

Public choice, technology and industrialization in Tanzania: Some paradoxes resolved

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Accepted 27 March 1996

Abstract. No less than in agriculture, industrialization in Africa is difficult to explain on purely economic grounds. This paper applies public choice theory to some of the most paradoxical aspects of technology and industrialization in one African country, Tanzania. Our analysis turns on two assumptions about bureaucratic behavior in that country: The first is that bureaucrats have preferences defined over projects rather than technologies and the second is that, in their capacity as managers of state-owned enterprises, these agents of the state have sought to initiate as many new projects as possible, mainly on the basis of foreign aid. These propositions are shown to be consistent with evidence regarding the growth of the public sector in Tanzania during the 1970s and 1980s.

1. Introduction

The public choice approach has already been used in the African context to explore the political rationality of policies that seem difficult, if not entirely impossible, to justify on purely economic grounds. A well-known study by Robert Bates (1981), for example, sought to explain why governments in Africa tend to adopt agricultural policies that are blatantly harmful to the interests of most farmers in the region. More recently, rent-seeking behavior has been used by Gallagher (1991) to explain variations in growth rates across a wide range of African countries. What has not been applied to any of those countries, however, is the area of public choice theory that deals specifically with the preferences and behavior of government bureaucrats: the so-called political economy of bureaucracy. Yet, as we shall argue below, this important strand of the public choice literature helps to explain some of the most paradoxical aspects of technology and industrialization in the public sector of one particular African country, Tanzania.

More specifically, our argument will be that these paradoxes can be explained by the following propositions. The first is that, contrary to what is almost always assumed in the literature on development economics, bureaucrats do not in fact have preferences defined over technologies (that is, they do not choose technologies in the usual sense of the word). Rather, their preferences

are thought to be defined over projects and particularly those projects that enable the institutions to which they belong, to grow as rapidly as possible.

2. Technological behavior in the public sector – two paradoxes

To a much greater extent than elsewhere in the Third World, the industrial sector in Tanzania (as in Sub-Saharan Africa more generally) is dominated by enterprises owned by the state and to a correspondingly greater extent than in the other regions, therefore, the technological aspects of industrialization in Tanzania need to be understood in relation to the behavior of those enterprises.¹

This understanding is made more difficult, however, by several paradoxical features of public sector behavior in the industrial sector of that country.

One such paradox is the marked discrepancy between actual technological behavior in the public sector and the behavior that would have been consistent with the particular type of socialism pursued by Tanzania since 1967. For, whereas that type of so-called 'African socialism' laid considerable emphasis on small-scale, labor- and local-input intensive technologies, the public sector has tended instead to use technologies with precisely the opposite features (that is, large-scale, capital- and import-intensive technologies). What is just as paradoxical, however, is that this apparent preference for certain types of technologies has not been uniformly applied across the public sector. Indeed, one can also find examples in the public sector of precisely the opposite forms of technological behavior from those that have just been described. In some cases, these pronounced technological variations occur even within the same sector at around the same point of time.

2.1. *The first paradox: Planned versus actual technological behavior in the public sector*

In order to make this first paradox as clear as possible, it is necessary to recognize that socialism in Africa after independence took a number of different forms. The first form, known as African socialism, is associated mainly with the governments of Nyerere in Tanzania and Nkrumah in Ghana during the 1960s. This form of socialism has been described as 'Afrocentric' and 'non-aligned', in that it purported to be adapted specifically to African conditions (Chazan, Mortimer, Ravenhill, and Rothchild, 1988: 150). African socialism needs to be contrasted with the 'Afro-Marxist' type of model that emerged in countries such as Mozambique, Angola and Ethiopia during the 1970s. In these and other countries that formed part of the 'second wave' of socialism in Sub-Saharan Africa (Rosberg and Callaghy, 1979), the distinctiveness of the

African situation tended to be rejected in favor of the established principles of scientific socialism (that is, of Marxist-Leninism).

This distinction is important because it bears so heavily on the type of technology that the developing country is predisposed to select. Whereas socialism of the Marxist-Leninist variety demands the most modern, advanced technologies, this is not at all true of the African socialism that was practised in Tanzania after 1967. Immediately after the Arusha Declaration, for example, President Nyerere (1968b: 98–99) made his position clear when he argued that “even when we are building factories which serve the whole nation, we have to consider whether it is necessary for us to use the most modern machinery which exists in the world. We have to consider whether some older equipment which demands more labor, but labor which is less highly skilled, is not better suited to our needs, as well as being more within our capacity to build and use.” There were indeed many cases, he believed, where the needs of society could better be met by labor-intensive, small-scale technologies than by large-scale mass production. These cases, furthermore, were closely in accord with his view that industry should be decentralized to the maximum possible extent. “In so far as there is a choice, we in Tanzania would infinitely prefer to see many small factories started in different towns in our country rather than one big factory started in any one of them” (Nyerere, 1968a: 107).

These early ideas were consistent with and indeed embodied in the key planning documents that were to form the basis of Tanzania’s industrialization strategy in the post-Arusha period. The second Five Year Plan, covering the years 1969 to 1974, for example, not only provided explicit encouragement of labor-intensive techniques, but also emphasized the importance of more decentralization and more effective linkages between large and small-scale industries (ILO, 1982).

For the period after 1974, the so-called ‘basic industry strategy’ strongly reaffirmed the principle of self-reliance, which played so central a role in the Arusha Declaration and in subsequent policy pronouncements by the top political leadership. This goal was to be achieved, among other ways, by the encouragement of a local capital goods industry which would lessen Tanzania’s dependence on imports of foreign technology. Moreover, the major objectives laid down by the ‘basic industry strategy’, such as employment creation, equality of income distribution and dispersion of industry, suggested implicitly or explicitly that where a choice existed, technologies should generally be relatively low-cost, labor intensive, simple and small-scale (Williams, 1976).

Beginning in the 1970s, however, a long list of scholars in Tanzania and elsewhere pointed out that the technologies actually being used in the public sector, typically had just the opposite features. That is to say, they were usual-

Table 1. Alternative rice-milling technologies

	Initial fixed cost (shs. 000)	Total capital Shs. per worker hour	Benefit-cost ratio Shadow prices full capacity
Rice huller			
4–8 tons per day	93.0	2.4	7.94 ^a
Rice roller			
24 tons per day	1,752.5	14.3	2.52
60 tons per day	4,410.0	11.9	1.69
120 tons per day	7,927.0	16.7	1.52

^a6 tons per day.

Source: Bagachwa (1992: Tables 1 and 5).

ly large-scale and inefficient, as well as being capital- and import intensive.² As such, therefore, these technologies also tended to have the effect of centralizing, rather than decentralizing the location of industry in Tanzania. Far, therefore from promoting the most important goals of the state, public enterprises in the industrial sector seemed to be doing just the reverse. It was not that there were no choices available to the managers of state-owned enterprises. On the contrary, over a wide range of manufacturing industries, a number of very different technological alternatives usually presented themselves.

Table 1, for example, shows that the available techniques for rice-milling range from a small-scale huller (producing 4 to 8 tons per day) to a large-scale roller (producing 120 tons per day), with the investment requirements per worker of the latter exceeding those of the former by a factor of around 7. Table 1 also shows that the estimated benefit–cost ratios vary inversely with the scale of the different techniques: the rice huller has the highest ratio of benefits to costs while the rice roller has the lowest ratio. If the choice of the former could thus have been justified on the grounds of employment creation and efficiency, it was also preferable from the standpoint of industrial decentralization and self-reliance. Although one might have expected these considerations to prevail in the light of our earlier discussion, the state-owned milling corporation chose instead to expand its capacity on the basis of the large-scale (120 tons per day) roller technology.

Given the overriding importance that was apparently attached to the need for self-reliance in the period after 1967, one would also have expected state-owned enterprises such as the milling corporation, to pay explicit attention to the acquisition of technological capabilities of various kinds. For there was certainly no lack of awareness on the part of national planners that a strategy

of self-reliance had necessarily to be based on the substitution of domestic for foreign technological capabilities (an awareness that was perhaps most clearly articulated in relation to the 'basic industry strategy' in the 1970s) and the public enterprise, as an extension of the state, ought, one would think, to have been a key instrument in effecting that transformation. In practice, however, not only has there tended to be an increase rather than a decrease in the public sector's reliance on imported technology but also a tendency for that technology to supplant rather than to stimulate the acquisition of indigenous technological capabilities (Wangwe, 1986, 1992).

2.2. *A second paradox: Pronounced technological variations in the public sector*

Though these various departures from what one would have expected well describe the technological behavior of the vast majority of firms in the public sector, they do not describe all of them. Indeed, one can also find examples in the public sector of precisely the opposite forms of technological behavior from those that have just been described. And especially when these pronounced technological variations occur within the same sector at around the same point in time, the possibility of a second paradox emerges, namely that the state holds inconsistent technological preferences – preferences, that is to say, which, under similar conditions, lead to the choice of different technologies. Formally, the paradox arises in that the state's preferences for such sharply diverging methods of production need to be represented by intersecting rather than non-intersecting indifference curves and the former unlike the latter violate the transitivity assumption of traditional micro-economic theory and welfare economics.

Two examples describe this paradoxical type of behavior especially clearly. Research on Tanzania's textile industry, for example, has revealed a very wide range of factor intensities among state-owned enterprises and in some of those enterprises the choice of technology was made at approximately the same time and under similar conditions (see below). The other example comes from the brick-manufacturing industry, where, "The [Tanzania] state has been involved in technological development, as well as in innovation. *But what is especially interesting about this is the diversity of state actions. Two very different types of technological choice have been made by the 'same' state, one of an almost unbelievably inappropriate nature, the other much more relevant*" (Kaplinsky, 1990: 93).

Mainly because it is the better documented of the two examples, we shall use data from the textile industry to illustrate the apparently inconsistent – and hence paradoxical – nature of the state's technological behavior. In particular, we shall confine ourselves to a comparison between two large-scale integrated

textile mills, that, in spite of having been established more or less simultaneously at the end of the nineteen sixties by the same public institution, the National Development Corporation, nevertheless exhibit a number of rather remarkable technological (and other) variations. The one plant, for example, is highly labor-intensive whereas the other is highly capital-intensive. The one textile firm is one of the most efficient in the entire industry, whereas the other performs poorly on virtually all the usual indicators. In the one enterprise, indigenous technological capabilities were successfully acquired, while in the other they were not.

Still another case that is difficult to reconcile with the general pattern of technological behavior in the public sector is to be found in the farm implements sub-sector. For, there is one state-owned enterprise in that sector, that has used relatively simple labor-intensive technology (in conjunction with other factors) to attain a highly competitive position (as measured by domestic resource costs) (World Bank, 1987).

This firm is also unusual in the rapidity with which it was able to dispense with foreign technical expertise – that is, in the rapidity with which it was able to acquire indigenous technological capabilities of various kinds (Barker, Mitschke-Collande, Bhagavan, and Wield, 1986).

3. Existing explanations and their limitations

The earliest and most detailed attempt to explain the foregoing paradoxes was made by David Williams (1976) with particular reference to the textile industry. He showed, among other things, that the pronounced disparity between the technologies chosen in the industry could not be explained on the basis of the existing literature on the choice of technology in developing countries. It is often argued in this literature, for example, that technological differences between firms reflect differences in the types of products they manufacture (where differences refer to variations in the characteristics that the various products embody). In particular, it is commonly argued that labor-intensive technologies tend to produce goods with a higher proportion of functional or 'low-income' characteristics than capital-intensive techniques. Williams (1975: 3), however, found "no grounds for assuming that any particular type of technology in the observed range was dictated by product characteristics." Nor was he able to find much evidence in support of another well-known category of explanations in the choice of technology, namely, those that impute various types of non-economic preferences to decision makers in developing countries. Perhaps the best known of these explanations is the 'engineering-man' hypothesis advanced by Louis Wells (1975). His contention, in brief, is that under conditions of imperfect competition the preference of 'engineering-

Table 2. A comparison of two textile plants

	Friendship	Mwanza
Capital cost up to 1969 (million shillings)	61.5	106.5
Production of woven fabrics in 1975 (million linear metres)	24.0	22.5
Number of employees in 1975	5057.0	2486.0
Profit in 1975 (million shillings)	2.8	2.3
Cost of carded cotton in 1973 (shillings per tonne)	2512.0	2910.0
Labour hours per tonne of carded cotton in 1973	247.0	98.0

Source: Coulson (1982).

man' for sophisticated automated technology and modern products dominates the concern of 'economic-man' to minimize costs of production. Yet, while there were certainly enough departures from perfect competition in Tanzania's textile industry at the end of the nineteen-sixties to enable 'engineering-man' to hold sway, one would then have expected a *uniform* bias in favor of capital-intensive techniques rather than the co-existence of techniques with markedly different factor intensities, as is most clearly illustrated by the comparison between the two textile mills (see Table 2 above). As Williams (1975: 7) puts it, "The engineering-man hypothesis would not predict that a single investor ... would set up both capital-intensive and labour-intensive plants at the same time." The same problem, one should note, would apply just as much to the various other technology-related objective functions that have been proposed in the literature, such as for example, the sense of 'national pride' which is sometimes said to be evoked by the use of the most modern technologies in developing countries (Winston, 1979).

3.1. *Project versus technological preferences*

For this reason, Williams (1976) suggests that one should investigate instead the nature of *non-technology* related objective functions in the public sector. He argues that managers are concerned essentially with *projects* rather than *technologies* and that they are especially concerned with maximizing the number of projects that can be initiated and implemented.

In seeking to meet this goal, managers tended to favor highly packaged projects – a tendency that was already present among parastatals by virtue of skill constraints and by lack of information about technology and other

markets. The main reason being that highly packaged projects generally also offered distinct advantages not just in terms of finance but also in terms of the relative ease and brevity with which they were able to be implemented (as is perhaps most obviously the case with turnkey projects). In fact, “a project package which included financing and which was ‘ready to go’ would often be accepted with little question” (Williams, 1976: 163).

What evidence is available does tend to support the view that public enterprises favor packaged projects, at least in comparison with comparable privately owned firms. A study of public and private sector industrial projects by Wangwe (1986), for example, found that it is mainly in the public sector that turnkey projects have been adopted in Tanzania.

Under these circumstances, so the argument goes, the ‘choice of technique’ is just the ‘fall-out’ or residual from the particular package of foreign finance and other related project inputs that happen to be chosen. What seems to be decisive in this process, which, one should emphasize, actually *excludes* technological issues from the purview of the typical project, is not the value of one project in relation to others (as measured by the major development goals), but rather the demands made by each of them on scarce equity finance. For their part, “The parastatals responded to the bureaucratic realities by presenting projects in a manner best calculated to ensure acceptance. Thus, a low-cost labor-intensive textile mill, completely financed outside the budget would be preferred to any mill for which more financing from the budget were required. But if circumstances were such that the more acceptable package available consisted of a high-cost capital intensive mill, then that would be chosen” (Williams, 1976: 165).

Let us now consider how this observation can be applied to the concrete case of the two textile mills that were established, as noted earlier, at more or less the same time by the National Development Corporation.

3.2. *A comparison of the two textile plants*

Table 2 above sets out the main technological differences between these two factories. It shows that the one plant, Friendship, is considerably more labor-intensive than the other plant, Mwanza, using as it does two and a half times as many workers per unit of output, together with an appreciably lower amount of capital. In circumstances where labor is comparatively cheap, as in Tanzania, it is not surprising that the labor-intensive alternative should be the more profitable of the two textile technologies, as shown in Table 2.

What then were the particular circumstances that surrounded the more or less simultaneous selection by the same public sector institution of these two factories? Friendship, it seems, was originally conceived after high-level political contacts between the People’s Republic of China and Tanzania and

the project was financed entirely by a long-term interest-free loan from the Chinese government. Because the proposed textile factory was both politically sanctioned and externally financed it was approved without much ado. And the technology that resulted from this externally financed project in no way reflected any technological concerns on the part of the Tanzanian bureaucracy, whose objectives tended to be defined purely in terms of projects. Rather, the technology that was 'chosen' for the Friendship project appeared to reflect instead the conditions in the supplying country and in particular the fact that the Chinese were familiar with older and relatively labor-intensive vintages of textile technology (indeed, the particular vintage used at Friendship happened to be the most labor-intensive of the technologies that were being produced at the time in China). A year later, by contrast, a very different – albeit perhaps equally attractive – package of project characteristics presented itself to the Tanzanians in the form of the Mwanza textile mill. One reason why this project differed from the Friendship case was that it was financed by a supplier's credit rather than by bilateral foreign aid. The most important difference, though, was that the financial source of the project was located mainly in France rather than in China and 'the latest and most automated equipment' used at Mwanza, tended accordingly to reflect conditions in the former rather than the latter country.

It is thus by defining bureaucratic objectives over *projects* that Williams is able to resolve the second paradox. For the seemingly inconsistent *technological* preferences are replaced in his framework by a consistent set of *project-related* preferences, from which technological outcomes are derived rather than chosen. What this framework is unable to clarify, however, is the first of the two paradoxes described above. For whereas that paradox has to do with both an observed bias towards large-scale, capital-intensive and inefficient techniques and a systematic tendency towards sophisticated, 'high-income' products, Williams (1976) argues instead that the factor intensity of technologies associated with packaged, externally-financed projects would be randomly distributed; that is, that there would be no systematic bias in any one direction.

This particular weakness of the approach, however, can be overcome by a more realistic analysis of the relationship between the sources of external finance and the types of industrial technology that have been transferred to the public sector in Tanzania. For one thing, even after the Arusha Declaration in that country, most of the foreign finance supplied to the public sector originated in the developed market economies (and took the form mainly of foreign aid, as shown in Table 5 below). And the types of products and processes associated with this type of finance are not randomly distributed, but are instead closely reflective of the socio-economic conditions prevailing

in the supplier countries (especially a relative scarcity of labor, high average incomes and large markets).³ On the other hand, though, when foreign finance originates instead in developing countries, the same historical line of argument leads one to expect the transfer of relatively appropriate forms of technology, an expectation that was clearly met in the case of the Friendship textile mill and also in the case of the labor-intensive farm implements enterprise referred to earlier. For in the latter case as well, what mattered was not “that the Tanzanian side took any greater degree of interest in the choice of technology than in any other project” (Barker et al., 1986: 123), but rather that the finance was provided by the Chinese who (as in Friendship) favored relatively simple technology.

By thus combining the basic insight provided by Williams – that managers seek to maximize external project finance – with a historically oriented view of how this behavior leads to particular technological outcomes, one can account for much of what seems paradoxical about the behavior of state-owned enterprises in Tanzania. Yet, for all its centrality to this composite argument, the foreign-exchange maximizing behavior by the bureaucracy remains far from well understood. Most importantly, it is not at all clear how this behavior actually enters the utility function of the manager of a public enterprise. What is lacking in other words is a detailed analysis of bureaucratic objectives and an assessment of the manner in which those objectives are furthered by foreign-exchange maximizing behavior in the public sector. Though it was not designed to address this particular question, we shall now argue that the public choice approach to bureaucracy nonetheless throws considerable light on it.

4. The public choice approach to bureaucracy

The public choice approach to bureaucracy emphasizes the multiplicity of ways in which an expansion of the size of an institution promotes the particular interests of its members. In so doing, we shall argue, this approach provides precisely what was missing from the previous section, namely, an analysis of how the maximization of foreign exchange (and more generally budget maximization) promotes the objectives that were really pursued by managers of state-owned enterprises.

Although an early contribution by Downs (1967: 17) had emphasized how “The expansion of any organization normally provides its leaders with increased power, income and prestige” and how those persons would therefore tend to favor organizational growth, the specific notion of a ‘budget-maximizing bureaucrat’ is most closely associated with William Niskanen (1973). The latter makes essentially two claims, the first of them being that

the manager of a public bureau has the following among his major goals: “salary, perquisites of the office, public reputation, power, patronage, output” (1973: 22). Niskanen’s second major claim is that since these goals are all assumed to vary directly with the size of the budget, the aim of the bureaucrat can be reduced to one of maximizing this financial variable during his time in office. This time element bears emphasizing in part because most of the gains that accrue to the budget maximizing bureaucrat “are nearly unrelated to the ‘net worth’ of his organization after his departure” (Niskanen, 1973: 33) and in part because his tenure in office itself may be relatively short in many developing countries.

5. Foreign-exchange maximizing bureaucracy and the political economy of Tanzania

It is easy to show that these goals find frequent expression in the writings of political scientists who work on Sub-Saharan Africa in general and on Tanzania in particular. Indeed, one of those goals, bureaucratic power, is one of the most pervasive themes of that part of the political science literature which deals with the post-independence period in Africa. After noting how the phenomenal growth in the size of the civil service in Tanzania (and elsewhere) created “a privileged group” with “corporate interests of its own” and with considerable opportunities for “personal aggrandizement”, Chazan et al., (1988: 53) for example, are not alone in suggesting that the bureaucracy “emerged as the core of a new dominant class in the postcolonial period.” Moreover, in its analysis of how the economic and political power thus acquired by the bureaucracy is exercised, the political science literature almost uniformly assigns a paramount role to patronage, another of the goals emphasized by Niskanen (1973).

There is, however, only one study which deals with the political economy aspects of the growth in the public sector in Tanzania and which, at the same time, analyzes the role played by foreign-exchange maximization in that growth. This study (Mukandala, 1988) takes as its point of departure the notion that since 1969 the “political stratum” of the Tanzanian state has been locked in an intense and prolonged conflict with the “managerial stratum” of the state (where the former category refers essentially to those who make or design policy and the latter refers largely to those who actually carry it out). It is not that there were no parastatals in Tanzania prior to the Arusha Declaration, but it was only in the years thereafter, where the parastatal sector had emerged as a “strategic and complex branch of the state” (Mukandala, 1988: 29) that the political and managerial strata came into direct and open conflict. For by then, following an extraordinarily rapid increase in their

numbers and their net assets (see Table 3 below) parastatals had become “too big, diverse and strategic to be left to the managerial stratum yet proved too difficult to control through conventional government methods” (Mukandala, 1988: 29). It was already all too plain, for example, that the parastatals were behaving less like vehicles in the transition to socialism and more like ‘bastions of capitalism’, with only a very tenuous connection to the political institutions of the state. What particularly concerned the ‘political stratum’, was the National Development Corporation (NDC), which accounted for no less than half the total investment by parastatals in new firms and which was in control of the majority of the state’s assets in manufacturing and other sectors of the economy. (So rapid in fact was the growth of this institution that its total net assets almost doubled over the period from 1967 to 1969.)

The ‘political stratum’s’ response to this situation was the introduction of a series of measures whose objective was to limit the degree of freedom then being enjoyed by the parastatal sector as a whole and the NDC in particular. These measures marked the beginning of what has been described as the ‘rationalization’ phase in the parastatal sector (Mukandala, 1988: 29). According to one such measure, for example, particular groups of parastatals were to be placed under the control of newly created parent ministries. Other measures involved a heavier degree of reliance on some parastatals (such as the National Price Commission and the Bank of Tanzania) in the regulation of other parastatals and a strengthened role for central ministries (such as the Treasury and the Ministry of Development Planning). By far the most extreme of all the measures employed by the ‘political stratum’ after 1969, however, was the attempt at ‘rationalization’ of the parastatal sector. What was intended by this was basically the fragmentation of the then existing corporations into increasingly smaller units, in the hope that they would thereby become less powerful and more manageable.

The policy of rationalization did produce some results: between 1971 and 1974, for example, the NDC was stripped of 17 of its operating companies and 19 of its projects. On the whole, though, these and other attempts to limit the rapidly growing influence of the ‘managerial stratum’ met with only a very limited degree of success. To some extent this was a reflection of a somewhat predictable set of administrative and logistical problems (predictable because the relatively scarcity of administrative resources must have been apparent right at the outset of Tanzania’s attempted transition to socialism). To a large extent, however, the failure of the political stratum to achieve its objective was due to the vigorous counter-measures that the parastatal institutions themselves undertook.

It is in these measures and their outcomes that one finds rather striking support for a public choice interpretation of bureaucratic behavior in Tanzania,

for what occurred was a particularly clear demonstration of the political advantages that accrue from an increase in the size of a public institution. Consider from this point of view Mukandala's telling description of how the parastatal sector as a whole responded to what, in the guise of rationalization, was nothing less than a familiar 'divide and rule' tactic by the 'political stratum'. Thus,

On the one hand the managerial stratum established new subsidiary companies to replace those hived-off by the state ... This was deemed necessary because the more subsidiaries a corporation had, the bigger it was and consequently a) more resources were allocated to it in the national budget for developmental purposes; b) the more bargaining power it had when negotiating for higher salaries (especially for its management). Size showed "umuhimu" or importance relevance; c) strengthened its hand in mobilizing external finance on its own...

External finance was also useful because once obtained, it assured approval for the projects from the Treasury, the Bank of Tanzania and the Ministry of Development Planning. Foreign capital's need to invest in new projects rather than expanding or rehabilitating old ones reinforced this trend (Mukandala, 1988: 32).

From the perspective of a sector engaged in a struggle for its very survival, therefore, what seemed to matter much more than its efficiency or profitability was its *size* and *power*. And it is from these political points of view, we suggest, that the central role of new projects and foreign capital needs to be understood.

To what extent then *did* the public sector actually grow in Tanzania? Table 3 provides evidence on this question for the manufacturing sector, while Table 4 refers to the public sector more generally (in both cases the data cover the period from the 1960s to the early 1980s). As one would expect, the figures in the tables show a marked growth in the public sector after the Arusha Declaration. For there was then a greatly enhanced need for civil servants and other officials to run the institutions that had just been nationalized (Mukandala, 1985). What is remarkable though is that the public sector continued to grow very rapidly *after* the early post-Arusha period, when no such obvious need for personnel was apparent and at a time when in fact the 'political stratum' of the state was bent on reducing the sector's size and power. Between 1971 and 1981/2, for example, public sector fixed assets in manufacturing grew more than three-fold, while the share of public enterprises in manufacturing value-added almost doubled (see Table 3).

These pronounced increases in the absolute and relative size of the public sector were closely related to the external sector, for in the "frantic spate of subsidiary creation" referred to above, "there was a renewed aggressiveness

Table 3. The growth of the public sector in manufacturing

	(1)	(2)	(3)	(4)
	Public sector fixed assets in manufacturing	Public sector employment in manufacturing	Share of public sector in manu- facturing employment	Share of public sector in manu- facturing value- added
	(million shillings)	(absolute numbers)	(per cent)	(per cent)
1966	21.0 ^a	2,330		5.0
1967		5,300	15.5	14.0
1971	971.0	20,113	46.4	29.0
1979	2,851.0	53,000	50.0	31.0
1980			50.0	37.1
1981	3,278.4		47.7	48.2
1982			52.7	56.8

^aRefers to 1964.

Sources: Col. (1) from World Bank (1988: 4); Col. (2) from Perkins (1980), Clark (1978) and World Bank (1987); Col. (3) and Col. (4) from Skarstein and Wangwe (1986).

Table 4. The growth of public sector in general

	Established posts in the civil service	Total number of parastatals
1966	65,708	43
1967	80,239	73
1971	99,564	
1980	295,342	380

Sources: For column 1) Mukandala (1985) and for column 2) de Valk (1992).

toward recruiting foreign project partners; the call for self-reliance notwithstanding ... This in turn led to a faster increase in the importation of capital rather than intermediate goods and over-installation of new industrial capacity” (Mukandala, 1988: 128–129). Tanzania’s increasing reliance on imported capital goods over this period was to a large extent made possible by growing amounts of foreign aid, which, as Table 5 shows, financed an ever-greater proportion of gross investment and government expenditure.

The effect of all of this activity on the technological dimensions of the industrialization process was hardly surprising. On the one hand, the powerful political pressure to grow as a means of institutional survival, with its attendant dependence on external sources of finance, meant that little time was

Table 5. The growth of external sources of finance

	Total aid (million US dollars)	Total aid as percen- tage of monetary gross investment	Share of foreign financing in govern- ment expenditure
1960s			30–35
1970	29.9	11.4	40
1975	114.9	25.3	45
1980	493.6	46.6	50
1982	514.9	54.3	

Sources: Col. 1) Skarstein and Wangwe (1986); Col. 3) Wangwe (1992).

available to public sector managers for consideration of factors such as labor-intensity, self-reliance and industrial decentralization, that were described earlier as being important to the 'political stratum.' Nor was there time for undertaking the various types of effort (such as search activities) on which the acquisition of local technological capabilities is known to depend. A management or technical collaboration agreement with a foreign partner for example was much more likely to have been seen by the parastatal as a way of overcoming short-run skills constraints on its expansion (via projects), than as an issue which carries important long-run implications for the acquisition of technological capabilities in the public sector. On the other hand, in its neglect of the managerial function the parastatal was further contributing to the inattention paid to capabilities issues, because it was effectively ignoring the range of issues that bear on technological learning and mastery at the operational level (that have to do, for example with project implementation, repair and maintenance).

5.1. *The size of the public sector under structural adjustment*

If the public sector in Tanzania continued to grow rapidly into the early 1980s, in spite of attempts to curb its size and power, it has also managed to withstand the privatization schemes and other measures that were introduced a few years later by the World Bank, as part of the wider process of structural adjustment.

On the one hand, some notable increases in the absolute size of the sector were recorded in the period after the reforms were introduced (that is, after 1986). The total number of state-owned enterprises, for example, grew from 380 in 1980 to 425 in 1988,⁴ while the civil service as a whole increased in size by more than 5 per cent over the period 1985–92.⁵ On the other hand (and

Table 6. The public sector share in Tanzania before and after structural adjustment

	Share of state-owned enterprises in GDP	Share of state-owned enterprises in non-agricultural economic activity	Share of state-owned enterprise investment in gross domestic investment	Share of state-owned enterprises in employment
1978-85	10.8	18.1	24.6	22.3
1986-91	13.7	23.8	30.0	22.3
Change	+2.9	+5.7	+5.4	0.0

Source: World Bank (1995).

relatedly), some recently-published World Bank data show that with respect to most macro-economic variables, the public sector share increased rather than decreased in the reform period, as compared with the seven previous years. In particular, one can see from Table 6 that the state-owned share of the GDP, non-agricultural activity and gross domestic investment actually increased in the later period, while its share in employment remained unchanged between the two periods.

6. Conclusions

In this paper we have sought to explain several of the most paradoxical aspects of technology and industrialization in Tanzania, since the Arusha Declaration of 1967. Our explanation has turned mainly on two assumptions about bureaucratic behavior in that country: the first is that bureaucrats have preferences defined over projects rather than technologies and the second is that in their capacity as managers of state-owned enterprises, these agents of the state have sought to initiate as many new projects as possible, mainly on the basis of foreign aid. Such behavior, we suggested, was rooted in a political context where the drive to institutional expansion was viewed as a key element in the survival of the bureaucracy. It meant that the various branches of the public sector continued to grow very rapidly well beyond the early post-Arusha years, when there had been an initial need for large numbers of extra civil servants to manage and run the newly nationalized industries. In fact, as we showed in a number of tables, the public sector grew very rapidly throughout the 1970s and early 1980s, at a time when the 'political stratum' of the state was bent on reducing its size and power. It also meant that during the period of structural adjustment reforms, which began a few years later in 1986, the public share of most macro-economic variables increased rather than decreased.

Notes

1. For details see James (1995). This book was the first attempt to apply public choice theory to African industrialization in general.
2. This was already clear from Clark's (1978) study of the period from 1964 to 1973. He pointed to a "failure of the post-Arusha companies to distinguish themselves significantly and favourably from the pre-Arusha companies" (Clark, 1978: 140) and he concluded that "There has been as yet no developmental innovation on the part of parastatals to make themselves more consistent with the Tanzanian ideology" (Clark, 1978: 140). Some years later, a very detailed study by Perkins (1980, 1983) of more than 300 firms in ten industrial sectors arrived at a similar conclusion, namely, that despite the existence of efficient labor-intensive technologies and "Despite the rhetoric, Tanzania's industrialization program has, in general promoted the establishment of [publicly owned] enterprises using large-scale capital-intensive, often technically and invariably economically inefficient technologies" (Perkins, 1983: 231).
3. This argument is most clearly elaborated in Stewart (1977).
4. These data are taken from de Valk (1992), who does not cite his primary source.
5. See World Bank (1994). This source does not however reveal the amount over 5 per cent by which the civil service grew over this period.

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