	8.6	11,668	8.3	256,456	7.9	14,399	8.2	118	28
Total	1,369,547	100.0	141,233	100.0	3,235,044	100.0	176,204	100.0	136	25

Source: Census of Industrial Production 1982/83, CSO, Table 10.

[a] Figures in thousands of current dollars.

[b] Figures for Kadoma not strictly comparable because of change in geographical reporting by a major company.

basic consumer goods. The other rationale was that they (small-scale industries) would be used to promote a decentralized pattern of ownership and location together with public sector enterprises, especially agricultural parastatals. The establishment of industrial estates was aimed at achieving multi-purpose objectives of decentralization of industry which would increase local participation and development of entrepreneurial skills, provide competition to existing monopolistic and other inefficient producers.[18]

In the view of the government a certain degree of appropriate technology has been achieved. "There has been a definite transfer, adaptation, diffusion and anchorage of imported technology through licensing agreements and the activities of subsidiaries and associates of foreign companies. However, most of this technology transfer has focused on the mechanisms of transfer cost as well as appropriateness of the technology".[19] Under the plan period, it is proposed to set up a Council for Industrial Research which should assist in the co-ordination of all industrial R & D and determining how best the industry can develop an indigenous technology capacity to increase complementarities between local and foreign technologies. The Council for Industrial Research will also be involved in research aimed at meeting the changing pattern of demand for industrial products and guiding the technological advancement of the manufacturing industry.[20]

This assessment by government of achieving a certain degree of success with regard to appropriate technology is viewed in a

narrow sense, i.e. only with the formal sector in mind. This is so inspite the explicit formulation of policies towards small-scale industries and industrial decentralization. Lack of action or inertia towards grappling with the crucial issues facing the appropriate technology resolution might lie in the deep-seated structural features of the broader macro-economic framework. The latter may often frustrate or hinder the intentions of the government in achieving its stated and planned objectives. We turn to the discussion of the institutionalized macro-economic framework immediately below.

4.2 Institutionalized Macro-Economic Policy Framework

Government policy can influence firms in a number of ways: directly through government directives to publicly owned enterprises, indirectly through policies enunciated through national development plans which influence deployment of resources and markets during the plan period.

In the Zimbabwean case the government does have direct publicly-owned firms in which it takes particular decisions through the choice of management policies such as in the case of IDC, SEDCO and many parastatal organizations operating in almost all the sectors of the national economy.[21] These government organizations and parastatals influence prices, markets, material and human resource deployment in the economy both directly and indirectly.

However, the most important category of institutional macro-economic policies that influence decision-making of Zimbabwean

firms with regard to technology are the financial resource mobilization instruments and controls developed during the UDI period. The allocation of foreign exchange is probably the most important policy instrument influencing the long-term and short-term decisions of enterprises both in the private and public sectors.

The Zimbabwean policy framework for resource allocation involves a high degree of indirect and direct controls over productive activities. Through the existing system of administrative allocation of foreign exchange, the government allocates all foreign exchange to firms for both current and investment purposes. The system is administered in line with the assessed global foreign exchange available and the perceived priorities of the economy. Current allocations are based upon historical allocations to firms as well as specific assessments of the current needs of enterprises and organizations and the level of shortages of foreign exchange.

Investment allocations are screened by three committees: the Industrial Projects Committee (IPC), the External Loans Co-ordinating Committee (ELCC) and the Foreign Investment Committee (FIC). All new investments or expansions involving foreign exchange have to be submitted for approval to the IPC. Projects requiring more than the equivalent of Z$2.5 million (US$1.6 million) in foreign loans require additional approval from the ELCC and projects with more than 15 per cent foreign ownership also require additional approval of FIC.

In practice the IPC approval is granted if the project

should (i) replace essential imports and/or produce exports and (ii) recoup the initial foreign exchange outlay within twelve months and continue saving foreign exchange throughout its life.[22] In other words the project should, ex ante, not be a net user of foreign exchange in any twelve month period during its projected life and that it should not compete with local production unless it also produces for export.

The criteria that for a project to be approved be a net non-user of foreign exchange has impeded the establishment of firms that are at least ex ante are set up to exploit the domestic market exclusively without either increasing exports or substituting imports. Historically, this setting-up industries criteria over the last 20 years has led to a high degree of product concentration. Thus half of the over 6,000 identifiable products produced in Zimbabwe are manufactured under monopoly conditions and an additional 30 per cent under oligopoly conditions.[23] Over half of manufacturing output and employment is in the 11 per cent of firms with more than 500 workers.[24] Established firms are not only enjoying protection from foreign competition, but also from actual and potential domestic competitors.

The rationing of foreign exchange through the IPC has also been responsible for the low level of investment, particularly since about 1975. In the early years of the UDI when ample opportunities for import substitution were still available the rationing of foreign exchange was not an impediment of investment. Investment in manufacturing during 1970-74 grew at

23.6 per cent per year, it began to decline in the post 1975 period though there was a slight recovery in the mid 1970s. Virtually all investment projects require imported capital goods, and therefore, IPC approval. In 1984 the foreign exchange component of industrial projects submitted to IPC was some 70 per cent of the total project value.[25] For every project approved four were rejected. The high rejection rate was attributed largely, although not exclusively, to foreign exchange constraints.

The origin of this protection set the conditions for allocating current foreign exchange according to historical shares as a basis for firm by firm allocation. Though in theory, these shares are modified for new entrants and changes in the needs of existing firms, in practice the system provides absolute protection against established foreign or domestic competition, since no allocation is available to a new entry if this would lead competition with domestically produced products. For example, if one or more companies are already established and produce container glass, it is unlikely that new entry would be allowed in this area of activity. The issues of the appropriateness of the technology in terms of local resource utilization, geographic location, market acceptability to a low cost clientele etc., may not be considered by the relevant committee or committees. Thus, there is a strong bias toward maintenance of the status quo: those enterprises already in the system are assured continuance of foreign exchange allocations for engaging either in production or trade.

Whilst the system is highly protected from foreign competition, it has also led to a high degree of protection from potential domestic competitors. This is so in spite of the government's statement since independence, that the IPC criteria would be modified to favour local investors and emerging entrepreneurs. This has not yet been the case, though a few emerging entrepreneurs have been allowed to establish themselves, without satisfying the strictly laid-down criteria.

A macro-economic concern of Zimbabwe's financial resource mobilization policy and its impact on industry is the possibility of crowding out credit requirements for the industrial sector by public sector borrowing. The government budget primarily mobilizes its resources from the institutional investors (insurance houses and pension funds) and the Post Office while the Agricultural Marketing Authority mobilizes resources mainly from the commercial banks. In the past crowding out, however, has not occurred to any significant extent as shown by the low interest rates given the lack of credit rationing. However, the primary reason for the co-existence of a large public sector borrowing requirement and the absence of crowding-out is the foreign exchange allocation system. Since above 70 per cent of the value of plant and equipment needs, be they for replacement or for new plant and machinery consists of foreign exchange,[26] shortages of the latter leads to depressing of the demand of credit by the firms.

Yet another area of concern is the historical conservative bias of the financial institutions in their lending policies.

Almost all private sector lending by financial institutions goes to well established firms. Zimbabwe's financial institutions generally make their lending decisions on the basis of prior earnings, credit history and the strength of the balance sheets of the borrowing firms as a measure of credit worthiness. The banks, in particular, lend on a term basis for general expansion, or against equipment purchases only to long-standing clients, or demand guarantees by a reputable firm of good financial standing. There is very little project-oriented financing undertaken by private financial institutions and as a result there are no conditions for aggressive lending to new business. These lending policies and procedures tend to limit opportunities for new appropriate technologies as they work against emergent businesses who have no connection with the financial community and offer little collateral.

Commercial banks who provide short-term lending, primarily for working capital and agricultural finance and merchant banks or finance company subsidiaries who in some instances provide medium-term lending (three to seven years) generally have no time for small-scale businesses either in industry on in agriculture. The services of merchant banks (technically known as accepting houses) are geared to corporate needs and large account holders such as financing of foreign trade through acceptance credits, processing commercial letters of credit and foreign bills of exchange, short and medium-term financing, bridge financing, and foreign exchange transactions and dealings. Insurance companies and pension plans are engaged in long-term financing and usually

in Central Government and parastatal securities.

The implications of the institutionalized macro-economic policy framework to appropriate technology choice would seem to leave much to be desired in the case of Zimbabwe. Appropriateness of industrial technology in the Zimbabwean case would demand development of small-scale industries and especially their decentralization to rural areas and other small towns and settlements leading to production of goods and services by the masses of the population, low capital investment per worker and encouraging people's participation to improve the quality of life at the local and community level. The development of small-scale industries would lead to improving of credit facilities, providing training in technology know-how and establishing of marketing opportunities. The broad aim is to promote rural small-scale industries in general, including the establishment of rural-based industrial estates and marketing opportunities.

Such decentralization would be complementary to the technologies developed in the formal large-scale industrial sector of the economy. But as shown in this section, the institutionalized policy framework under which financial resources for new and replacement investments are given is still biased in favour of the large-scale sector. This is so in spite of the official rhetoric and pronouncements in support of the small-scale industries and decentralization.

5. The Latent Potential for Appropriate Technology in the Rural Economic Sector

As shown above Zimbabwe's economic activity has, historically, been dominated by the formal sector and the bulk

of economic services and policies have been oriented toward the formal sector activities. Macro-economic policies that have shaped and continue to influence formal sector activities in the industrial sector have been discussed above.

The government's policy thrust of technology activities towards the formal sector is to a certain degree appropriate. This is due to the fact that the main characteristics of the economy include heavy reliance on export of raw materials and a high degree of technology dependence on the outside world. Zimbabwe's technological dependence is borne by the fact that 84,0 per cent of its total imports consists of intermediate and capital goods with the remaining 16,0 per cent consisting of consumer goods.[27] Accounting for over 30,0 per cent of the total imports are the capital goods which range from light and heavy-duty machinery to precision instruments, while intermediate goods include, among others, simple implements such as screws, bolts, plate glass and explosives. It is know that production of some of these intermediate goods involves relatively simply processes most of which are readily available in Zimbabwe. Indeed there has been a break through in the production of some intermediate goods in Zimbabwe.

In a recent field survey carried-out by the author in which a sample of 30 metalworking firms were interviewed, all the firms were found to have developed new products and made product modifications particularly in the post UDI period.[28] A sample of products (mainly capital goods) manufactured by the larger firms is shown on Table 4. Agricultural machines and implements range

Table 4. Zimbabwe's Main Machinery Manufacturers

Company	Year of Establishment	Location	Main Products
A. Agricultural Machinery/Implements			
Zimplow	1951	Bulawayo	Ploughs, cultivators, hoes, harrows, ridgers.
Imco Ltd.	1964	Harare	Fertiliser spreaders, land mills, ploughs, planters, mowers, graders.
Bulawayo Steel Products	1965	Bulawayo	Ploughs, harrows, ridgers, planters, cultivators, axes, picks, mattocks.
Bain Manufacturers	1968	Harare	Disc ploughs, disk and spike harrows, tine and spike cultivators, rollers, potholders, rollers, rippers, tippers.
Tinto Industries	1968	Harare	Disc and time chisel ploughs, mounted off-set disc harrows, disc ridgers, tillers, rollers, tine cultivators and graders.
Farmquip	1972	Harare	Crop sprayers, humidifiers, tobacco curing equipment, grain handling equipment.
B. Mining and General Machines			
W.S. Craster	1936	Harare	Mechanite castings, mining equip., agric. equipment, non-ferrous castings.
Clarson & Co.	1918	Harare	Iron and non-iron castings, hammer mills (for food, mining and general industries), sinter plants, mine pulverisers, mine filter presses, water cooling towers, effluent and sewage plants, turbines, heat exchangers.
Conolly & Co.	1929	Bulawayo	Castings, ball mills, hammer mills, coal pulverising plant, iron pipes, electric travelling cranes, sugar mills.
Hogarths	1926	Harare	Mine headgear, steel structures, boiler support structures, water circulation ducts.

Source: Ndlela, Daniel B. "Technology Imports and Indigenous Technological capacity building: The Zimbabwean case" WEP - working papers 173, ILO, Geneva, March 1987.

from hoes and axes to tractor-drawn disc ploughs and crop sprayers. Mining machinery include sinter plants, ball mills and electric travelling cranes. The sample included both large and small firms, ranging from multinational to family enterprises. Whatever the size of the unit, decisions were taken by individual units in the light of their own objectives and resources. These decisions are influenced by the external environment, particularly macro-economic policies of the government. In this respect, the intensification of the macro-economic policies in the formal sector activities does influence appropriate technologies designed to enhance growth and employment.

However, since the 56.0 per cent of Zimbabwe's population consists of peasants who live in rural areas, while 23,0 per cent live in urban areas the focus of appropriate technologies to the rural areas provides an answer to many economic and social problems, especially the unemployment problem. In terms of relieving the unemployment problem and increasing and spreading of the impact of growth, the rural and urban non-formal sectors have the latent potential for appropriate technology in Zimbabwe. Experience from elsewhere, particularly Asia shows the potential for growth in output and employment to lie in the selection of appropriate technologies in these areas. This experience indicates that there are three areas for successful growth:

(i) sustained growth in smaller agricultural incomes;

(ii) extension of economic services, especially transport services between rural and small towns; and

(iii) a supportive, and relatively unregulated environment for small scale entrepreneurs and self-employed urban dwellers.

In the case of Zimbabwe, the post independence government had to face the historical reality of the massive colonial government's land alienation and the settler state's developed machinery to provide systematic technical, financial, marketing and infrastructural support to the large-scale white farmers, who over the decades achieved advanced levels of productivity and the major contributions to GDP and export earnings. These high levels of productivity achieved by white farmers contrasted with declining growth in the African 'Communal' areas where land degradation due to use of marginal lands laid the basis for the dualistic production system which was inherited at Zimbabwe's independence in 1980.[29]

In the post independence period (after 1980) the government undertook measures to reverse the dualistic structure of the economy inherited at independence. Resettlement of landless peasants was identified as one of the major programmes to attain the rural development objective. Provision of back-up services such as extension and credit was to ensure the agricultural production improved. The agricultural extension services are primarily oriented towards small-scale farmers by Agritex, a national institution under the Ministry of Agriculture. The Agricultural Finance Corporation (AFC) also under the Ministry of Agriculture, provided loans to the small-scale farmers. E.g.

only in 1984 the A.F.C. provided 19,900 loans worth Z$10,2 million (US$6.2m) to small-scale farmers.[30]

Manpower training for the agricultural sector is the responsibility of the government. In addition to university agricultural graduates, Zimbabwe has four agricultural training institutes including two colleages, producing 300 graduates per year. There is also an output of 375 rural training centres. In further attempts to strengthen the infrastructure connected with rural activities, at independence the state controlled estates organization, the Agriculture and Rural Development Authority (ARDA) was given a generalized mandate to develop rural area activities beneficial to the inhabitants of the respective areas including any mining, industrial, commercial, agricultural or forestry undertakings.[31] ARDA's programmes are meant to develop the following types of organizations:

(a) Pure state farms, which engage in the production of 'strategic commodities' such as breeding stock, seed and selected food crops;

(b) Nucleus estates, which primarily encourage individual tenant farmers to engage in technically sound production;

(c) Agro-industrial estates, which integrate commodity production with processing.[32]

In spite these apparant measures to promote appropriate technologies in the rural industrial sector there is not yet an emergence of rural small-scale industries in Zimbabwe. Firstly, Zimbabwe still lacks an effective "problem-oriented" approach to

rural small-scale industries that is designed to ease specific bottlenecks and constraints at the enterprise level. As shown above the official instruments for improving credit facilities, providing training in technology know-how and establishing marketing opportunities, SEDCO and IDC have not been effective. Up to 90 per cent of SEDCO's supported enterprises are still in the commercial sector and as such do not promote small-scale manufacturing or processing enterprise. The directive for the IDC to promote small-scale industries has not yet been implemented. IDC continues with its mandate of promoting medium to large-scale formal sector enterprises.

The second approach of promoting small-scale industries at the sector level including assistance to small-scale enterprises, provision of a package inputs and services required, establishment of rural-based industrial estates and marketing co-operatives has had limited success. The resettlement programme of landless peasants and establishment of agricultural co-operatives have not been accompanied by establishment of small-scale industries.

Conclusions

The macro economic policies that influence choice of technology by enterprises in Zimbabwe is mainly geared towards the formal sector units. This has developed historically as a result of the close working together between the government and the private sector, especially during the UDI when colonial

Zimbabwe faced economic sanctions that were imposed against her by the international community.

While appropriate technology decisions have been taken with regard to firms in the formal industrial sectors, these have not been complemented by similar decisions in the small-scale urban and rural sector industries. Well articulated government policies that are meant to influence the environment in which micro-economic units take decisions have not been followed up simply because these policies have not been implemented. There seems to be a contradiction between planned goals and policies on one hand and the institutionalized macro-economic policies that are in vogue in the economic system.

Thus while national development plans have elaborated objectives of labour-intensive technologies, geographic decentralization of industry and promotion of small-scale industries, etc. macro-economic policies in place strongly militate against these goals.

There is also a strong protection of well established industrial enterprises by the policy instrument of the foreign exchange allocation system. Firms are given foreign exchange on the basis of historical quotas, which naturally favours the larger and well established enterprises. Secondly, no new firm is given foreign exchange to establish itself in an area where older firms are already manufacturing similar products, unless the new firm demonstrates its ability and commitment to export its products.

The current macro economic policies described in the text

have to a certain degree contributed to choice of appropriate technologies in the industrial sector as evidenced by Zimbabwe's development of the capital goods and intermediate goods subsectors which are vital for the national economy, especially for the agricultural and mining sectors. However, since the larger majority of the population consists of peasants who live in rural areas, the focus of appropriate technology to the rural areas seems to provide an answer to the many economic and social problems, especially the unemployment problem. It is, therefore, argued that macro policies that have an impact on industrial growth in the rural areas and informal sectors do have the latent potential for appropriate technology in Zimbabwe.

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13. Transitional National Development Plan (TNDP) 1982/83-1984/85, Vol. 2, Printed by the Government of Zimbabwe, May 1983, p. 5.

14. Ibid. See also Small Enterprises Development Corporation No. 16, Zimbabwe Act, Printed by the Government Printer, pages 119-137.

15. UNIDO, op.cit. p. 181.

16. The ZDB finances projects of about Z$100,000 (US$61,000). This minimum threshold was adopted on the understanding that projects below this level were to be financed by SEDCO.

17. First Five-Year National Development Plan 1986-1990, Volume 1, Zimbabwe, April 1986, p. 31.

18. Ibid.

19. Ibid.

20. Ibid. pp. 31-32.

21. Few examples of parastatals operating in the economy are the Agricultural Marketing Authority, Grain & Marketing Board, Cotton Marketing Board, Agricultural Rural Development Authority, Cold Storage Commission and Dairy Marketing Board in the agricultural sector, Zimbabwe Electric Supply Authority, National Railways of Zimbabwe operating within the energy and transport sectors respectively.

22. There are other IPC criteria such as that the project should not produce goods already in local production unless it also produces for the export market; sell at competitive prices and satisfactory quality; and show firm exports orders, preferably on a continuous basis.

23. UNILO, op.cit. Table 2.3.

24. Ibid.

25. Ibid. p. 330.

26. Ibid. p. 347.

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