C. J. DOYLE*

PRODUCTIVITY, TECHNICAL CHANGE, AND THE PEASANT PRODUCER: A PROFILE OF THE AFRICAN CULTIVATOR†

In the face of slow development in the agricultural sector of most African economies, attention has focused on the cultivator's alleged resistance to change. The attractively simple theory that the limited progress of traditional African farming is rooted in the innate conservatism of rural value systems has found less favor recently. No doubt this is for two reasons. In the first place, all the indications are that the demand for increased material welfare is not alien to African tribal society; in fact, there is strong evidence that the African farmer's cash requirements are neither as low nor his consumption horizon as narrow as is often implied (*4, 12, 28, 33*). Secondly, the idea that within traditional societies there is an almost inevitable conflict between the social and economic consequences of any technical advancements induced from outside poses the entire debate in a static framework, when what is called for is a dynamic treatment of an essentially complex problem. In particular, this view overlooks the fairly well attested fact that opportunities for technical change may provide the impetus for social change (*9, 18, 20, 24*). After all, a tribal society is in some sense an ecological unit in which social structure is just as much intimately bound up with agricultural practice as the other way round (*9*). Given these criticisms, can we frame a more satisfactory alternative explanation of why a good many apparently profitable innovations have met with considerable resistance from African farmers?

A QUESTION OF MISUNDERSTANDING

Leaving aside the problem of innovations which are technically ill-considered, one possibility is that the collapse of a large number of programs, aimed at stimulating rapid agricultural development among African farmers, arises not so much from a failure on the part of the authorities to take into account social

* The author is a Departmental Demonstrator at the Institute of Agricultural Economics, University of Oxford.

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factors per se, but from the planners imputing very different weights to certain economic variables from those ascribed by the cultivator. Certainly, the growing number of studies concerned with the marketing of crops within subsistence economies in Africa indicates that the cultivator's calculations on the value of planting cash crops or of increasing the offtake from his herd are conducted in much the same manner as that of the planner or extension officer (*1*, *7*, *17*, *21*). As the debate surrounding the price response of African farmers indicates, they appear to respond in a very orthodox manner (*4*, *7*, *14*). In particular, W. O. Jones (*28*) has compiled considerable evidence to show that economic exchange in traditional African societies operates under the same sort of demand and supply responses as those postulated by Marshall. While Edwin Dean (*12*) studying the factors governing the adoption of a newly introduced crop among African cultivators—namely tobacco among the smallholders of Malawi—noted that the volume of production was extremely sensitive to price.[1] What is more, he observed that as the prices for cash crops fell—compared with wage rates in the mines of Rhodesia and South Africa—there tended to be an increase in emigration, suggesting that the African cultivator has a fairly clear idea of the opportunity cost of his own labor.

Rather interestingly, these conclusions are borne out by a number of studies conducted in African communities that have apparently stagnated, economically speaking. Thus M. Attems and K. H. Friedrich (*1*, *17*), studying the receptiveness of farmers in the Usambara region of Tanzania to agricultural innovations, have put forward the thesis that the smallholder cultivator is a modified target worker, adjusting his productive target when the increase in returns looks sufficiently large to make the increase in cropping attractive. They certainly felt that the economic stagnation apparent in the communities surveyed could not be ascribed to any cultural peculiarities. Rather, the major cause of the problem appeared to be the absence of an especially profitable cash crop which would "serve to 'break the ice' for agrotechnical change and progress" (*1*, p. 171). While there was no lack of possibilities for more productive farming, it was clear that each existing opportunity represented only a small step in the right direction, the return from which was not high enough to elicit lasting effort. Likewise Judith Heyer in her study of Kamba farmers also concluded that the major factor inhibiting the uptake of proposed new crops in the area was not a social one, but purely and simply a matter of profitability (*21*, *22*). In this particular case she contended that the authorities had failed to take into account the labor requirements of the overall farming system in judging the merits of the new activities. Even in a study like Rowena Lawson's which purports to show the importance of social obligations in inhibiting the exploitation of new economic advantages opened up by external developments (*34*), it is noteworthy that the attempts made by the few alleged innovators to grow marketable crops were thwarted by the inefficiency of the marketing system, which resulted in low returns to effort; pointing perhaps to the fact that the apparent restraint imposed by social conventions on development may have been no more than inertia in the face of limited incentives to change.

[1] Dean, comparing the price elasticity of Malawi tobacco with that for a large sample of American crops, found that, if anything, the former was larger (*12*, pp. 78–79).

Utility of Leisure

But while this suggests that the African farmer essentially approaches the question of innovating in much the same way that an orthodox economist would, balancing expected profits against both risk and input costs, the checkered history of agricultural extension indicates that the cultivator may not base his profit and loss calculations on quite the same information or take into account the same considerations as the conventional policy maker, resulting frequently in sharply differing realized outcomes from those planned (*2, 11, 26, 32*).[2]

Throughout the literature there is an undercurrent of feeling that the typical African cultivator attaches very different weights to what are termed "leisure" and "income" from his European counterpart. He appears to place a comparatively high value on his leisure time—higher than the planner imputes—so that he may not adopt an output-increasing innovation that entails a marked increase in the labor input or may treat capital purely as a substitute for his labor rather than a means of assisting increased production (*29*), in spite of the very low annual inputs of labor in most traditional farming systems.

An interesting case in this respect is related by G. L. Karr, M. F. Kallon and A. O. Njoku (*31*). Studying a district of Sierra Leone, they noted that, although swamp rice cultivation was not unknown in the area surveyed, the traditional preference was for upland rice farming. However, an analysis of the returns to labor on a typical four-acre rice farm showed that the net returns per workday in the first year were around one-and-a-half times higher on the swamp rice farm than on a similar-sized farm devoted to upland rice, though swamp rice cultivation required a larger number of man-days per acre. Yet the adoption of swamp cultivation techniques was apparently slow until government subsidies raised the comparative returns to swamp rice farming to almost double that on upland farms. In view of the considerable population pressure, the high degree of purportedly surplus labor and the fact that swamp cultivation was a known and understood technique, this might suggest that, even at low levels of work, the African farmer attached a high value to his leisure.

However, it is equally plausible that the apparently high value attached to leisure reflects nothing other than the fact that a fairly high return on an innovation is required before the cultivator appreciates that the new technique or crop is of real benefit. All too often the planner tends to assess the benefits accruing from a given technique in terms of the foreign exchange value or monetary benefits to the group as a whole, without considering what this may mean for the individual cultivator who is going to make the innovation. One of the problems frequently confronted in trying to implement improved grazing conditions is that the benefits to the individual herdsman are comparatively small, so that there is only limited inducement for him to actively cooperate in such a scheme (*33*). Equally, the interpretation of leisure activities may be misleading. The considerable amount of time required for food preparation is often forgotten, while many apparent social visits may have an ulterior motive to do with the farm business.[3]

[2] In particular it is interesting to note that this view is finding acceptance among sociologists (see *26*).

[3] More detailed evidence is provided by a series of papers delivered at the Conference on Competing Demands for the Time of Labor in Traditional African Societies held at Holly Knoll, Va., Oct. 19–21, 1967 (see *29* for summary).

The productive value of allegedly leisure activities may, therefore, be high; the farmer would need to earn a fairly high return on the new crop or agricultural activity before he could afford to devote more of his own time to the farm and pay somebody to carry out the necessary social activities. Once again the opportunity cost of labor may be high even at comparatively low labor inputs on the farm.

Value of Additional Earnings

The reluctance to apply more labor to the farm may also reflect a low marginal utility attached to additional increments of money income;[4] not so much because the African's welfare function is dominated by explicit non-material considerations which run directly counter to material progress, but because there is a certain inertia in the native farmer's consumption horizon engendered by the general problem of limited economic opportunity. It is forgotten that a rise in purchasing power is not necessarily automatically associated with an increased provision of new consumer goods. The peasant farmer is generally caught in a vicious circle in which low incomes generate a market for a very limited bundle of consumer cash goods; this, in turn, creates a rather low consumption horizon. In these circumstances it is understandable that the utility attached to marginal increases in income may be low, reducing the incentive to adopt cash crops or techniques which will increase the marketable surplus. As such this points to the fact that it is insufficient to promote an innovation and hope it will catch on; in many instances consumption expectations need to be raised.

Although direct evidence of this proposed relationship is difficult to find, a number of studies suggests that the reception given to an innovation depends, at least in part, on the overall stimulus afforded to economic development in that society. In particular, it is interesting to note the contrast in the degree of observed development in the two communities studied by Lawson (*34*) and Margaret Haswell (*19*, *20*). The two studies embrace roughly similar spans of time and look at the impact of improved communications on agricultural development. However, whereas in Geneiri in Gambia the old social structure undergoes modification in the face of efforts to adopt new farming practices and a steady growth in commercial contacts, in the Ghanaian village studied by Lawson no such development occurs. It is noteworthy in the Ghanaian example that the improvements in road communications are not paralleled by any pronounced efforts to promote new crops or by the marked increase in commercial contacts which typifies Geneiri. Hence the apparent stagnation in the Ghanaian case may be due to the absence of these economic stimuli.

A similar interpretation is also afforded by a study conducted into the patterns of agricultural change found in the Mount Meru region of Kenya (*3*). In this case a marked difference in the farming activities and techniques has emerged since the 1950s between the upper and lower slopes of the area. After the Mau-Mau Emergency the authorities entered on a program of road improvement, market expansion, and agricultural extension in the more favored highland districts of the region and it seems to have fostered a rapid change in farming patterns and methods. So much so that the area now stands in marked contrast to the lower

[4] In particular, see the work of R. T. Shand (*47*).

slopes, which were largely bypassed in this program, and where agriculture, in spite of the obvious example of the neighboring zone, has continued very much unchanged. This might suggest that the mere promotion of new techniques or crops without corresponding efforts to stimulate consumption expectations through the provision of increased market access and opportunities for procuring a more diversified bundle of cash goods may inhibit technical advancement.

Assessment of Risk

The planner and the individual African farmer may also differ in their assessments of the risks involved in adopting new crops and farming systems. In particular, while the extension officer is concerned frequently with yield variations about the regional average, the farmer or local community will be more concerned with local fluctuations that may be larger than the regional variation. Furthermore, as new husbandry practices are adopted, the farmer increasingly loses control over his own environment. Should things go wrong and the cultivator be required to utilize more pesticides and herbicides, it is he who pays the price, not those who planned on his behalf. Hence a farmer will be reluctant to introduce a new crop until its characteristics have been fully determined; the fact that he knows little about its variation in yield is likely to be an important deterrent to adoption. Certainly, a cultivator who is an early adopter and who has never previously tried the innovation, though he has seen the results on a nearby demonstration farm, is likely to include a significant discount factor in any estimates of yield derived from his immediate observable experience.

T. J. Kennedy, in his findings on smallholder cotton cultivation in the Nyanza and Coast Provinces of Kenya in the early sixties (*32*), was struck by the fact that, though extension workers had outlined a series of simple and apparently profitable ways of significantly raising yields, the rate of adoption of these ideas had been discouraging. In particular, the early planting of cotton, which promised to markedly increase yields had met with considerable resistance. The chief reason for this was that it conflicted with the labor demands for food crops and, despite the relatively high returns from early cotton planting, the cultivators seemed unwilling in general to divert labor from subsistence to cash crops. This did not, however, appear to be associated with a limited aspiration for higher levels of consumption, for the more affluent members of the community, who had access to mechanical power, were only too ready to adopt the idea. Rather, Kennedy maintained, the additional returns from early plantings were insufficient to compensate the smallholder should the inclemency of the weather that year result in high grain prices. In the absence of widespread reserves of grain the farmer saw that his first priority was to ensure that he cultivated sufficient food crops. Similarly, C. P. Brown noted in a sample survey of African cash croppers drawn from several areas of Malawi that in reply to the question of why they did not become more specialized and give up growing their own food requirements, a large proportion of the farmers intimated such a strategy involved very high risks, since in poor years maize might be unobtainable locally (*7*).

Some writers, among them Brown (*7*), have remarked on the fact that African cultivators are more conscious of yield than price risks even in the case of cash crops. Brown, at least, appears to argue that this is surprising but not inexplicable

behavior; it is an extension of the traditional concern in a non-monetary economy with yield fluctuations. But there may be nothing irrational or unorthodox about it. Where variations in yield are more pronounced than variations in price, a large proportion of the annual change in cash income may be explained by the quantity harvested. Certainly, in an economy where intermediaries, such as the marketing boards, absorb to a large degree variations in the market price, it seems an eminently reasonable response.

A more important consideration which is often forgotten is that the manner in which an innovation is presented to the farmer may affect its apparent riskiness and so deter adoption. In particular, this seems to be the basic message behind Michael Lipton's (*35*) and John Weeks' (*54*) theorizing on the impact of the Green Revolution, although the issue is somewhat masked by their concentration of the discussion on the distinction between profit-maximizing and survival-oriented behavior.[5] The point being made essentially is that indivisibility in the package of inputs associated with an innovation—whether it is caused by assumptions about the minimum acreage a farmer will be required to plant before he will receive assistance, or by restrictions on the minimum quantities of capital inputs which can be procured—may involve the smaller and less wealthy farmers in unconscionable risks. A bad year initially could force the smallholder to mortgage his land or assets and so seriously imperil his future income stream. In practice, the problem of higher risks for the smallholder is often compounded by the fact that he cannot obtain credit on equivalent terms with the large farmer; his costs of borrowing are often higher and so his expected profits are lower. It is difficult in such a case to decide whether it is the lower profits or higher risks which impede adoption of the new crop or technique. Certainly, the few attempts made to assess the relative importance and validity of the profit-maximizing and survival algorithms regarding the African cultivator suggest that, whichever algorithm is employed, it makes little apparent difference to the likelihood of innovation (*21*, *41*).

Nevertheless, there can be little doubt that risk is a very real consideration as far as innovation is concerned. Moreover, it is highly probable that the planner tends to be less conscious of this particular consideration than the farmer. Certainly, the planning authorities may underestimate the economic risks involved and may even pay more attention to political uncertainties, especially where they are personally affected. Once again however, the logic of the argument is that the rejection of apparently profitable techniques and crops by African farmers stems more from differences in perception of the economic world by the planners and the cultivators than from vital differences in social attitudes and beliefs.

Social Considerations Reexamined

The danger is that one completely neglects the role of social factors in the analysis of technical change. As P. Chantran has pointed out, observance of the social structure and patterns may be very important in promoting innovations(*9*).

[5] The idea that small and large farmers pursued different objectives—the latter following a profit-maximizing algorithm, and the former being content with a "survival algorithm" (see Lipton, *35*)—is perhaps somewhat artificial. Certainly Weeks' closely argued formulation of the survival algorithm suggests that it is nothing more than a strategy of maximizing profits subject to a risk constraint; the level of risk that can be tolerated depends on the farmer's asset position.

For instance, at least initially, the successful promotion of new techniques and crops in rural Africa undoubtedly depends on the cooperation of the social leaders. In the work of Lawson one comes across the contention that the stronger group-orientation of African communities may hinder personal initiative (*34*). In these circumstances it is possible that conformity to the social norm in respect of obligations and consumption aspirations may be more significant than the planners are prepared to concede. However, although the portrait of rural capitalism that a major work like Polly Hill's (*24*) tends to present is one based on social groups rather than individuals,[6] there is ample evidence in the various African farm surveys to suggest that a good deal of individual accumulation and investment goes on below the surface. Thus, a study conducted by D. C. Catt relating to a sample of progressive farmers in Malawi, revealed that many of the farmers obtained considerable income from small business interests, such as shops and workshops (*8*). Similarly, work by Pauline Phipps on the Chilwa fishermen (*43*) and that by Hill on the Ghanaian cocoa farmers (*23*) show how new developments in crops and techniques may give rise to a moneyed élite with many of the characteristics of the entrepreneur of classical economics.

In the light of this it seems best to regard social attitudes as rather more accommodating than traditional social theory has implied (see *26*). Certainly the weight of evidence would seem to lean toward the interpretation that where the economic benefits of technical change are sufficiently apparent, social attitudes will tend to adjust to accommodate the innovation. This is a principle that, in many respects, social psychologists have accepted for some time. In particular, the theory of Cognitive Dissonance states that a person who, for some reason, commits himself to an act in a manner contrary to his beliefs, or what he believes to be his beliefs, is in a state of dissonance.[7] In such a state the person will attempt to reduce the tension between action and belief. Since the disruptive behavior has already taken place and cannot be undone, while the belief can be changed, reduction of dissonance is achieved principally by modifying one's beliefs in the direction of greater harmony with the action. So in a society, whatever stage of development it has attained, an innovation that opens up new economic opportunities is likely to lead to the modification of social values in favor of its adoption and retention.

As such, this view tends to reverse the common argument that the low supply of effort, noted in African rural societies, is a cause of the low incomes; instead it sees the low labor inputs as a consequence of the limited economic opportunities. Brown (*7*), Berg (*4*), and Dean (*12*) in particular, have directly shown that increased income and economic opportunity are generally associated with increased work effort by the African cultivator, or if not by the cultivator then by his dependents, who tend to multiply with increased wealth. This suggests that when the economic opportunities facing society are poor, there is a widespread acceptance of low-level consumption patterns and in turn these limited expectations elicit a low supply of effort. The impact of technical change is to create the opportunity for increased incomes, ultimately permitting higher levels of consumption. Whether the opportunity is translated into reality largely de-

[6] Although it is doubtful that this is the picture she intended to convey.
[7] See D. Schön, especially Chapter 4, entitled "Diffusion of Innovation" (*46*).

pends on whether sufficient economic stimulus is given to consumption aspirations—notably through increases in the availability of cash consumer goods, in which market access perhaps plays an important role. Given this, an increase in income arising from an innovation is likely to increase the intensity of consumer demand, and in turn the shift in preferences will induce farmers to supply more labor, further increasing income.

All this suggests that expectations of resistance to technical change among African cultivators may be more plausibly framed in terms of economic than social considerations. For although the evidence may have to be treated with a degree of circumspection, the weight of argument favors the view that financial considerations, such as risk, the size of the economic benefits, and the availability of a more diversified consumer basket, are the prime factors in the African farmer's decision to take up a new technique. Failure of an innovation to be diffused is then a matter of the planners insufficiently recognizing the importance of one of the factors, such as the risk implication, in the farmer's decision to adopt, rather than any social obstacle to development. It is a question of mistaken identification.

THE SCARCE FACTOR

Yet, while the differences in the weights attached to particular considerations by the planner and the cultivator may explain the reluctance to innovate in a number of circumstances, it is also arguable that there has been a degree of mistaken identification of the scarcer resource with respect to agricultural development within Africa. In particular, it would seem that the shortage of capital compared to land or labor has been overemphasized (*13, 21, 28*).

Importance of Capital as a Constraint on Innovation

Traditionally, writers have emphasized the shortage of capital as the most serious constraint on development, for as Sayre Schatz has succinctly remarked "capital accumulation is inevitably the bearer of technological progress. . ." (*45*, p. 40). Yet in spite of this, it is not at all clear that capital is in such short supply in rural Africa as has been made out, or that the limited availability of money capital has inhibited technical change as often as is implied. In the first place, a considerable amount of rural capital formation in Africa consists of the straight embodiment of labor in the form of building huts and earth bunds, removing stumps and preparing the ground in general. Few attempts have been made to measure the value of such non-cash investments, but a study conducted by A. M. Morgan-Rees (*39, 40*) in the late fifties on two farm improvement schemes in Northern Rhodesia suggested that stump removal alone accounted for something like 37 to 40 percent of the capital invested on these farms (excluding livestock); that is around £60 to £100 per farm.[8] While a recent Food and Agriculture Organization (FAO) study of agricultural capital formation in developing countries estimated that in Ethiopia the simple investment of physical labor accounted for something like 60 percent of all capital formation in agriculture (*48*, p. 31). The potential for such investment still appears considerable.

[8] The value of such investment was rather crudely costed at two pounds an acre. If we include livestock, the figure falls to around 20 to 25 percent.

In the second place, although the belief that peasant economic activity gives little opportunity for either accumulation or investment in monetary wealth has a long history, both cash accumulation and investment do take place, albeit on a small scale. What limited data is available on the amount of cash savings in rural Africa (see Jones for a comprehensive survey [*28*]) suggests that they are not insignificant. Moreover it is generally believed by extension workers most in contact with the African farmer that they secretly hoard considerable sums. R. Galletti, trying to reconcile cocoa farmers' annual income and expenditure figures with changes in their stock of assets, was forced to conclude that in some areas considerable amounts of money seemed to be disappearing into undisclosed hoards (*18*, p. 547). Certainly, a study of the major uses of disposable income by cocoa farmers indicated that savings amounted on an average to over 40 percent (*44*), though admittedly the figures were taken in the early fifties when cocoa prices were exceptionally favorable. However, more conclusive evidence of the general tendency to save among primitive farmers is provided by R. Foster and L. Yost's study of the Buganda (*16*). A detailed study of the receipts and expenditures of one farmer showed that in the year immediately studied he reinvested about 25 percent of his gross income, including on-farm consumption, or about Sh.120. Although the figure was inflated to a certain degree by expenditure on new housing, in more normal years this particular farmer still reinvested about 10 percent of his gross income or Sh.45, and the impression gained was that this might be unusually low by comparison with neighbors.

At the same time, smallholder credit surveys provide no clear indication that shortages of institutional credit critically affect the decision to adopt. Though farmers when asked understandably emphasize their inability to save sufficient capital to permit them to introduce many of the new techniques, the outcome of government loan policies and the actions of farmers speak differently. In spite of his own belief in the importance of the availability of credit, C. K. Brown, in his detailed survey of some of the problems of investment and innovations confronting the Ghanaian food-crop farmer, found that no significant relationship existed between those who received a loan and those farmers who embarked on a new technique (*6*). Also Josef Vasthoff, investigating the experience the Kenyan authorities had with extending credit to small farmers, remarked that, while a large proportion of the farmers interviewed were firmly agreed that they would not have accomplished the investments they had if finance in the form of institutional loans had not been forthcoming, he doubted the truthfulness of these responses. In many cases he thought it could be assumed that the investments would have been carried out, even if the farmer had received no loan (*52*, pp. 92–93). Certainly, for many simple innovations the African smallholder appears to be able to raise the small sums of cash required, either by drawing on his own capital or borrowing from relatives. As J. C. de Wilde notes, it is surprising how much development has taken place in tropical Africa with comparatively little or no institutional credit (*13*, p. 198).

Finally, the importance attached to capital stems partly from a belief that there are marked economies of scale closely associated with this factor. In particular, with mechanization in mind, people have argued that capital inputs into agriculture possess a certain indivisibility; the more advanced techniques requir-

ing a higher level of production than is characteristic of peasant farms, if the benefits are to be realized. However, many capital inputs which could considerably benefit farming, such as fertilizers, new seed, and pesticides, are inherently divisible. Even if economies of scale do exist, they are often realizable at quite low production levels, as David Feldman implies in his study of tobacco farming in Tanzania (*14*). Moreover, provided their services can be hired, draught power and irrigation may be treated as neutral with respect to scale in a purely technical sense.

Labor as a Limiting Factor

By comparison the significance of the land-labor ratio seems to have been understated. There is not inconsiderable evidence to suggest that in many instances labor rather than capital may be the more immediate constraint on innovation. Certainly the inadequate recognition of the vital role of the labor supply in African agriculture has been a prominent cause of failure in many past efforts to increase output. Efforts to get farmers to plant earlier have repeatedly failed because not enough labor was available at the recommended time and no provision had been made to introduce implements to relieve the labor bottlenecks (*32*). Again and again, attempts have been made to intensify output under conditions where farmers, not troubled by a shortage of land, obviously thought that extensive production was a more effective way to increase their net income. In most of these cases there was a failure to understand the relative scarcity of labor or to grasp the importance of maximizing returns to the scarce factor. Thus, Heyer noted that the crucial decisions for the Kamba farmers appeared to be the allocation of labor at critical times, and this largely seemed to determine the crops grown (*22*). Likewise, David Norman observed that the tendency to grow crop mixtures, so typical of African farming, might have an economic explanation other than mere survival (*41*); for though gross returns per man-hour averaged only 80 percent of those for areas sown under a single crop, if the average gross returns per man-hour at the peak season in June-July were used as a basis for comparison then the relationship between sole crops and crop mixtures was roughly inverted. While J. E. Bessell, investigating planting activities in two Zambian villages, recorded that the importance of the choice of planting method did not seem to be adequately realized, and that more emphasis was apparently laid on saving labor at planting time than saving labor and increasing yields over the entire cycle. As a result row planting was not widely adopted (see *50*).

Important though the seasonality of labor is, it does not fully explain the interesting phenomenon of critical labor shortages within family holdings going hand in hand with a high degree of wider employment.[9] In part it may reflect a high valuation placed on leisure or alternatively a conception of the normal working day or year which is much less than the accepted norm in industrialized countries. A more cogent explanation, however, is apparent in the work of Margaret Haswell on Geneiri (*19*). She observed that although the output per man was low, the cultivators had no apparent incentive to use the land better. Although the highest yields per acre were secured through a greater intensity of production, the intensification of cultivation seemed to be checked by fairly sharp

[9] J. H. Cleave discusses this point in detail (*10*).

falls in the marginal rewards per hour of labor. A similar argument was also put forward by Friedrich to explain the economic stagnation apparent among the Wahaya in the Usambara region of Tanzania, despite the obvious scope for intensification (*17*). Work on the banana plots in particular showed a markedly higher productivity than in the neighboring farm systems. But in spite of the fact that the marginal return to labor on these lands was higher than the prevailing wage rate for hired labor, a more intensive husbandry of the banana-coffee holdings seemed to be checked by decreasing marginal returns per hour of work. On these infertile soils expansion of the crop would have involved two or three years of mulching with banana leaves before the crops could be successfully grown. Hence, he concluded that the returns per hour from growing field crops were insufficient to induce cultivators to do more than necessary to meet their domestic requirements.

Not only does the low productivity of labor reduce the incentive for high inputs of family labor, but it also depresses the wages farmers can realistically afford to pay for hired labor. Heyer, in her study of Kamba farming, recalled that the returns were so low that farm work was unattractive even to the unemployed. Bessell and his colleagues in their Zambian study noted that hiring labor was not a popular way of relieving labor scarcity (*50*). The basic reason seems to be that, while the average returns per hour of labor in the absence of motive power varied between 1.5 and 5 ngwee per hour, wage rates of 10 to 20 ngwee per day were common (*50*, pp. 43–44). As a result, hired laborers only accounted for between 5 and 16 percent as much labor as did the wives. Likewise, Galletti, Baldwin and Dina reported that, although demonstration plots had shown that higher cocoa yields per tree and per acre were possible with no great changes in the method of farming save an increase in labor, the Nigerian farmer did not take up the prescribed activities because of the high cost of casual labor (*18*). Whereas the permanent labor force on the experimental plots received at the time around 1/5d. per day, the average farmer (who could not afford to maintain a permanent labor force) might have to pay 2/10d. (*18*, p. 383). Understandably, even the modest technical revolution proposed was unlikely to be accepted.

Mechanization as an Answer to Labor Shortage

At the same time, mechanization does not seem the way out. Despite the fact that one report at least has argued that African farming on average has only about one-tenth of the estimated minimum power requirement for an efficient agriculture (*27*, p. 1–23), it is not at all clear that mechanization is economically feasible. In the first place, mechanization is only possible if an economic means of meeting the higher operating costs can be found. Only if the additional production can be absorbed will mechanization, and more generally increased draft power, become realistic. Thus a study conducted at Agnale in Ethiopia concluded that, unless a market for production surplus to the village needs was created, mechanization offered little scope for improvement (*27*, pp. 2–50). Moreover, Haswell has argued that the level of productivity in many African societies is too low even to support oxen. Despite the fact that J. M. Peacock's work (*42*) on oxen-plowing in the Gambia suggested that the labor efficiency of the farmers employing oxen-power was increased by half, Haswell felt that at least at

Geneiri this was insufficient to justify the promotion of oxen. In the first place, where pasture is locally short a good deal of the improvement in grain yield must go to feed the oxen. In the second place, she intimated that as production rises above the subsistence minimum the farmers prefer to satisfy certain felt wants for clothing and building materials rather than reinvest their earnings in a pair of oxen. Without laboring the point regarding the implications of this argument for consumption priorities and the relative weighting between current and future consumption, it does highlight the fact that if increased draught power is to pay for itself, then new and very profitable crops will have to be introduced.[10]

Thus, with the present factor-cost relationships, it is not worthwhile in most cases to substitute capital for labor. As the UNZALPI[11] study indicated, most African farmers could not efficiently use a tractor. In fact, at Mumbara and Katete—the two villages surveyed by the UNZALPI team—it was found that the hire charges for both tractors and oxen exceeded the value of the additional output derived from using these resources in place of simple labor (*50*, pt. 3, p. 47). In addition, as M. P. Collinson observed in the Maswa district of Tanzania, the effect of introducing mechanical power or oxen cultivation may be to shift the critical labor peak from planting to harvesting, rather than removing it (*11*). Hence, no significant benefits may accrue to farmers introducing oxen cultivation into an already well-integrated hand technology.

Managerial Ability as a Limiting Factor

Coupled with these reservations surrounding the possibilities of removing the immediate labor bottleneck by mechanization is a further one concerning the level of skills and managerial ability to be found among African cultivators. As the level of power becomes increasingly sophisticated, a higher level of modern agricultural inputs becomes necessary to raise productivity sufficiently to compensate for the rising costs of production. In turn the process of modernization necessitates a higher level of skills and managerial ability. All in all, the new assortment of inputs has deep implications for the set of agricultural skills passed on from generation to generation.

The importance of this learning process is very evident in some of the "post-mortems" on the early experiments with large-scale mechanized farming. In particular, Martin Upton, surveying the Nigerian attempts at extensive farming, noted the high drop-out rate among settlers and concluded that part of the problem lay in the fact that they were unable to cope fully with the more intensive and regulated systems of farming prescribed (*49*). And J. D. MacArthur, after surveying the progress of the Kenya Land Settlement Scheme, was no less convinced that the human factor was much less capable of rapid change than the farming structure (*36*). The gap between subsistence grazing and migratory grazing on the one hand, and crop rotation and intensive dairying on the other, appeared to have proved too much for one generation of farmers to bridge successfully. Massell and Johnson's study, which tentatively argued that "management" played a part in determining the observed marginal productivity of labor,

[10] Whereas the usual theories of risk aversion to investment imply the peasant places quite a heavy emphasis on his future income stream, the implication of Haswell's argument is that the peasant may be relatively shortsighted about his future income/consumption stream.

[11] Universities of Nottingham and Zambia Agricultural Labour Productivity Investigation.

suggested that the shortage of competent farmers, capable of managing more advanced farming systems, was the scarce factor (*37*). This emphasizes the fact that the stock of farm skills is as important a constraint on technical advancement within African farming as the physical stock of labor. More importantly, it indicates the need to find new crops and techniques that will specifically raise the returns to labor without demanding radical reorganizations of farm systems or large inputs of fixed capital.

SUMMARY

In all it can be seen that the identification of capital as *the* scarce resource as regards the development of African agriculture is somewhat mistaken. Certainly it is arguable that considerations associated with labor are as vitally important. However, contrary to the view propounded by the early anthropologists, these considerations are less social than economic. There is an impressive amount of evidence to suggest that the persistence of traditional methods of farming among African cultivators is not wholly to be explained away as a lack of interest in material ends. It is undeniable that people will hesitate to change accustomed methods of farming unless the economic incentives are very strong. It is even possible that African communities may be somewhat more conservative than societies in the developed countries, but there is considerable evidence to the contrary. For these reasons it seems plausible to argue that the apparent obstacles created by African rural value systems to development are really a function of the weakness of the economic incentives to change. Certainly there is a fair number of documented cases which suggest that the new crops and techniques promoted have not always been well considered. Not uncommonly it appears that a closer analysis of the implications of the chosen innovation at the farm level would have shown that its profitability was more apparent than real. Differences in the weights ascribed by the planners and the African farmers to specific economic considerations have often resulted in the intended outcome of an innovation being widely different from that realized. Sadly, this reaction has been mistakenly identified with the idea that apparently profitable innovations have been rejected because of social attitudes. The support for this latter contention is noticeably difficult to find, which suggests that explanations of the low productivity of African farming may better serve future development if they concentrate more on the paucity of the economic incentives and less on the alleged unwillingness of the cultivator to respond to these incentives. What is lacking at the moment in many areas of rural Africa is the incentive to change, not the ability or desire.

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