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THE TRANSFER OF TECHNOLOGY TO TANZANIA'S PUBLIC
ENTERPRISES

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In the political programme of every government in Africa, economic development through industry and agriculture features very significantly. This is more so in countries which have chosen socialism as a strategy for development. Many manifestoes of various African political parties start with phrases about structural dependence, the neo-colonial underdevelopment syndrome and how to get out of it. The development strategies comprise of measures geared towards increased government participation in the economy and this as a prerequisite for state controlled technological development. Public enterprises are usually formed in order to enhance this goal. In Tanzania such enterprises have been formed on a very large scale. At the end of 1982 there were 373 public corporations.¹ Roughly 70% of these are engaged in industry, 20% in agriculture and 10% in services. The main objectives behind the establishment of these enterprises especially in the industrial sector, were one, to ensure that the government controls industrial development in the vital areas of the economy and two, to ensure rapid technological transformation. The objective of this paper is to examine the main constraints the Tanzanian government faces in its attempt to achieve these goals.

TANZANIA'S CONCEPTION OF TECHNOLOGY

At the level of the individual and that of the society there is need for a clear conception of what constitutes an objective

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and the means of attaining it. The majority of planners, politicians and researchers in Tanzania do not seem to have developed a clear conception of what constitutes technology and its transfer. There is a general failure to disaggregate technology and differentiate between the physical transfer of technological hardware and the actual acquisition of its disembodied component which is technical-know embodied in the organisational and technological methods and systems of running, maintaining and harnessing that hardware to local developmental needs and technological requirements. Even the intelligentsia is still very shaky in its conception of what constitutes of a 'transfer of technology.' Masete Kuuya for example, divides technology into three main components, (a) technical and commercial information that can be used in the research and development of new methods of production, marketing or services, (b) highly trained manpower that can design, develop and carry out research on technology and make decisions about the efficient utilization of such technology, and (c) physical assets that are man-made.'

Having very correctly categorised technology, Kuuya goes on to say that 'transfer of technology', "should be understood to mean the acquisition by that country, of what statisticians would call, 'the combination and permutation' of the above three categories." This, as far as it refers to acquisition generally (including local development of these capabilities), may be correct because it may cover situations in which the three of them or some of them are developed from within. But Kuuya goes on to say, 'that is to say the importation of either a or b or c or a+b or a+c or b+c or a+b+c into a country would constitute a transfer of technology.'² This outlook of 'transfer' is very erroneous. It implies^{that} the mere

recruitment of foreign experts to carry out feasibility or any other kinds of studies or the construction and commissioning of a plant by such experts amount to a 'transfer' of technology. Worse still it even implies that a mere acquisition of technical equipment in se constitutes of a transfer of technology. In our opinion neither of these necessarily constitute of actual transfer of technology.

Transfer cannot be complete unless it is accompanied by an actual acquisition by the recipient not only of the physical technological hardware and its elementary processes but also the mastery of the organisational methods and systems, independently of the supplier.³ As Dahlman and Westphal have argued, "technological mastery is not achieved by passively importing foreign technology." Rather for there to be a transfer, indigenous efforts must be made to assimilate, absorb, diffuse and modify imported knowledge and this can only occur where a thorough effort has been made to put imported technology at the command of local forces. Neither the government of Tanzania nor the ruling party have (even in the most radical of their policy statements) ever addressed themselves to this vital question. As a result no industry in the public sector has been able to address itself thoroughly to the question of what transfer of technology is, beyond the mere acquisition of 'modern' equipment and 'expertise'. It is only by addressing themselves to these questions that some countries, once underdeveloped, have made big strides in the area of technological development. Jorge Katz for example, has shown how due to clear conceptions and policies towards technological advancement, ^{Latin American enterprises} have been making substantive progress in the process of assimilating technology by for example, "stretching the capacity of existing plants through various adaptations, breaking bottlenecks in particular plants, improving

the use of byproducts, extending the life of equipment, adjusting to change in raw materials resources, and altering product mix."⁴

All these cannot be achieved when technological development strategies are based on spontaneity. Conscious policies have to be developed and tested and these are lacking in the majority of our countries including Tanzania. In their study of developments in Brazil and Argentina Dahlman and Wedphal have clearly shown that all the assimilation efforts have been based on conscious policy. They say for example that in Brazil, 'some of the firms studied appear to have followed explicit technological strategies aimed at specific long term objectives. Others seem merely to have reacted defensively to changes in their circumstances or to obvious needs to adopt imported technology."⁵ In both circumstances however, the main determinant force is clarity of objectives, a national consciousness of national limitations and needs and an industrial transformation strategy. All these require a carefully studied, worked out and supervised technological development policy.

TANZANIA'S TECHNOLOGICAL POLICY

The study of such a policy usually ends up as a study of its absence. Tanzania has remained shackled to the pylon of political nationalism. National economic consciousness has been limited to petty monetarism, based on the general loss-profit accounting. It has not developed or exhibited a high level of economic nationalism which would compel it to devise a developmental strategy leading towards the mastery of its industrial environment. Explicit technological policy is lacking and wherever attempts have been made to pronounce it, they have been limited to isolated statements on minor issues

involving technology generally. The earliest statements reflecting an element of technology policy appeared in the First and Second Five Year Development Plans i.e. between 1964 and 1974. In both these plans, all having been said about borrowing and generating funds internally for technological and other development, it was casually cautioned that wherever possible priority should be given to labour intensive production techniques. 'Technology' in the two plans only referred to technological hardware and not the mastery of its accompanying disembodied components. The reasons advanced for the preference of labour biased technology (hardware) was the generation of employment opportunities.⁶ With very few exceptions like the Chinese Built Friendship Textile Mill, very few factories set up between 1964 and today can be said to be capital serving.

On the other hand, the sole ruling party TANU, as it then was, issued a more thorough-going statement in 1971. In its guidelines issued in 1971 (perhaps the most radical guidelines it has ever given), the Party pronounced its policy on small-scale industries. The guidelines pointed out inter alia that, 'small-scale industries are essential to the development of our country because in a country like ours which has been exploited and oppressed for a long time, there is an acute shortage of high-level technological skills and investment capital. Because small industries do not require a high level of skills or a lot of capital, they can be initiated and run by the people themselves and more easily so, if they are organised into socialist units.'^{6a}

Reasons advanced by the Annual Congress were:-

- (a) That in most peasant societies agriculture was seasonal; that the remaining period of the year was dry and wasted in

idleness; that small industries would therefore diversify peasant economic activities and give the peasants extra economic activities;

(b) Small industries would help absorb surplus labour in the villages and reduce rural urban migration;

(c) There was need for a rural technological revolution and that these industries could accelerate this process and help inculcate new and modern skills in agricultural production;

(d) Small scale industries would reduce rural-urban disparity and this would enhance socialism by reducing the difference between the towns and the villages;

(e) Because^f the small industries, the cost of production would be significantly reduced.⁷

Although Obrien, Dolman and Kisanga argue that the small-scale industrial strategy was prompted by the feeling that small was appropriate and manageable, the reasons which were clearly spelt out by the Party go beyond fascination with size. The party congress in actual fact made thorough analysis of the colonial ossification of the indigenous science and technology. The strategy therefore sought to stimulate the revival of indigenous technological capabilities.

The guidelines were sound up to the level and especially as regards the essence of the strategy but it had inherent shortcomings which might be defeative of its objectives. First, instead of these industries being established as complimentary to urban-based industries, they were and are being supplementary to large-scale industries. Hence they do not provide a linkage within the national industrial system. Secondly, practice has shown that instead of small-scale industries being mainly rural based, they are mainly urban based.⁹ This in essence mainly defeats the twin

objectives of cutting down rural-urban migration and that of bridging the gap between the towns and the countryside. Thirdly, while the small-scale industries and the Small Industries Development Organisation [SIDO] which is supposed to promote and develop these industries] were initially expected to serve as an internal medium for the transfer of technology from urban to rural industries, they have been made appendages of international technology culture, like their counterparts in towns. SIDO seems to be creating small industries bearing its own image. Fourth, the Guidelines were isolated right from the start. They were passed at the same time as other guidelines on agriculture [The Famous 'Agriculture Implies Politics' Guidelines and vice versa which were pronounced in May 1972] but no attempt however, was made to link the agricultural strategy to the small-scale industrial strategy. Nowhere has an industrial revolution ever taken place without striking this vital link. Finally, since 1971 when the guidelines were issued, the Party has never made a serious appraisal of their implementation. As a result, SIDO has been operating without any checks or balances and the most it has done is, as said earlier on, operate as an appendage of the international donor agencies and as an agent of transnational Corporations.¹⁰

Other explicit science and technology policy statements have been confined to a very general level. The emphasis has been put only on science training in secondary schools and the University but this has not been accompanied by any conscious or sound programmes to channel this training towards the creation of local technological ^{institutions} schools. Recently the local UNESCO Committee on social sciences has observed that:

"There is already a vast accumulation of knowledge and it is within man's ability to use knowledge to solve problems of poverty, hunger, housing and illiteracy."¹¹

It has noted further that developing countries have failed to use this knowledge because they have not been able to assimilate technologies from developed countries. But this committee simply diagnosed the problem. It did not work out a programme which could take Tanzania, out of the syndrome of technological dependence. Its main bias has been ^{for the} increased of science training enrolment and facilities.

At enterprise level, very few enterprises seem to have devised a science and technology policy. The National Development Corporation established a year after independence i.e. in 1962, has been charged with the gigantic task of stimulating industrial development. This Corporation is not known to have ever pronounced a technology policy. The only set of guidelines it issued were in 1969 on the criteria for investment. These included the conventional criteria for investment i.e. proximity to raw materials, transport facilities, and other infrastructure, labour etc. In actual fact these criteria have been used by the NDC to explain its urban biased industrial investment pattern.¹² The absence of technological policy on the part of the NDC has made it operate without a sound direction. Between 1964 and 1971, it controlled the majority of the public investment enterprises. It almost plunged the whole country into a disaster by serving as membrane for the penetration of these enterprises by transnational corporations. It threw its subsidiaries into a web of neo-colonial dependence, signing unconscionable consultancy and equipment supply agreements.¹³ It initiated joint ventures between its subsidiaries and transnationals most of which have not shown any signs of technological spill-overs. They have helped multinationals

to gain a foothold in Tanzania without Tanzania acquiring the necessary technological know-how from them. Overpricing and transfer pricing have been alleged to have been highly facilitated by this alliance.¹⁴ Studies of specific subsidiaries of the NDC have testified to these allegations. The Tanzania Bag Co. for example established in 1972 achieved the highest production capacity in the first year of operation (58%). A year later i.e. in 1973 the capacity fell to 54% and in 1974 the official estimate of the capacity was 43%.¹⁵ Ever since the Company's performance has been going down. The designs of the plant and supply of the machinery were done by Gardella which in actual fact simply handed over the project on a turn-key basis and handed over to the NDC almost immediately. The NDC had failed to negotiate favourably because it did not enter into any agreement on the supply of spares nor did it in the commissioning agreement make room for the transfer of technological capabilities from the suppliers to the Company. It would be ridiculous to enter into a consultancy or management agreement which is exclusive of the local technical and management staff as this would impede learning by doing and the accumulation of local technological capabilities. But it is equally ridiculous and even chaotic to acquire a new plant without capability to run it and instead of learning from the supplier its organisational and operational systems, cutting a link with the supplier and employing other consultancy firms to run the same. Now the Bag Co. has been transferred to the Tanzania Textile Corporation with all its deficiencies. It seems without exaggeration that the only efficient thing at that enterprise is the football team.

Coulson's study of the Tanga Fertilizer Co. in 1975 revealed how Klockner, a German Company had ripped off the NDC in its joint venture agreement. Klockner carried out the pre-design, design and construction work; it managed tenders for the supply

of equipment and materials and blocked international bids thus ensuring that all the equipment and materials were supplied by its own subsidiary. This was neither disclosed to the NDC nor did the latter inquire about the relationship between the supplier and the consultant.¹⁶ Having messed up the initial stages, Klockner delayed the construction, changing plans and designs in the middle of the construction process. The result has been disastrous. The factory took more time to construct than anticipated. The insistence of Klockner on the importation of sulphates from one of its subsidiaries in the Middle East (although they were available in plenty 250 miles away), made production of fertilizers very expensive. The peasants have been the group most affected by the disaster. In order to hasten loan repayment, the government has been compelling the peasantry to use fertilizers even where other kinds of fertilizers are available. The prices have been very high and the Tanzania Rural Development Bank has been distributing fertilizers on loan basis to villages. In 1978, the Bank was deducting up to 75% from the proceeds of the peasantry in tobacco growing areas. In 1978 a Member of Parliament from the Urambo District (a tobacco growing District) asked the government to cancel the debts of the peasantry. The request was ignored. The situation is still pathetic. The NDC acquired the cross from Klockner and the peasantry like Simon in the Bible bears it.

The NDC has landed the Tanzanian industry into an unfarthomable quagmire of technological dependence. Few other examples include the obtaining of obsolete and sub-standard equipment from an Italian Company called Danielli, for the Steel Rolling Mills in Tanga. The equipment was 'inappropriate' in the conventional sense. This Corporation which is supposed to provide a base for the steel industry uses sub-standard equipment,

whose billets are of a smaller size than the gauge currently in use. The billets are hard to find elsewhere except from the supplier Company.¹⁷ The Mill has had a tumultuous history of loss accumulation and the prices of its products have been going up from time to time. This has in turn increased the cost of iron and steel products elsewhere in the economy thus hampering development in the engineering and metal based industries.

All these examples have been given to show how the lack of a technology policy at enterprise level has very much affected the development of industry in Tanzania. Obrien and his colleagues have argued that the basic problem on the part of Tanzania's leadership in government and its enterprises is that they fail to work out independent developmental strategies because of an inferiority complex inculcated by colonialism and perpetuated by neo-colonialism.¹⁸ When such a complex is camouflaged in false confidence and arrogance, the problem becomes hard to overcome. Such false confidence has been exhibited in some utterances of parastatal officials. For example in 1970, the General Manager of the MDC had this to say about collaboration with multi-nationals,

'The point may be made that it is anomalous that a socialist organisation like MDC should work or even wish to work, in partnership with capitalist companies. The short answer is that there is no possibility of such companies dominating or even influencing our economy or of altering our charted pattern of development. If just happens that we for our motives and they for theirs can meet at certain points to our mutual advantage.'¹⁹

Five years later the government found itself compelled to suspend the third five year development plan because the public enterprises which had initially been expected to finance the plan had not only proved that Rostow's take-off theory applies only to aviation

in a neocolonial economy but also proved the above-quoted recital of moribund theories of comparative advantage antiquated and uninformed.

RESEARCH AND DEVELOPMENT

If imported technology has to be successfully diffused and assimilated there has to be development oriented research. This research has to be carried out on two main fronts. First it has to guide recipients to choose "efficient techniques" or the best techniques which Westphall and Dahlman describe as techniques which have the highest net benefit for the recipient.²⁰ This kind of research has been of great use to some Latin American enterprises studied by Dahlman and FONSECA²¹ especially the USIMINAS in Brazil which did not rush to set up a steel industry until it had studied the comparative benefits it would get from each of the bidders and thereafter chose a Japanese firm on the basis of known and consciously determined merits. Jorge Katz has also shown how pre-project research has helped many enterprises in Argentina and Brazil.²²

The second area where research can be very useful is in the post-investment assimilation. As Westphal and Dahlman point out, indigenous efforts must be made to assimilate, modify and diffuse technology because it is only through local efforts that existing technological knowledge can be mastered.²³ But as the two authors point out,

"the initiation of a new production activity requires a great deal of iterative problem solving and experimentation as the original concept is refined and given practical expression.

This sequential process lasts for as long as changes continue to be made in the operation of the venture."²⁴

Two things are essential if this process has to be initiated and continued to its logical conclusion. First both at national enterprise levels, there has to be a conscious Rand D policy as part of the development strategy. Government support is very vital in this area. The Tanzania government has shown its realisation of the need for research and development by establishing a lot of industrial and agricultural research institutions. The most important of these are the Tanzania Industrial Services and Consultancy Organisation [TISCO] established in 1974, The Tanzania Industrial Research Development Organisation [TIIRD], National Engineering and Design Company [NEDCO] Tanzania Agricultural Research Organisation [TARO] Tanzania Livestock Research Organisation and the Arusha Appropriate Technology Centre. In addition there are other research oriented government enterprises.

One characteristic feature of these and other institutions, is that neither of them were established as part of the national technological advancement strategy because no such strategy exists at all. Most of them have been spontaneously established. Secondly and most important is that most of these operate as consultancy organisations and their main objective is to replace capitalist consultancy firms. This has an advantage in that it diverts revenues from capitalist consultancy firms to government coffers. Furthermore it arms the government with vital policy implementation instruments if there were such policies or at the time these policies emerge. But at the moment the absence of such policy makes these vetal institutions perform the same role as is performed by capitalists consultancy firms -

the perpetuation of neo-colonial dependency. Thirdly TISCO, TIRDO and TARO are mainly manned by experts from the traditional international consultancy firms which in the past have been party to the ruin of Tanzania's industry. With this kind of collaboration, it is clear that now instead of these consultancy firms ruining Tanzania's industry directly the harm is caused by local staff and local institutions working under their instruction. What these international firms are now doing is merely serving old wine in new bottles.

With lack of conscious local efforts at state level towards self-reliance, the enterprises at the micro level are caught up in web of economic dependence on the international technological systems. In enterprises where isolated research and development efforts are attempted as in the textile sector, the innovations are spontaneous insignificant, costly and not strongly supported by government. As O'Brien and his colleagues argue,

"The international economic system with its tendencies towards the internationalisation of capital and transnationalisation of production, has inherent forces which tend toward the marginalisation and fragmentation of the developing countries. Within this system science and technology are becoming even more hierarchical centralised and specialisation oriented."²⁵

If no steps are taken by the government to arrest these developments, no single enterprise however organised, funded or determined can pull the hands of the clock back. It is worth noting that while this kind of dependence is generated by the international economic system it is groomed and sustained by the local forces in developing countries, conscious policy and committed efforts can easily break the notorious and often mystified vicious cycle.

CONCLUDING REMARKS

We, academics are usually criticised for being too critical and ignorant of the actual reality. We are usually told that there are practical problems which theoretical analysis and theory per se cannot solve. But any practice is usually an interpretation of a theory and there cannot be a practice without a theory. When we allege for example, that Tanzania lacks a technological policy, what we simply mean is that the government ought now to sit down and work out a policy which will operate in its favour. What we mean is that the current theories on which its practices are based e.g. theories of comparative advantage, are not its own and do not apply in the absence of a clear well digested policy. Compared to other countries in the third world, e.g. Brazil and Argentina, Tanzania although preaching a radical policy, is worse than the former. Dahlman and Westphal have shown for example that "some firms studied [in Brazil] appear to have followed explicit technological strategies aimed at specific long term objectives. Others seem merely to have reacted defensively to changes in their circumstances, or to obvious needs to adopt imported technology."²⁶ This has been corroborated by specific studies on CNS and USIMINAS in Brazil carried out by Dahlman and Fonseca.²⁷ In the two enterprises, conscious and positive policy has influenced choice of techniques, suppliers, raw materials etc. The result of this policy has been an appreciable degree of mastery of technology on the part these Brazilian firms. Tanzania has the capacity to launch a serious programme of industrialisation based on well planned policy. The relative strength of the government is an added advantage.

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