Tilburg University

The political economy of inappropriate technology

James, M.J.

Published in:
Development and change

Publication date:
1996

[Link to publication in Tilburg University Research Portal](#)

Citation for published version (APA):
James, M. J. (1996). The political economy of inappropriate technology: Industrialization in Sub-Saharan Africa. *Development and change*, 27(2), 415-431.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

The Political Economy of Inappropriate Technology: Industrialization in Sub-Saharan Africa

Jeffrey James

ABSTRACT

The failure of public sector investment projects in Sub-Saharan Africa can often be described in large measure as a technological one, where technology is defined not just in the narrow sense of alternative factor proportions, but in the wider terms of scale and import intensity as well. In confining itself mainly to the economic dimensions of the problem, the existing literature fails to consider the reasons for the extraordinarily rapid and widespread expansion of the public sector in Sub-Saharan Africa and it hence ignores the possibility that this expansion might itself be related to the observed patterns of technological behaviour in the sector. Such a possibility, I suggest, resides in the political and institutional compulsions that drive industrial firms in the public sector to increase the size of their operations.

INTRODUCTION

'The heart of Africa's economic crisis' according to a well-known World Bank Report published in 1984, 'is the low rate of return on its capital investment' (World Bank, 1984b: 41). Such failures, the Report further suggests, have most often taken the form of public sector investment projects that were financed by external aid. It is therefore at these types of projects that one should look most closely in order to understand why investment in Sub-Saharan Africa has typically yielded so little. In much of this region, the failure of these types of projects can often be described in large measure as a technological one, defining technology not in the narrow sense of alternative factor proportions, but including scale and import intensity as well. For not only have public enterprises in the industrial sector of most African countries shown a persistent and well-documented tendency to choose large-scale, capital- and import-intensive technologies, but these technological features are also known to be statistically significant determinants of economic inefficiency at the firm level.¹ Steel's study of Ghana, for example, concludes that capital intensity is a statistically significant explanation for the high

1. The following data are taken from James (1995).

domestic resource cost (DRC) that he observed (Steel, 1972). In Zambia state-owned industrial enterprises with 'relatively high DRC's (above 2.0) tend to have higher capital intensity — a 1 per cent increase in the capital/labor ratio is associated with an increase of 0.2 per cent in the DRC' (World Bank, 1984a: 67). Similarly, a firm-level survey in Tanzania finds that 'Efficiency of manufacturing is also negatively affected by higher capital intensity' (World Bank, 1987: xi). In two of these same countries, moreover, firm size is also statistically significant in explaining high DRC values. In Tanzania, 'firms employing between five and 100 workers had a domestic resource cost of 1.07; while for firms employing between 100–250 and 250–1500 domestic resource costs were 5.54 and 20.54 respectively' (Bagachwa and Stewart, 1992: 161). Finally, as the Zambian case illustrates, import intensity exhibits a systematic relationship not only to factor intensity, but also to overall efficiency as measured by DRC. In particular, methods of production that were relatively import-intensive also tended to be associated with capital rather than labour-intensive technologies and to increase rather than reduce domestic resource cost.

Most existing explanations of this highly inefficient pattern of technological behaviour tend to follow the general literature on the choice of technology in developing countries in emphasizing essentially the economic dimensions of the problem. In so doing, however, the existing literature fails to consider the political reasons for the extraordinarily rapid and widespread expansion of the public sector in Sub-Saharan Africa,² and it hence ignores the possibility that this expansion might *itself* be related to the observed patterns of technological behaviour in the sector. The growth and technological performance of public enterprises, that is to say, may in fact be governed by the *same* (political) logic, rather than (as is implicitly assumed in the existing literature) by a logic that operates independently on both. Such a possibility, I will argue, resides in the political and institutional compulsions that drive industrial firms in the public sector of the typical African country to increase the size of their operations. Though the importance of these various compulsions has been recognized in a wide variety of institutional settings, as noted in the following section, they have not yet been applied to explaining the systematic forms of economic and technological behaviour exhibited by industrial state-owned enterprises in Sub-Saharan Africa.³ Redressing this neglected aspect of the problem is the task of the second and third sections of this article.

2. On the extent of this increase, see for example Nellis (1986). Note, however, that there are some important differences across Sub-Saharan Africa. Some countries in the region (such as Zambia and Tanzania) have a much larger public enterprise sector than others (such as Botswana and Zimbabwe).

3. See, however, James (1995) on which much of Sections 2 and 3 are based.

THE PERVASIVENESS OF THE EXPANSIONARY DRIVE

The pervasiveness of the drive towards institutional expansion is evident from the variety of different settings in which this objective is thought to be pursued. Indeed, although a great deal has been written about the expansionary tendencies of public sector institutions, it was in relation to privately owned enterprises that the pursuit of objectives related to firm size first came to be widely recognized in micro-economics.

Sales Maximization in Privately Owned Enterprises

In an early contribution to the theory of the firm, Baumol was the first to argue that in conditions of imperfect competition, managers seek to maximize sales or, more realistically, to maximize the rate of growth of sales. 'Economists who have spent time observing the operations of business enterprises', he claimed, invariably 'come away impressed with the extent of management's preoccupation with growth. Expansion is a theme that ... is dinned into the ears of stockholders and is constantly reported ... Indeed, in talking to business executives one may easily come to believe that the growth of the firm is the main preoccupation of top management' (Baumol, 1967: 87). Similarly, Oliver Williamson's theory of managerial discretion (in support of which there is considerable empirical evidence), posits that salaries, perquisites, staff size and control over investment funds are the overriding concerns of management, and that each of these variables is likely to be promoted by an increase in the size of the firm (Williamson, 1964).

Both Baumol and Williamson recognized, however, that the managerial concern with firm size and growth would have to be tempered by some form of minimum profit constraint (imposed in part by the demands of the firm's stockholders). Thus, in reality the managerial objective function would be some combination of the two concerns — firm size and profitability. In a comparatively recent formulation by Vickers, for example, the firm in period t is assumed to maximize

$$U_t = W_t + \alpha S_t$$

where U signifies utility, W profit, S output or sales and α is a weighting factor (Vickers, 1985: 141). Thus, the higher is α , the more important is output or sales maximization relative to profitability in the managerial objective function.

Institutional Expansion in Public Choice Theory

Institutional size is also central to the efforts that public choice theorists have made to explain the economic behaviour of institutions in the public rather

than the private sector. (The 'fundamental premise' of such theorists is that 'bureaucratic officials, like all other agents in society, are significantly — though not solely — motivated by their own self-interests' [Downs, 1967: 2].)

The first systematic attempt to study bureaucracies from a public choice perspective was undertaken in relation to the American experience by Niskanen, whose specific concern was with:

organizations that have *both* of the following characteristics:

1. The owners and employees do not appropriate any part of the difference between revenues and costs as personal income.
2. Some part of the recurring revenues derive from other than the sale of output at a per unit rate.

In a single sentence: '*Bureaus are non-profit organisations that are financed at least in part, from a periodic appropriation or grant*'. (Niskanen, 1973: 8, emphasis in original)

Thus deprived of an incentive to maximize profits, the manager of a bureau in Niskanen's model is assumed to turn instead to many of the same objectives that have just been mentioned in relation to the privately owned firm, such as 'salary, perquisites of the office, public reputation, power, patronage, output of the bureau' (ibid: 22). Since these objectives are all thought to vary directly with the size of the budget, the aim of the bureaucrat thus becomes one of maximizing this variable during his tenure in office. (The time issue bears emphasis partly because most of the gains that accrue to the budget maximizing bureaucrat are unrelated to the 'net worth' of the organization after his departure and partly because his tenure itself may often be of relatively short duration.)

Other reasons have also been advanced in support of the contention by public choice theorists that budget maximization tends to promote bureaucratic interests within the public sector, although, as Table 1 shows, neither these nor the reasons provided by Niskanen himself necessarily apply to the same levels of functioning in the bureaucratic hierarchy. Increased patronage powers, for example, may benefit only the upper echelons of the bureaucratic institution.

'Expansion Drive' and 'Investment-Hunger' in Eastern Europe

Kornai (1981) describes the major characteristics of East European growth over the twenty-five year period ending in the mid 1970s, and is concerned with the set of institutions that collectively make up the public sector in those countries, namely the nationalized enterprises, the co-operatives and the non-profit institutions.

Among the most important of the behavioural characteristics exhibited by this class of institutions is, as he sees it, '*a persistent expansion drive*. There is a permanent desire to grow. Strongly linked to that we have an *insatiable*

Table 1. *Welfare gains for Bureaucrats from Budget-maximization*

Type of welfare gain	Salience for ranks		
	Bottom	Middle	Top
Improving job security	++	+	0
Expanding career prospects	+	++	0
Increased demand for skills and labour	+	++	0
Triggering upward regrading	0	++	+
Reducing conflict in bureau management	0	+	++
Boosting bureau prestige	0	+	++
Improved relations with clients or contractors	0	+	++
'Slack' creation to cope in crises	0	+	++
Increased patronage powers	0	0	++

Key: ++ = high salience; + = medium salience; 0 = low salience.

Source: Dunleavy (1991: 192).

investment-hunger' (Kornai, 1981: 965–6, emphasis in original). These phenomena are thought to arise for some of the same reasons that have already been mentioned in connection with sales maximization in privately owned firms and budget maximization in the public choice approach. For instance: 'A larger organization brings more prestige and also more power. Perhaps in some organizations and institutions there are financial advantages attached to the size: growing brings a greater bonus or salary' (ibid: 966). Indeed, since Kornai claims that the eagerness to grow is inherent in every economic system, he sees nothing distinctive about this aspect of the behaviour of public sector institutions in Eastern Europe. What does sharply differentiate these firms from their counterparts in the private sector, however, emerges from his answer to the question of whether there is 'any self-restraint which will moderate, or put some constraint on the expansion drive' (ibid: 966). In particular:

In a private enterprise such moderating considerations are: fear of losses and of failure, caution and, together with them, risk-aversion. In other words, investment is a risky undertaking and failure can lead to bankruptcy, or to the dissolution of the firm. The uncertainty of expectations puts a restraint on the expansion-drive. What distinguishes the East European system from the behaviour of private entrepreneurs concerning investment is that this self-restraint is missing. The 'animal spirits' never relax; they are permanently there. There is not the slightest fear for losses, there is practically no financial failure, no bankruptcy, and a paternalistic state bails out almost automatically all firms which get into trouble ... This paternalistic relationship between state and firm, or state and non-profit institution is the main explanation of insatiable investment-hunger; ... Under such circumstances the investor is not cost-responsive, and not price-responsive, either on the input side, or on the output side. He is convinced that expansion can go on at any cost. (ibid: 966)

INDUSTRIALIZATION AND PUBLIC SECTOR EXPANSIONISM IN SUB-SAHARAN AFRICA

Although they rarely, if ever, refer to the literature mentioned above, many political scientists ascribe to public sector institutions in Sub-Saharan Africa some of the same objectives that have just been described and especially those that are associated with the public choice approach. Hyden, for example, suggests that the 'growth of the parastatal sector also reflects latent political objectives. Foremost of these is the fact that an expanded public sector, particularly one generating its own capital, provides an attractive source of income for reassignment according to political criteria' (Hyden, 1983: 99). According to David Leonard:

Africans are unusual among the world's elites in the extent of their patronage obligations to poorer peoples and the strength of the moral pressures which they feel to fulfill them. For these reasons and for selfish ones that are far more universal, state organizations in Africa are extensively used to pursue informal, personal goals of their managers rather than the collective ones that are formally proclaimed. (Leonard, 1987: 901)

In still another description that is worth citing in this regard, Abernethy observes that:

In theory, bureaucrats are the agents of government output. In practice, the larger and more privileged their ranks relative to the population they govern, the more they should be analyzed as powerful *input* agencies within a political system. The salary structure of African governments has helped transform these governments into powerful interest groups whose overriding interest is themselves. (Abernethy, 1988: 203)

Among public sector institutions, public enterprises warrant particular attention from this point of view because of the relative autonomy that they tend to confer on their managers. For, unlike the rest of the public sector, public enterprises are engaged in the production of saleable output and their performance can thus be measured more easily than those other institutions. This, in turn, means that managers of state-owned enterprises tend to be less encumbered by constraints — such as civil service rules on hiring, firing, employment and budgetary controls — than the rest of the public sector (Horn, 1988). In some cases, industrial public enterprises in Sub-Saharan Africa have been specifically created to enable managers to exploit this comparative autonomy, while in other cases existing public enterprises have expanded in order to meet the managerial objectives described above in relation to the public choice perspective. The former process is particularly well illustrated by the energy sector in Nigeria during the 1970s, while the expansion of the National Development Corporation in Tanzania during a similar period provides a lucid illustration of the latter case. An examination of these two examples shows that the political logic which the two cases suggest accounts convincingly for the observed patterns of technological behaviour in the public sector as already described.

**The Political Logic of Public Enterprise Creation and Expansion:
Two Case-Studies**

The Energy Sector in Nigeria

Wilson's (1978) study of rural electrification in Nigeria's Mid-Western state in the early 1970s is important, among other reasons, because it shows that the organizational form for implementing the programme was a variable rather than a given datum. It also demonstrates that although there were at least two other possible organizational forms, a decision was made in favour of creating an entirely new public enterprise. This choice, Wilson suggests, had little to do with the 'mass of the population' which 'lacked the political wherewithal to impose an organizational solution on the state elite' (Wilson, 1978: 342). It was made instead by the 'high officials in state government' (ibid), whose purpose 'was as much to remove the activities of electricity supply and distribution from the somewhat tighter bureaucratic controls of the Ministry of Works so that they could be perverted for personal use, as it was to ensure efficient operation of the programme' (ibid: 302).

There were at least five specific respects in which the newly formed public enterprise was made to serve the narrow interests of those who were entrusted with running the programme:

1. To gain privileged access to services produced by the PC [public corporation] (its outputs);
2. To gain privileged access to the supply inputs required by the PC (the foremost being capital, but including machinery, labor, etc.);
3. To gain privileged access to the receipts and revenues generated by the PC;
4. To engage in kickbacks, double billing and other practices for expensive foreign equipment;
5. To gain access to potential political power through the authority to decide what individuals, groups or firms, will or will not receive a 'public service' such as electricity. This bargaining power can then be translated into other spheres of political and economic activities. (ibid: 343-4)

Furthermore, the Mid-Western case was by no means a unique or even an extreme version of public sector behaviour in Nigeria. On the contrary, because of the organizational autonomy that it so plainly confers, the public enterprise became a 'favorite instrumentality' of elite groups 'for meeting societal and personal needs at the same time' (ibid: 343). More generally still, Wilson suggests that it is this very coincidence between formal societal goals on the one hand and the 'substantive personal interests of top policy makers in and around the PC' on the other, '*which must be seen as central in explaining PC expansion in Africa*' (ibid: 344, emphasis added).

The Expansion of the National Development Corporation in Tanzania

By the end of the 1960s the National Development Corporation (NDC) had become the most important of the very large number of enterprises owned by

the Tanzanian state. It controlled the majority of state-owned assets in manufacturing and other sectors of the economy and accounted for no less than 50 per cent of investments by parastatals in new firms (Mukandala, 1988). Indeed, it was precisely because of its size and influence that the NDC had come to pose a threat to what Mukandala refers to as the 'political stratum'⁴ of the state. For, on the one hand, this institution had become 'too big, diverse and strategic' (Mukandala, 1988: 29) to be left in the hands of the 'managerial stratum', while on the other hand it was proving impossible to control by the supervising agencies of the state — it was already obvious, for example, that the behaviour of the NDC in particular and the parastatal sector in general, had very little connection to the socialist ideology that was then being proclaimed so enthusiastically by the top political leadership. Thus it was that the political stratum embarked on a series of policy measures that were designed to curtail the power and freedom of the NDC, by no means the least important of which was an attempt to split the corporation into progressively smaller and presumably more manageable units.

What is interesting from our point of view is the way in which the NDC responded to these measures and in particular to the 'frantic spate of subsidiary creation' (ibid: 128) that then ensued to replace the companies 'hived off' by the state. Mukandala tells us that 'The corporation's three year 1973–75 plan, for example, was premised on the injection of Shs. 140 million by the [managerial] stratum into the corporation for expansion and new projects partly through the take-over of private concerns' (ibid: 133). According to Mukandala:

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 (ibid: 32).

Here, it seems, is a particularly clear illustration of the political logic described above and especially that which was described as being characteristic of the public choice approach to the behaviour of state institutions. In the case in question, this logic plainly dominated any concern with economic efficiency that might otherwise have asserted itself. For in the struggle over its very political survival, the things that evidently mattered most to the NDC were its *size* and *power* rather than its efficiency and profitability. What mattered to the corporation, in other words, was the number of projects that it was able to initiate rather than the outcomes of those projects (Brodén and Mattsson, 1980). Partly because it implied a heavy and uncritical reliance on foreign sources of technology and other inputs, this attitude imparted a

4. The distinction between the political and managerial strata being essentially the difference between those who formulate policy and those who are responsible for its implementation.

distinct and pronounced bias to the technological behaviour of the public sector, as the following section tries to demonstrate.

THE TECHNOLOGICAL CONSEQUENCES

Kornai (1981) suggests that the tendencies towards what he calls 'expansion-drive' and 'investment hunger' will exert two contradictory influences over the choice of technology. On the one hand, the virtual absence of pressure to minimize costs in the state-owned sector allows managers to indulge their 'engineering preferences' for modern capital-intensive technology and sophisticated 'high-income' products (a tendency which is familiar in the choice of technology literature and which is usually referred to there as the 'engineering-man hypothesis'). On the other hand, the extent to which 'investment hunger' can actually be satisfied is seriously constrained, in the eyes of the Soviet manager, by the permanent scarcity of capital:

They learn about it not from prices or interest rates, but from quantity signals. In all bargaining processes, when they claim investment resources from the higher authorities, it is quite clear to them that investment funds are scarce. At the same time, in the extensive period they have easy access to labour. Therefore, *they are pushed by the one-sided quantity signals to look for capital-saving and labour intensive technologies.* (Kornai, 1981: 967, emphasis added)

The combined result of these two conflicting tendencies, Kornai believes, would be 'an intermediate, not very capital-saving, rather labour-intensive choice of techniques' (ibid). The drive to expansion would also, he thought, subject this type of technology to a low scrapping rate: 'if you strive for large quantity, you simply do not want to throw out machinery which can still be used' (ibid). The resulting high growth rate of employment is described by him in fact as a distinctive property of the Eastern European growth pattern.

What makes the situation in Sub-Saharan Africa so different from the technological tendencies that have just been described is not so much that the 'engineering-man' bias fails to operate there; it has rather to do with two other distinctive features of the countries in the region. The first is that compared to Eastern Europe and to other parts of the Third World, most countries in Sub-Saharan Africa are lacking in fundamental technological capabilities, as measured for example by labour skills, educational achievements and so on (Lall, 1992). This means that there is correspondingly less scope for firms in the public sector to generate (and possibly also to search for) the capital-saving type of technologies to which 'investment hunger' and 'expansion drive' jointly give rise, when confronted with a pervasive shortage of capital. A second distinctive feature of the African case, moreover, makes it less likely that state-owned firms in the region will be confronted with so pronounced a scarcity of investment funds in the first place: Africa is unusual among developing countries in the amount of foreign aid which it receives, and the comparative abundance of this form of capital provides to the

'expansion driven' state-owned enterprise a convenient substitute for the lack of domestic resources. Indeed, as we shall now see, the notion of a 'foreign-exchange maximizing bureaucrat' in the African context plays a pivotal role in explaining the technological outcome of 'expansion-driven' enterprises owned by the state in the industrial sector.

The Foreign-Exchange Maximizing Bureaucrat

In the budgetary circumstances prevailing in more than a few African countries, the budget-maximizing bureaucrat of public choice theory often finds himself transformed instead into a foreign-exchange maximizer. For in these circumstances it is often difficult, if not impossible, to gain budgetary approval for projects without some commitment of external funds. It used to be the case in Kenya, for example, that the Treasury was reluctant to make a budgetary allocation for a project in the absence of a prospective aid donor. The first step by a public sector institution in the acquisition of investment funds was thus 'usually to find a donor' (Holtham and Hazlewood, 1976: 216). Similarly, in Tanzania, 'The parastatals learned that projects could be classified in terms of the ease with which they would be accepted into the budget. . . . Projects originated by the parastatals for which little or no budget funding was required were usually accepted readily. Hence a project package which included [external] financing and which was "ready to go" would often be accepted with little question' (Williams, 1976: 163).

If there was a buoyant demand for foreign exchange by the growing numbers of parastatals, there was also a ready supply, at least as far as foreign aid was concerned. During the ten year period beginning in 1973, for example, growth rates in aid disbursements amounted to more than 10 per cent in a number of African countries and much of this aid, it seems, went to finance investment in the public sector. The result, as Table 2 shows, was that by the end of the period aid financed the bulk of investment expenditure in most of the African countries in the sample; in some of the poorest of those countries aid financed not only all investment spending but also part of consumption as well.

The technological consequences of so heavy a reliance on aid and (to a lesser extent) other sources of foreign capital, largely depend, in turn, on two recognitions: that these funds emanate mainly from the developed countries (James, 1995); and that there are a variety of mechanisms which link the financial aspects of development projects more or less closely to the technologies imported by recipient institutions in the public sector. Some of these mechanisms (such as tied aid and suppliers' credits) are direct and well-known while others are less direct and less visible (for example, when a consultant appointed by the financing institution is biased in favour of technologies originating in his home country or in developed countries more generally). Either way, though, the end result is that most technologies

Table 2. Foreign Aid and Domestic Investment, 1984: IDA eligible countries

IDA eligible country	Net official development assistance (ODA): Disbursements		
	Per capita (US dollars)	As percentage of gross domestic investment	Bilateral (% of total)
Benin	19.8	125.2	51.0
Senegal	52.0	91.6	73.7
Malawi	23.3	80.3	32.6
Guinea-Bissau	61.2	134.4	55.2
Sierra Leone	16.4	68.6	37.0
Sudan	28.7	62.6	50.1
Central African Rep.	45.5	161.0	59.9
Kenya	21.9	33.4	68.3
Ghana	16.1	45.8	44.1
Mauritania	99.1	103.8	40.7
Zambia	36.6	64.4	75.8
Tanzania	26.0	50.0 ¹	72.9

Note: ¹ Refers to foreign finance as a proportion of government expenditure for 1980–5.

Source: The World Bank (1986); Wangwe (1992).

imported with developed country sources of finance will tend to originate in those same developed countries and will tend therefore to reflect the prevailing socio-economic conditions in those countries (Stewart, 1977). The large-scale, capital- and import-intensive technologies that appear so pervasively in the African public sector have in part, therefore, to do with factors as broad as the international division of labour and the direction of technological innovations that are generated for the most part in the developed countries.

At the same time, one should not underestimate the specific role played in this by the foreign-exchange maximizing bureaucrat himself. In particular, his behaviour during the project cycle is often such as to negate the influence of factors that might otherwise have exerted a countervailing influence against the use of inappropriate technology in public sector investment projects. Recall, to begin with, that bureaucratic behaviour, as described above, is concerned above all with ensuring the approval rather than the performance of investment projects. At the initial project identification stage, this preoccupation is likely to manifest itself in a tendency for bureaucrats to consider only a very limited range of project proposals and in some cases only a single proposal. (In Tanzania, for example, 'one foreign partner is chosen [by the NDC] already in the preparatory phase' [Broden and Mattsson, 1980: 3].) Since labour-intensive technologies are usually relatively difficult to identify (and even more difficult to have financed with external funds), what this behaviour effectively means is that a bias in favour of inappropriate technology is likely to arise very early on in the project.

At the evaluation stage, however, one might expect this type of technology to be discouraged by the use of social cost-benefit analysis which replaces market prices with shadow prices. Since the former typically distort the choice of technology towards capital- and import-intensive techniques and away from labour- and local-resource intensive methods of production, use of the latter would exercise an influence in the opposite direction (the market wage, for example, is usually above the shadow wage, the market rate of interest is low in relation to its shadow value and the exchange rate is overvalued). Yet, in practice any such countervailing influence tends to be thwarted by bureaucratic interests which influence not only the extent to which social cost-benefit analysis is used, but also the manner of its use (both of which issues can properly be described as being part of the 'political economy of evaluation').⁵

The extent to which it is used turns on the basic contradiction between what social cost-benefit analysis is designed to achieve, on the one hand, and what bureaucratic decision-makers actually aim for on the other hand. For whereas social cost-benefit analysis was conceived in order to improve (or, in the minds of its most ardent proponents, to maximize) resource allocation, this is not a goal which features at all prominently in the bureaucratic objective function as we have described it. Indeed, industrial enterprises owned by the state in Africa seem to be just as insensitive to cost and profitability considerations as the East European firms described in the article by Kornai (see, for example, James, 1995). To this extent, therefore, social cost-benefit analysis will simply not be perceived as a relevant tool for decision-making in the public sector, a consideration which might help to explain why the technique is practised in so few African (or indeed other developing) countries (Lacey, 1989), although of course there are also other possible explanations for this finding (Leff, 1985).

Even where social cost-benefit methods of project appraisal are used, however, one cannot necessarily expect that a significant degree of influence will thereby be exerted on behalf of appropriate technology; in fact, one cannot even be sure that the most conspicuous cases of inappropriate technology will be avoided. For, again, bureaucratic motivations have to be considered and one has to recognize in particular that:

When undertaking the appraisal of a new project, it would be in the interests of the budget maximizing bureaucrat to understate the costs and to overstate the benefits of the project and at the same time to use a low rate of discount when calculating expected net benefits to the community. This kind of strategy increases the chance of the project being approved and the continued existence of the bureau. (Jackson, 1982: 202)

In the African context, perhaps the most notable manifestation of this type of evaluative behaviour in the public sector is an unquestioning reliance on

5. Credit for this term is due to Carlsson et al. (1994).

estimates provided by foreign machinery suppliers, management agents and other actors with a vested interest in promoting the acceptability of a project. What is especially revealing about this tendency is that it has often persisted even in the face of strenuous criticism from other institutions of the state. In the case of Kenya, for example:

Available evidence suggests that reliance on the proposer's description of the various aspects of an investment package is the rule rather than the exception . . . In some cases, findings of the NPC [New Projects Committee], IPD [Industrial Promotion Department], or ISPC [Industrial Survey and Promotion Centre], and independent sources critical of certain projects appear to have been ignored. This sometimes led to the acceptance, at face value, of projects with little chance of success and whose descriptions provided in glossy brochures were much different than what was implemented. (Gachuki and Coughlin, 1988: 95)

Similarly, a detailed study of parastatals in Tanzania reports that 'The question of the viability of a project was usually satisfied by the presentation of a single feasibility study. These studies invariably indicated that the project would be profitable' (Williams, 1976: 165).

The 'Overcapitalization Hypothesis'

According to the foregoing discussion, the technological consequences of budget-maximizing behaviour in the public sector are felt *indirectly* through the selection and promotion of particular *projects*; in fact, technology can be regarded merely as the by-product of a bureaucratic process, the 'fall-out' from the particular package of external finance and other project inputs that happen to be selected (Williams, 1976). Even where technologies are subject to comparison, however, the same technological bias to which this bureaucratic process gives rise, will tend to persist. For at that point, the so-called 'overcapitalization hypothesis' (Niskanen, 1975) comes into play.

Drawing on the basic assumption of public choice theory that the bureaucrat pursues his own interests while in office, this hypothesis ascribes the 'overcapitalized' nature of technology in the public (as opposed to private) sector to the comparatively short period that is actually available to the bureaucrat for this purpose. In particular, since '[the] bureaucrat's rewards are specific to his tenure in that position', he is assumed to 'prefer present spending to future spending and, thus, to prefer production processes with higher capital costs and lower operating costs' (Niskanen, 1975: 639). In support of this hypothesis, Niskanen cites studies from developed countries which show that public utilities are more capital-intensive than private utilities in the private sector.

Although there are relatively few studies which have compared the technological choices made by public and privately-owned enterprises in African industry, those that do exist suggest that the former tend to be more capital-intensive than the latter, thus providing at least a degree of support

for the 'overcapitalization hypothesis' in this context. For Ghana, Ahiakpor (1986: 155) found that: 'Though they are not statistically significant, the other results from the pooled sample give the impression that wholly state owned firms are more capital intensive than private firms (2.1 to 1) while the mixed private and private local firms are less capital intensive than the private foreign firms'. In comparisons between Kenyan firms in the same industry producing an identical or similar product, Hopcraft and Oguttu (1982: 191) concluded that 'on the whole parastatal firms are more capital intensive than other firms'. Similarly, for ten major industries in Tanzania: 'In every sector except printing or publishing, Government or joint-owned firms operated more capital intensive and less capital productive techniques than private firms' (Perkins, 1987: 197).

Aid Donor Practices

Although this article has addressed itself primarily to public sector institutions in the industrial sector, it is essential to recognize that the behaviour of these institutions is often reinforced by, and may even be the product of, particular aid donor practices.

For example, Tendler (1975) and others have persuasively argued that achievement within aid donor institutions tends to be measured by the quantity of funds transferred, rather than by the effectiveness with which those funds are actually utilized. When combined with a typically biased availability of capital funding relative to resources for recurrent expenditures, this method of rewarding achievement imparts a clear bias in favour of large-scale, capital- and import-intensive projects. In this and in other ways (such as a preference for project over budget aid and for short rather than long time horizons), it is more appropriate to speak of a coincidence rather than a divergence of interests between aid donors and foreign-exchange maximizing bureaucrats in the host countries.

CONCLUSIONS

This article has taken as its point of departure the notion that technological problems — in the broad sense of the term — lie at the heart of the poor performance of public investment projects in Sub-Saharan Africa. It has further suggested that most existing explanations of these problems fail to consider the possibility that the extraordinarily rapid expansion of public enterprises in the industrial sector has *itself* been closely associated with the observed patterns of technological behaviour in the sector. The theoretical basis for such a possibility was found to reside in a variety of literatures, ranging from the theory of the firm, to public choice theory and the behaviour of the public sector in Eastern Europe. In each of these cases, what

is emphasized is the size and growth of the enterprise rather than (or in addition to) its profitability.

Partly on the basis of case-study material drawn from the political science literature, it can be argued that the expansion of public sector industrial enterprises in Sub-Saharan Africa can be directly related to the managerial objectives (such as power, patronage and institutional survival) posited by Baumol (1967) and Williamson (1964) in the theory of the firm, and by Niskanen (1975) in the public choice approach. These firms, it seems, are no less 'expansion-driven' or 'investment-hungry' than their state-owned counterparts in Eastern Europe and no more subject than the latter to considerations of costs or efficiency. However, the technological consequences of expansion, rather than cost-oriented behaviour in the public sector, are not at all the same in Sub-Saharan Africa as in Eastern Europe. Whereas enterprises in the latter region appear to exhibit some tendency to search for and develop capital-saving technologies, in Africa the public sector is led inexorably to highly labour-saving technologies that are strikingly inefficient and inappropriate in the local context. Much of this difference can be ascribed to the dominance of foreign aid in financing an 'expansion-driven' public sector in Sub-Saharan Africa and to the complementary role played during the project cycle by the 'foreign exchange maximizing bureaucrat'. His role, one should emphasize, will not necessarily change as a result of the macro-economic reforms that have been introduced in Africa as part of structural adjustment programmes. With no significant alteration in either the penalties attached to inefficient enterprise performance or the rewards that accrue to managers from improved economic performance, 'budget-maximizing' bureaucrats will see little reason to alter their accustomed patterns of technological behaviour.⁶ In Tanzania, for example, not even the most unprofitable public enterprises had been forced to close down by the end of the 1980s. Nor, by that same period, had privatization made any appreciable impact on the size of the public sector. Indeed, in Tanzania, as in many other African countries, fewer than 10 per cent of the total stock of public enterprises was divested between 1986 and 1992 (World Bank, 1994). 'Efforts at reform', according to the World Bank's most recent evaluation of the African experience, 'have been disappointing overall' (World Bank, 1994: 109).

One needs to recognize, however, that not all countries in the region have been uniformly unsuccessful from this point of view. In a few cases, the rate of privatization of public enterprises has been in excess of 40 per cent, while in other countries a reduced willingness on the part of finance ministries to continue subsidizing public sector deficits has changed the circumstances confronting the bureaucratic decision maker (World Bank, 1994). To this extent, the severity of the problems described above — which relate

6. For more details, see James (1995).

primarily to the public enterprise expansionary phase of the 1970s — will tend to be reduced.

REFERENCES

- Abernethy, D. (1988) 'Bureaucratic Growth and Economic Stagnation in Sub-Saharan Africa', in S. Commins (ed.) *Africa's Development Challenges and the World Bank*, pp. 179–216. Boulder, CO: Lynne Rienner.
- Ahiakpor, J. (1986) 'The Capital Intensity of Foreign, Private Local and State Owned Firms in a Less Developed Country', *Journal of Development Economics* 20: 145–62.
- Bagachwa, M. S. D. and F. Stewart (1992) 'Rural Industries and Rural Linkages in Sub-Saharan Africa', in F. Stewart, S. Lall and S. Wangwe (eds) *Alternative Development Strategies in Sub-Saharan Africa*, pp. 145–84. Basingstoke: Macmillan.
- Baumol, W. (1967) *Business Behavior, Value and Growth* (2nd edn). New York: Harcourt, Brace and World Inc.
- Brodén, M. and J. Mattsson (1980) 'Negotiating Joint Ventures in Tanzania', Research Project No. 97, Linköping University.
- Carlsson, J., G. Köhlin and A. Ekholm (1994) *The Political Economy of Evaluation*. Basingstoke: Macmillan.
- Downs, A. (1967) *Inside Bureaucracy*. Boston, MA: Little, Brown.
- Dunleavy, J. (1991) *Democracy, Bureaucracy and Public Choice*. Hemel Hempstead: Harvester Wheatsheaf.
- Gachuki, D. and P. Coughlin (1988) 'Structure and Safeguards for Negotiations with Foreign Investors: Lessons from Kenya', in P. Coughlin and G. Ikiara (eds) *Industrialization in Kenya: In Search of a Strategy*, pp. 91–111. London: Heinemann.
- Holtham, G. and A. Hazlewood (1976) *Aid and Inequality in Kenya*. London: Croom Helm.
- Hopcraft, P. and J. Oguttu (1982) 'Parastatal Development Agencies and their Relationship with the Private Sector', Occasional Paper No. 39. Institute of Development Studies, University of Nairobi.
- Horn, M. (1988) 'The Political Economy of Public Administration: Organization, Control and Performance of the Public Sector'. PhD thesis, Harvard University.
- Hyden, G. (1983) *No Shortcuts to Progress*. London: Heinemann.
- Jackson, P. (1982) *The Political Economy of Bureaucracy*. Oxford: Phillip Allan.
- James, J. (1995) *The State, Technology and Industrialization in Africa*. Basingstoke: Macmillan.
- Kornai, J. (1981) 'Some Properties of the Eastern European Growth Pattern', *World Development* 9 (9/10): 965–70.
- Lacey, R. (1989) 'The Management of Public Expenditures: An Evolving Bank Approach'. Policy, Planning and Research, WP5 46. Washington, DC: The World Bank.
- Lall, S. (1992) 'Structural Problems of African Industry', in F. Stewart, S. Lall and S. Wangwe (eds) *Alternative Development Strategies in Sub-Saharan Africa*, pp. 103–44. Basingstoke: Macmillan.
- Leff, N. (1985) 'Optimal Investment Choice for Developing Countries', *Journal of Development Economics* 18(2/3): 335–60.
- Leonard, D. (1987) 'The Political Realities of African Management', *World Development* 15(7): 899–909.
- Mukandala, R. (1988) 'The Political Economy of Parastatal Enterprise in Tanzania and Botswana'. PhD thesis, University of California, Berkeley.
- Nellis, J. (1986) 'Public Enterprises in Sub-Saharan Africa', World Bank Discussion Paper. Washington, DC: The World Bank.
- Niskanen, W. (1973) *Bureaucracy: Servant or Master?* London: Institute of Economic Affairs.
- Niskanen, W. (1975) 'Bureaucrats and Politicians', *Journal of Law and Economics* 18(4): 617–43.

- Perkins, F. (1980) 'Technological Choice, Industrialisation and Development: The Case of Tanzania'. PhD thesis, University of Sussex.
- Steel, W. (1972) 'Import Substitution and Excess Capacity in Ghana', *Oxford Economic Papers* 24(2): 212–40.
- Stewart, F. (1977) *Technology and Underdevelopment*. Basingstoke: Macmillan.
- Tendler, J. (1975) *Inside Foreign Aid*. Baltimore, MD: Johns Hopkins University Press.
- Vickers, J. (1985) 'Deregulation and the Theory of the Firm', *Economic Journal* 95 (supplement): 138–47.
- Wangwe, S. (1992) 'Building Indigenous Technological Capacity: A Study of Selected Industries in Tanzania', in F. Stewart, S. Lall and S. Wangwe (eds) *Alternative Development Strategies in Sub-Saharan Africa*, pp. 265–93. Basingstoke: Macmillan.
- Williams, D. (1976) 'Choice of Technology and National Planning. The Case of Tanzania'. PhD thesis, Graduate School of Business Administration, Harvard University.
- Williamson, O. (1964) *The Economics of Discretionary Behavior*. Englewood Cliffs, NJ: Prentice Hall.
- Wilson, E. (1978) 'The Political Economy of Public Corporations in the Energy Sectors of Nigeria and Zaire'. PhD thesis, University of California, Berkeley.
- World Bank (1984a) *Zambia: Industrial Policy and Performance*. Industry Dept., Industrial Strategy and Policy Division. Washington, DC: The World Bank.
- World Bank (1984b) *Toward Sustained Development in Sub-Saharan Africa*. Washington, DC: The World Bank.
- World Bank (1986) *Financing Adjustment with Growth in Sub-Saharan Africa, 1986–90*. Washington, DC: The World Bank.
- World Bank (1987) *Tanzania: An Agenda for Industrial Recovery*. Africa Region, Industrial Development and Finance Division. Washington, DC: The World Bank.
- World Bank (1994) *Adjustment in Africa*. Washington, DC: The World Bank.

Jeffrey James is Professor of Development Economics and Director of Graduate Studies in Economics at CentER, Tilburg University, PO Box 90153, 5000 LE Tilburg, The Netherlands. He is currently engaged in research on A. K. Sen's notion of functionings and on the concept of technological systems in developing countries.