

AGRARIAN DEVELOPMENT PROGRAMMES OF AFRICAN COUNTRIES:
A REAPPRAISAL OF PROBLEMS OF POLICY

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As the rate of growth of population in developing countries increases and prospects of expanding domestic and external markets become brighter, agricultural development becomes more crucial. Agricultural development is the process of change from traditional and subsistence production towards a greater degree of market-oriented production, a movement from a relatively lower level of productivity and low returns to a relatively higher level of productivity and high returns. It involves the application of science and technology to farming as an enterprise. For developing countries, agricultural development is a basic requirement for sound economic growth.¹⁾

The productivity of agricultural resources in developing countries is considered to be low by Western Standards. This low productivity stems from a number of factors, such as the low level of capital formation, inadequate application of technological innovations, obsolete land tenure systems, etc. In Nigeria, for example, the rate of growth of this sector has not exceeded 4% per annum and for the past few years, it has been about 2% per annum.²⁾ If the productivity of the agricultural sector is to be raised, it becomes imperative that the sector should undergo some structural changes.

Although the strategic role of agricultural modernisation in the process of economic growth has gained wide acceptance, opinions are divided on the strategy to adopt in this process of change. The whole issue centres on what some economists refer to as the "improvement" approach and the "transformation" method.

In this paper, we shall make a brief analysis of each of these two aspects of agricultural production technique, attempt a critical evaluation of them and indicate, in the light of available evidence, what we consider to be an

appropriate policy for a developing country to follow, given its level of development and technical know-how. In a short paper of this nature, it is impossible to deal exhaustively with the whole of Africa. We shall therefore, make references to a few African countries.

The "Improvement" Approach

Belshaw defines the "improvement" approach as consisting in "the improvement of agricultural productivity within the existing framework of small-scale peasant agriculture".³⁾ In other words, it consists of changes within the existing traditional methods of farming - the adoption of production methods based on the use of familiar, but improved techniques. The basic ingredients in this approach are as follows:⁴⁾

1. use of simple labour - saving devices such as ox-ploughs, rotary weeder, manual-operated threshing machines, etc;
2. biological innovations exemplified in the use of better quality seeds, insecticides and fertilizers;
3. provisions of short-term, medium-term and long-term credit to farmers to purchase the necessary farm inputs, and
4. provision of extension service to farmers to advise on cultural practices and proper use of farm implements.

A major advantage of the improvement approach lies in its low cost. Any failure of the scheme is attributable to poor implementation procedure.

Economic historians have often made reference to the Japanese model of agricultural development as an embodiment of the "improvement" approach. Evidence from the works of Johnstone and others points to the fact that increases in agricultural output and productivity in that country have been achieved with remarkably small demands on the criti-

cally scarce resources of capital and foreign exchange within the framework of existing peasant agriculture.⁵⁾ Japan's attempts to introduce western methods of large-scale mechanised farming in the 1870s were unsuccessful. Henceforth, the strategic importance of increasing the efficiency of the prevailing system of small-scale agriculture based on peasant holdings was recognised. The Japanese application of Meiji technology has been aptly described by Ogura as "a combination of indigenous know-how and very selective borrowing from the West".⁶⁾ Thus, the genesis of Japan's agricultural revolution lay in the people's "intimate knowledge of the best of their traditional farming methods". The organisation of group activities, such as agricultural shows and meetings in which incentive schemes ranging from competitions, prizes and subsidies were introduced, added momentum to the agrarian revolution. The peasants became receptive to new techniques of production. The net result of all these measures was the fostering of attitudes favourable to agricultural progress.

The Japanese model therefore, demonstrates the potential which exists for increasing farm output and resource productivity within the ambit of small-scale labour-intensive agriculture, and ultimately, for modernising the rural sector. Agricultural modernisation cannot, therefore, be effected in a vacuum. Hence Lockwood's remark:

"If Japan's experience teaches any single lesson regarding the process of economic development in Asia, it is the cumulative importance of myriads of relatively simple improvements in technology which do not depart radically from tradition or require large units of new investment".⁷⁾

"It is always easier", he asserts, "to introduce innovations which do not break radically with the past".⁸⁾

The "Transformation" Method

The "transformation" method of agricultural development on the other hand, is based on large-scale mechanised culti-

vation using motorised equipment, irrigation systems, settlement and ranching schemes. The economic principle underlying this approach is that the traditional tools for farming, such as the hoe (jembe) and the machet (panga) are limiting factors in the process of agricultural development and economic growth. Large-scale application of capital equipment to farming is considered to be the only way to break the "vicious circle of poverty". The technique is assumed to lead to the "creation of markedly more efficient agricultural systems," thus underscoring its wealth-creating capacity.

In contrast to the Japanese model, the Mexican model of agricultural development is a classic example of the "transformation" approach. In the model, increases in agricultural output and productivity in the post-war years came from a small number of large-scale, capital-intensive, commercialised farms made possible by the massive application of credit obtainable on favourable terms from the Ejido banks.

However, the growth of farm output in Mexico was limited to the semi-northern part of the country, while the southern part was largely not affected by the "green revolution". Thus, the "transformation" approach in Mexico meant that the bulk of the nation's farmers were largely by-passed by the progress that had been made. The result was a dualistic economy "sharply divided between a relatively affluent sector engaged either in modern industry or the commercial subsector of agriculture, and a large backwater still eking out an existence in semi subsistence agriculture".⁹⁾

THE APPLICATION OF "IMPROVEMENT" AND "TRANSFORMATION" TECHNIQUES TO AGRICULTURAL DEVELOPMENT IN AFRICAN COUNTRIES

The relevance of either the "improvement" or the "transformation" approach to agricultural development depends partly upon the suitability of either of the methods to the economy concerned and partly upon the degree of importance attached to either the present or the future.¹⁰⁾ In other words, the relevance of each of the models to any

developing country is a function of the rate of time preference of the people concerned in terms of the value they place upon present income vis-a-vis future income. Some economists have argued that low-income countries have a high rate of time preference in that they attach greater importance to present incomes than to future incomes. Short-term investments typical of the "improvement" techniques, the argument goes, are preferable to long-term investments exemplified in the "transformation" approach, on the grounds that the latter involves large capital outlays with no immediate prospects of returns. In the selection of appropriate method long-term investments in agriculture, such as sophisticated irrigation schemes, ranching schemes and farm settlements (transformation method) which yield returns in the more remote future, should be more carefully studied when assessing their values against returns in the more immediate future from short-term investments (improvement method). Moreover, if long-term investments in agriculture are undertaken when there are still major economic projects of immediate importance to the economy, the opportunity cost of the extra unit of capital invested in such long-term-yielding investments may be quite high. Hence loading up development budget with capital-intensive slow-yielding investments in the early years of an economy is considered a poor strategy. On the other hand, this argument ignores the fact that although the long-term investments may be slow-yielding they strengthen the productive capacity of the economy and make possible a higher level of future consumption.

Nonetheless, there is evidence that remarkable successes have been achieved where labour-intensive "improvement" approach to agricultural development has been adopted. In Nyeri district of Kenya for instance, farmers using this technique are known to earn high incomes from their farm operations. Similarly, in Abakiliki division of the East Central State of Nigeria where the Norwegian Church Agricultural Project (NORCAP) has been carrying out experiments on improved labour-intensive production techniques based on small-holder schemes, encouraging results have been recorded. The efficiency of the

system of agriculture practised by the NORCAP can be appreciated when per acre average yields of some of the crops grown at this agricultural research center are compared with the average yield of the Nigerian farmer (table 1).

Table 1

Average Yields of Three Basic Food Crops of Nigeria
Compared with Those of NORCAP

Crop	Nigerian National Average lbs/acre (1971)	NORCAP Average Yield lbs/acre (1972)
Rice	963	3,500 (swamp rice)
Yam	8,422	13,000
Maize	806	1,800

Sources: Federal Department of Agriculture, Federal Ministry of Agriculture and Natural Resources, Annual Report, 1972/73, Lagos, March 1974, Appendix II; NORCAP farm records.

The figures above represent real differences in the productivity of the average Nigerian farmer and that of Norwegian Church Agricultural Project, a reflection of the differences in the techniques and methods of farming employed. The high average yields of the Norwegian Church Agricultural Project are decidedly the result of better and high-yielding varieties of seeds used, adequate application of fertilizers and organic manure to crops, as well as better cultivation methods. Farming implements used by the farmers at this centre consists of tractor (whose operation is centrally administered) for cultivation and harrowing - seed bed preparation, hoes, matchets, wheelbarrows, headpans, buckets, foot and hand threshing and winnowing machines. With the exception of the tractors which involve high overhead costs, the rest of the implements are within the reach of the average farmers, and if they form themselves into associations of farmers or producer co-operatives, they will be in a position to obtain tractors. Were the small-scale farmers to adopt the farming techniques and cultural practices adopted at the Norwegian Church Agricultural Project, their crop yields would most likely rise remarkably.

In respect of the Nyeri district of Kenya, one can argue that the fertility of this area rather than the efficiency of the "improvement" approach is responsible for higher per acre yield. Nyeri has deep fertile soils mainly of volcanic origin.¹¹⁾ The same may be said of Abakiliki. By traditional methods, yields from Abakiliki farms are known to be high. We recognize the fact that the comparison of yields in table 1 tends to assume equal fertility for all Nigerian farming zones. A better comparison might be NORCAP yields compared with those of an average Abakiliki farmer in the same zone. Yet this is not without its limitations since Abakiliki soils are, by no means, homogeneous. However, the comparison does show that by improving upon the traditional methods and adopting better farming practices high yields are obtainable.

Studies made in a rural part of the East Central State of Nigeria have also confirmed the claims of the proponents of the "improvement" techniques. A research team in Uboma has found out that simple technological innovations have contributed to rapid expansion and development of agriculture in that place. For example, the construction of a few simple earth dams across an all-season stream helped with the introduction of extensive monocropping for irrigated and upland farms and also made it possible for farmers to develop wasting Raffia palm grove into a rich all-season vegetable garden, thus providing "that adaptive technology rather than the degree of its sophistication tends to be the more important factor for agricultural development".¹²⁾

One of the capital-intensive production techniques that gained acceptance by the Government in Uganda in the 1960s was the group farm scheme.¹³⁾ In its implementation policy for agriculture in the Second-Year Development Plan, the Uganda Government placed a great deal of emphasis on intensive public capital investment in agriculture as a central means of securing increases in the country's agricultural output by rapidly expanding the public programme of group farming and government-owned tractor-hire services. The new plan

portrayed the programme as representing a solution to the "classic problem" of introducing mechanised techniques into a peasant economy of scattered holdings on a profitable basis.

"The establishment of group farms has made possible the introduction of mechanised agriculture in the peasant sector... In addition there will be a considerable investment in large-scale farming and facilities serving the small farmer".¹⁴⁾

Developing countries of Africa have a long catalogue of large-scale agricultural development schemes which have failed. These schemes have invariably involved massive application of scarce resources of capital and expertise. Notable examples are the ₦10 (₦1 (Naira) is equivalent to 10 East African Shillings) groundnut Scheme in Tanzania, the Mokwa agricultural project in Nigeria, the Jinja agricultural enterprise and the group farm scheme in Uganda.¹⁵⁾

In Uganda, for example, the expanded group farm programme of the 1960s was found to be unprofitable. In costing the programme it was wrongly assumed that each tractor would run for 1,000 hours per annum, but the assumption proved to be unrealistic. From 1964 through 1965 the average running time of tractors was less than 500 hours per annum. The running costs of tractors were estimated to be 90 kobo per hour. A thorough analysis of the records of the period revealed that tractor running costs were never less than ₦2 per hour. The summarised data of 1964 and 1965 on the economic performance of the scheme revealed a low benefit/cost ratio of about 0.44 for the whole country.¹⁶⁾ The programme incurred a deficit of ₦470,000 in 1964 and ₦500,000 in 1965.¹⁷⁾ The large deficits incurred were attributed to a poor feasibility study on the investment and the corresponding returns necessary for judging the viability of the project.¹⁸⁾ But one could conceivably say that it was due to the fact that the time was not yet propitious to introduce the scheme.

The Ugandan experience in large-scale mechanised cultivation

and capital-intensive agricultural projects has shown that the cost of such schemes were prohibitive, considering capital and other limitations facing the country.¹⁹⁾ Thus, fears were strongly expressed on the profitability of mechanised agricultural schemes in the country.

Clayton has summarised the situation in Uganda.

"Experience has shown that farm mechanisation has become uneconomic in Uganda, requiring a substantial degree of subsidisation. Over the years it has involved rather large capital outlays and has affected a tiny fraction of the farm population. Moreover, there are no indications that the introduction of tractors has raised over-all agricultural labour productivity".²⁰⁾

Writing about the Tanzanian experience in agricultural mechanisation, Van der Laar commented:

"After the failure of the capital-intensive approach to agriculture, the concept of intermediate technology is now being taken more seriously. Although many simple agricultural implements have been proposed and in fact manufactured in the past, plans have received little support because many started from the misplaced conception that the most modern techniques should obviously be applied".²¹⁾

In an economy with an abundant land resource but scarce labour, capital-intensive technique generally alleviates the problem of scarce labour resource. There is the expectation that mechanised cultivation will enable a farmer to expand the cultivable area and that the increase in farm income resulting from this extended cultivation will more than offset the costs incurred.²²⁾ Investigations carried out in the Northern part of Nigeria where land is relatively abundant, proved that mechanisation is economic when limited to seed bed preparation. An undue expansion of acreage leads to weeding and/or harvesting bottlenecks, because as one process which limits the area cultivated is mechanised another non-mechanised process takes its place and acts as a constraint on production (table 2). It becomes uneconomic to attempt to get around this difficulty by mechanising

the process.²³⁾

Table 2

Cost and Returns on Crop Acreages Achieved by Hand Labour and Mechanisation in Northern Nigeria

Cost and Returns per farm	Hand Labour (8 acres)	Mechanised Cultivation (13 acres)	Mechanised Cultivation and harvesting (32 acres)
	₦	₦	₦
Gross Return	52	90	236
Costs	-	34	196
Net Returns	52	56	40

Source: E.S. Clayton, Mechanisation and Employment in East African Agriculture, International Labour Review, Vol. 105, No. 4; April 1972, p. 5.

In the table, the hand labour indicated is that of the family which is assumed to have no costs, but this is an unrealistic assumption. The indicated net returns is therefore inconclusive.

It would appear that a more rational proposition for developing countries is to give greater encouragement to small-holder labour-intensive schemes, where simple improved production techniques would be applied, rather than invest in better cultural practices like better and timely weeding, better pruning (where applicable), mulching, etc., so as to shift the production function to higher levels, and better market organisation so as to get better crop prices.

In evaluating the success of large-scale mechanised agricultural projects one may have to ask whether the benefits derivable from them are commensurate with the large expenditure on them in terms of scarce resources of capital and expertise and whether there are no cheaper and more effective ways of achieving an increase in agricultural production and productivity, such as measures to improve the farmers'

existing techniques in production. The opportunity costs of large-scale mechanised schemes should be taken into consideration when drawing up such plans.

It should be borne in mind that in a country with a high percentage of rural unemployment, adoption of agricultural production techniques which tend to displace hand labour are a further aggravation of the unemployment problem. According to Onoh, labour saving/capital using technique "may have the greater advantage of raising the productivity of labour but it will considerably worsen the problem of under-employment in the agricultural and industrial sector...²⁹⁾ He further argues that:

"Where there is a choice between sophisticated capital-intensive technique and a simple production technique with more labour inputs the latter should be preferred. Capital limitation and abundance of cheap labour makes the choice necessary. It may be argued that cheap labour may not after all be so efficient... Experience gained in the Soviet Union has proved that labour if properly channelled, controlled and directed could be efficient in the long run".³⁰⁾

Conclusion

The problems of "improvement" and "transformation" techniques in agricultural production have been analysed in this paper. The burning issue is probably not whether to opt for either labour-intensive improvement approach or capital-intensive transformation method, but what adaptation is most suitable to an economy, given its level of development. For some countries, such as the Sahel region and the dry Sudanic zone of West Africa where nature appears rather harsh, massive application of capital investments to agriculture such as irrigation projects and other mechanised schemes are inevitable if the "green revolution" is to reach the desert dwellers. Here we assume that capital, though a scarce factor, could be obtained from external sources, such as the World Bank and other international agencies. In this regard, capital-intensive investments should be coupled with the "improvement" approach for small-scale farming systems. The

following quotation is instructive:

"Although the strategy pursued by Japan seems to have considerable relevance to many contemporary underdeveloped countries, it certainly does not follow that the techniques that were used to increase farm productivity and output in Japan can merely be copied... One of the principal lessons to be derived from the Japanese experience is the importance of progressively modifying existing farming system rather than attempting the whole scale substitution of modern for traditional agriculture."³¹⁾

Similarly, Lester Brown has this to say:

"Each country must analyse its own situation, identifying those activities which if mechanised would intensify agricultural production and create additional employment. Governments should then use all the available policy instruments to encourage the mechanisation of those activities which create jobs while discouraging the mechanisation that is largely labour-displacing".³²⁾

There is no doubt that large-scale mechanised farms, group farms and farm settlements and other related mechanised schemes have visible effect on the landscape. They also offer the necessary platform for development, as well as prestige and value, but these attributes have a very cost value out of proportion to their benefits for a developing economy in the short run. They represent the "transformation" approach to development. Yet the "improvement" approach with a limited amount of mechanisation, if pursued wisely is capable of making a significant impact on such an economy.

REFERENCES

1. B.N. Okigbo, "The Need for a Dynamic and Effective Agricultural Development Policy for the East Central State, in M.O. Ijere (ed.) The Green Revolution: Proposals for a Dynamic Agricultural Policy and Strategy in the East Central State, (draft copy 1972, p. 82). In print, Collins Publishers, London.
2. First Progress Report on the Second National Development Plan, 1970-1974, Government Printer, Lagos, p. 10.
3. D.G.R. Belshaw, The Economist and Farm People in a Rapidly Changing World, Thirteenth Conference of Agricultural Economists, 1967, (London), 1969, p. 393.
4. Ibid.
5. K. Ohkawa; B.F. Johnstone and H. Kaneda (eds.) Agriculture and Economic Growth: Japan's Experience, Princeton, 1970, p. 58.
6. T. Ogura, (ed.) Agricultural Development in Modern Japan, Tokyo, 1963, p. 625.
7. W.W. Lockwood, The Economic Development of Japan, Princeton, 1954, p. 198.
8. Ibid, p. 192.
9. K. Ohkawa, et al, op.cit., p. 89.
10. For more discussion on this, see A.K. Sen, Choice of Techniques: An Aspect of the Theory of Planned Economic Development, 3rd Edition, Basil Blackwell, Oxford, 1968, Ch. 11.
11. Hans Ruthenberg, African Agricultural Production Development Policy in Kenya, 1952-1965, Springer - Verlag, New York, 1966, p. 151.
12. Q.B.O. Anthonio and M.O. Ijere, Uboma Development Project, 1964-1972; An Appraisal of a Technical Assistance Programme for Rural Development in Nigeria, Shell International Petroleum Company Ltd., 1973, p. 26.
13. These group farms take the form of large areas of land cleared mechanically by the Government free of charge and laid out in long narrow strips for tractor cultivation and then subdivided into portions for the various crops. The strips are then distributed to the few farmers who are to benefit by the Scheme.
14. (Work for Progress), Uganda's Second Five-Year Development Plan, 1966-1971, Government Printer, Entebbe, p. 58.
15. See, for example, R.F. Lord, Economic Aspects of Mechanised Farming at Nachingwea in Tanganyika, London

- HMSO 1963; K.D.S. Baldwin, The Niger Agricultural Project: An Experiment in African Development, Basil Blackwell, Oxford, 1957; L.J. Joy (ed.) Symposium on Mechanical Cultivation in Uganda, Government Printer, Entebbe, 1960.
16. D.F. Watts, Work for Progress and the Recent Design of Agricultural Development Policy in Uganda, East African Review, Vol. 2, December 1966, p. 56.
 17. Ibid.
 18. Ibid. Contrast the failure of this project and other such agricultural schemes with the success of the Gezira Scheme. See: A Gaitskell, Gezira: A Story of Development in the Sudan, Faber and Faber, London, 1959.
 19. L.J. Joy, op.cit.
 20. E.S. Clayton, Mechanisation and Employment in East African Agriculture, International Labour Review, Vol. 105, No. 4, April 1972, p. 14.
 21. A.J.M. Van der Laar, "Tanzania's Second Five-Year Plan", ISS Occasional Papers, Institute of Social Studies, The Hague, 1969, p. 13; cited in J.K. Onoh, Crucial Policies in Economic Development, Rotherdam University Press, 1972, p. 139.
 22. E.S. Clayton, op.cit., p. 4.
 23. Ibid., p. 5.
 24. F.A.O., Agricultural Development in Nigeria 1965-1980, Rome, 1966, p. 39.
 25. Consortium for the Study of Nigerian Rural Development (CSNRD), Strategies and Recommendations for Nigerian Rural Development, 1969/1985, Michigan State University, 1969, p. 6.
 26. J.K. Onoh, Crucial Policies in Economic Development, Rotherdam University Press, 1972, p. 139.
 There are conflicting views on the employment-creating and employment-displacing role of mechanisation. Cf McFarquhar and Hall, "Mechanisation and Agricultural Development: No Miracle in Africa," in Options mediterraneennes (Paris), December 1970, pp. 26-32; D.G.R. Belshaw, "Technological Innovation in Agriculture: The Economists' Role," paper read to a conference of East African Agricultural Economics Society on Technical Innovations in East African Agriculture, Nairobi, 1969; J.W.Y. Higgs, R.K. Kerkham and J.R. Raeburn, Report of a Survey of Problems in the Mechanisation of Agriculture in Tropical African Countries, London HMSO, 1950.
 27. Ibid.

28. Josef Vasthoff, Small Farm Credit and Development - Some Experience in East Africa with Special Reference to Kenya, IFO Institute, African Studies No. 33, Welt Forum Verlag, Munich, West Germany 1968, p. 88, Cited in J.K. Onoh, op.cit., p. 140.
29. J.K. Onoh, op.cit., p. 139.
30. J.K. Onoh, "Economics of Engineering System", a paper read at a Seminar, Institute of Management and Technology, Enugu, July 12, 1974, published in the "Renaissance", Enugu, July 22, 1974, p. 11.
31. K. Ohkawa et al, op.cit., p. 90.
32. L.R. Brown, The Seed of Change: The Green Revolution and Development in the 1970s, Mail Press Ltd, London, 1970.