EDUCATION AND THE DEVELOPMENT OF FARMING IN TWO AREAS OF ZAMBIA

During the last ten to fifteen years there has been a substantial increase in educational facilities in developing countries, in order to provide skilled manpower for both urban and rural development. There is now a need to see if education ha3 contributed to this development, not only at the national level, but also in the villages spread throughout the rural areas.

This thesis is the result of a quantitative investigation into how education has contributed to the improvement of the farming of the 239 family cultivators surveyed by the Universities of Nottingham and Zambia Agricultural Labour Productivity Investigation (UNZALPI) in the Mumbwa and Katete districts of Zambia.

In this study, education has been defined broadly to include schooling, farm training, contact with the agricultural extension service, non-farm employment and general experiences. The contribution of these educational experiences, both directly to production and indirectly through the stages of the process of the adoption of improved practices, was examined.

The three main findings of the study can be summarised as follows :

(i) At the level of farming in the survey areas, motivation was found to be an important pre-condition for the improvement of farming. The schooling of the cultivators contributed to this motivation, but its contribution appeared to be constrained by community values. Those who had been employed in urban or rural areas were not more often than the others motivated to improve their farming;

(ii) The extension service, although it was regarded as the main source of the knowledge, skills and management needed for the improvement of farming, was not regarded as being of significant help in this respect. Consequently, the cultivators' opinions of this service were low, as was the morale of the staff. The staff were not entirely to blame for this, and the service must be reorganised in such a way as to raise both the morale of the staff and their status in the rural community;

(iii) If school-leavers are to be persuaded to return to their villages in order to commence farming, they must see that farming in a village situation can be profitable. This means that higher priority must be given to adult education : both motivational education and farm training. School-leavers must also be given every assistance to fulfil their aspirations for a higher standard of living if they are to be prevented from migrating to urban areas, or from settling back into traditional patterns of behaviour.

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EDUCATION AND THE DEVELOPMENT OF FARMING IN TWO AREAS OF ZAMBIA

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INTRODUCTION

"Education is a crucial type of investment for the exploitation of modern technology".[1] Instead of being regarded as just a consumptive luxury, education is now considered as a productive investment. Many writers, especially educationists, have been attempting to prove this new role for education in order to acquire for it a higher share of government expenditure. Drucker (1961, p.19), for example, goes as far as to claim that, because of the importance of education to economic development, "..... the development of educated people is the most important capital formation, their number, quality and utilisation the most meaningful index of the wealth producing capital of a country". Schultz (1961, p.51) claims that the importance of education can be seen by the fact that, between 1900 and 1957, the human-capital value of the labour force in U.S.A. increased from 22 per cent to 42 per cent of all productive capital. The implications in Drucker's article are not only that investment in education is necessary to economic development, but also that, if investment in education is increased, development will follow.

On the other hand, some claim that education can only contribute to economic growth if the economic conditions are favourable, in which case education would be a tool to assist in economic growth and not a cause of it.

From my work as a Field Officer with the Universities of Nottingham and Zambia Agricultural Labour Productivity Investigation (UNZALPI) during 1968 and 1969, I was able to observe farming in Zambia. While it was obvious that economic constraints to the improvement of farming were important, I was impressed more by the

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[1] Halsey, Floud and Anderson, (1961, p.1).

constraints within the individuals themselves. Many seemed unable to look beyond the narrow confines of their own society to see the opportunities for improvement which existed, while others, who saw the opportunities, did not seem to have the knowledge or ability to grasp them.

These personal constraints can, I believe, be overcome by education. The questions are : How can education assist in motivating the cultivator to improve his farming, and how can it assist him to acquire the knowledge and ability to turn desire into achievement?

This thesis is the result of an investigation into how education has contributed to the overcoming of these personal constraints for the 239 family cultivators surveyed by UNZALPI in the Mumbwa and Katete districts of Zambia.

Chapter 1

HUMANISM, EDUCATION AND RURAL DEVELOPMENT IN ZAMBIA

1.1 Humanism and Development

In past African society a key feature was conformity to the traditional way of life, but in modern society there is a greater emphasis on individual and community change. To many in a modern society any change is for the good, but, for the more discerning, the change must be in a given direction, towards a goal, where the goal represents, in some fashion, a change for the better along a path of development. But what changes in a society represent development? Does it simply mean an increase in the national income, or per capita income; or can it be measured by the degree of industrialisation, or the amount of electric power consumed? These are, certainly, some aspects of development, but contemporary thought concerning development is becoming increasingly interested in the associated outcome of these aspects, i.e. their effect on the welfare of the people.

Over the last fifteen years the majority of African countries have gained independence from their former colonial authorities. Virtually overnight, inexperienced people have found themselves in positions of authority, with not only the usual problems of governing a country but also with many others not faced by the more experienced politicians in the developed countries. As they solved some of the more pressing problems, they became aware that there was more to leadership than just the routine duties of administration. There was a need to interweave the traditional way of life with the modern economic and social advances that were sweeping their countries, so that they developed a way of life which was suitable to their traditions, environments and

personalities. One of the first to do this was Leopold Senghor of Senegal, who proclaimed through his writings the concept of "Negritude". Julius Nyerere based Tanzania's development on "African Socialism" and "Self-Reliance", and Kenneth Kaunda of Zambia made "Humanism" the philosophy for his country. Each of these men saw the virtues of the traditional way of life in danger of being overrun by an alien "culture", which he regarded as excessively competitive and materialistic.

The word "humanism" was first used in connection with the philosophers of the fourteenth to sixteenth centuries, who started with man as the basis for their philosophy instead of God, as had been the custom. To-day it is associated with the free thinking group of philosophers, who in rejecting God, look at man as a complete entity in himself. But to Kaunda, a belief in humanism is not incompatible with a belief in God. He has defined "Humanism" simply as : "The high valuation of man and respect for human dignity." (Kaunda, 1968, p.7). Fortman (1969, p.1) has put it in this way : "Humanism means that a man should remain master of his own achievements, that he should subdue the earth instead of being subdued by it." In other words, the person is more important than what he achieves. This, together with the concept of "mutual aid", Kaunda claims to be the basis of traditional life, and following naturally from this he defines development as "increases in the economic and social welfare" of the Zambian people (Kaunda, 1969, p.4). Industrialisation, per capita income, infrastructure and agricultural development are only means (albeit, important means) and not ends in themselves.

Kaunda's philosophy is not basically different from the principles laid down in the United Nations Charter, or in the

declared aims of most countries. They would all claim to be primarily concerned with the welfare of the people. Kaunda would say, however, that the desire for, and preoccupation with, material things has made materialism the principal objective of those living in these societies, and that the majority are being exploited for the increased wealth of a minority. He is, therefore, determined that all Zambians will benefit equally from the development of the country and that this will increase their economic and social welfare.

His means to achieve this are to be socialistic; a working together for the common good, rather than the setting up of large, privately-owned, capitalist-controlled enterprises.

This may be idealistic but any discussion of the current development of agriculture in Zambia must be in the context of Humanism; that the people are more important than the goods produced, and that co-operation is more important than excessive competition and individualism.

1.2 Rural Development and Agriculture

In the past, the rate of development in Zambia has not been equal in all areas of the country. During the colonial days the government was concerned primarily with the welfare of the Europeans and so development took place mainly where they settled, i.e. the area surrounding the railway line which runs from south to north[1] and on the Copperbelt.

To induce skilled workers to come to the mines from Europe and South Africa high salaries had to be offered. Now, through

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[1] This area is normally referred to as the "line of rail".

Zambianisation, the highly paid positions, both in the mines and in the government, have been largely taken over by Zambians. As a result a Zambian urban class has now grown up with a relatively high standard of living compared with that of the average rural dweller. Since independence the cost of living has risen sharply and the urban population, being more in demand and concentrated in cities and towns, has been able to press successfully for increases in wages to offset this inflation.[2] The rural people, on the other hand, spread throughout the rural areas in small villages have had little bargaining power, even though they may have had the "know how" to press for better conditions. This has had the effect of causing wide income differentials in the society between the urban wage earners and the rural cultivators as can be seen from Table 1.1.

Investment in the urban areas has had priority over investment in rural areas because :

(i) the government believed that the highest rate of development would occur with rapid industrialisation and the resulting increase in national income could be used for the development of the rural areas. So industrialisation was given priority in development planning (Schultz, 1968, p.3);

(ii) private investors concentrated on investment in the industrial sector since this offered the best security and the highest returns;

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[2] The increases in urban wages cannot be attributed to increases in productivity, as this has decreased since independence. Taking 1964 as 100, the productivity index in 1968 was 88 (International Labour Office, 1969, p.14).

Table 1.1 Increases in Zambian Incomes Since Independence[1]

	Number, 1968	Average annual wage at end of 1968	Increase since 1964[3]
	Thousands	Kwacha[4]	%
Farmers[2]	800	145	3
Wage earners (Outside mines)	27	640	52
Wage earners (Mines)	50	1300	35

[1] International Labour Office (1969, p.9).

[2] "Farmer" refers to a person producing his own food on his own or on his family farm.

[3] These increases are in real terms allowing for the increases in prices.

[4] 1 Kwacha = 58p sterling.

Ideally, all these should exist in a process of rural development, but for the foreseeable future the greatest opportunities lie in the improvement of farming. As Mellor (1966, p.129) sees it, "the problem of farming development is not so much one of meeting a food crisis, but one of increasing rural incomes so the people may live better, broaden their horizons and their area of choice". To Kaunda, such development should continue to be organised around the family farm, rather than by the setting up of a large number of "commercial farms" or ranches with employed managers and farm labourers, a system which may increase production in the short term, but which Kaunda does not consider to be a "humanistic" system.

1.3 Constraints on Agricultural Development

Traditional agriculture based on the maximisation of security was necessary within the context of the traditional society, but it is inappropriate for the earning of money necessary to enter the modern society.[5] For this, an individual must aim at the maximisation of profits, and in so doing take risks which a traditional cultivator would not take. It is not just a matter of his working harder, but also of his adopting the improved practices of modern farm technology (Schultz, 1964, p.37). There are a number of constraints preventing cultivators from adopting these improved practices. These will be discussed here under two main headings: the economic and technical constraints, and the personal and cultural constraints.

---

[5] A modern society is one which participates in the exchange economy.

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[5] A modern society is one which participates in the exchange economy.

1.3.1 Economic and technical constraints

There are three main types of economic and technical constraints: the suitability of the improved practices to the village conditions, the shortage of the necessary supporting services, and the cultivator's shortage of economic resources preventing him from acquiring and using the improved practices. The first two types of constraints can only be overcome by government action through the agricultural department, whilst the overcoming of the third is the responsibility of the individual cultivator. Mosher (1966, pp.60-120) discusses five essentials for the overcoming of the first two types of economic and technical constraints. They are :

(i) Markets for produce : these must be easily accessible and the cultivator must have confidence in their existence from year to year;

(ii) Constantly changing technology : the government through its research and extension agencies must be introducing new and better techniques to the cultivator;

(iii) Local availability of supplies and equipment : these have to be readily available at the right time, in the right place and in suitable quantities. The cultivator must have confidence in advance that this will be so before he will commit himself to investing in them;

(iv) Production incentives : the prices at the markets must allow the cultivator to make a reasonable profit from his year's work at his present stage of farming and not just give an adequate return to the best cultivators (Schultz, 1964, p.5);

(v) Transportation : this must be readily available to the cultivator, both for marketing his produce and for receiving his farming requirements.

1.4.2 Educational experiences and learning

There are differing views on the exact meaning of education. Some hold the view that education is the combination of educational experiences and the learning which results from these experiences. Wharton (1965, p.203) sees education in its broadest sense as a "perceived experience which leads to a change in future behaviour patterns - both external behaviour patterns such as physical action, and internal behaviour patterns such as cognition, reflection and other mental processes". This implies that if an individual does not learn, then he has not been through an educational experience, which is generally the case, but it also implies that the quality of the educational experience depends on the effect it has on the individual. A different approach defines educational experiences separately from learning, because the learning also depends on the personal characteristics of the individuals: their motivation, mental ability and the state of their knowledge at the time of the experience.

In a developing country where only a minority have been to school, a lot of knowledge is obtained outside the school system. The sources of the knowledge are important to the present study because of the effect this knowledge may have on agricultural development. For this reason the discussion concerning educational experiences will be kept separate from that concerned with the knowledge these experiences produce.

1.4.3 Measurement of educational experiences

When considering measurement of educational experiences in an attempt to describe the total education of an individual there are two aspects which should be taken into account. Firstly there is the length of time the individual has undergone the experience and

secondly there is the quality of that experience. The former is relatively easy to measure and can usually be obtained through an interview, but the latter is more difficult. For example, Beeby (1966, pp.10-12), when discussing schooling, mentions three attributes of "quality", the first two of which are relevant here. The first attribute is concerned with the quality of both teaching and learning in the classroom, and can be observed to some extent by an inspector, while the second attribute concerns the relevance of the schooling to the individual's future needs in society. These attributes differ between schools, between teachers within the same school, and even between students in their responses to their teachers. It will be shown later that at the time when most of the cultivators in the UNZALPI survey were at school the quality of schooling, both in terms of the quality of the teaching and the relevance of the schooling, was low.

The quality of all educational experiences, depending as it does on the exact nature of the experience, is difficult to measure since the measurement involves a series of subjective value-judgements. While it is generally believed that differences in the quality of educational experiences are important, the present author believes that measures based on the quantity of the experiences are valid, and so these have been used in this study. Because the socialising experiences have been undergone by everyone, valid differences exist only in quality (e.g. types of family structure, socio-economic status of parents), and so only the extraordinary and formal educational experiences were measured.

It has been possible to create from the answers given to questions asked of the cultivators co-operating with UNZALPI, four indexes[7] to represent the different aspects of educational experience.[8] These indexes represent :

(i) Cosmopolite experience (extraordinary) : a measure of the past experience of the cultivator outside the village environment. The index was constructed from the time spent by the cultivators in urban and rural employment, and unemployment in urban areas. The years were weighted in two ways. Firstly, it was assumed that urban employment was a more important educational experience than rural employment or urban unemployment, and so was given a greater weight. Secondly, it was assumed that the more recent an experience, the more important it would be at the time of the investigation, and so was also given a greater weight. This measure is similar to that used by Rogers (1969)[9] and others, but it will be interpreted as an experience and not as a personal characteristic resulting from the experience;

(ii) Present cosmopolite experience (extraordinary) : a measure of the cosmopolite experience during the period of investigation. This included time spent away from the village for more than a day at a time, attendance

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[7] The method of the construction of the indexes is found in Appendix II.

[8] Details of the measures of education are found in Appendix I.

[9] Rogers (1969, p.147), calls the experience cosmopoliteness and defines it as the degree to which an individual is orientated outside his immediate social system.

at community development meetings, at church and at adult education and literary classes. Because these experiences took place during the investigation, their effect may be different from the past experiences and for this reason they have been treated separately;

(iii) Training and experience in farming (extraordinary and formal) : this index includes the experience the cultivator has gained by his working on a European farm, and his contact with the agricultural extension service through extension visits, field days, demonstrations, and by belonging to farming organisations. Farm training courses have been included in this measure as an insufficient number of cultivators had attended these courses for a separate measure to be constructed. It was not possible to make a distinction between the training and experience in farming obtained during and before the period of the survey;

(iv) Schooling (formal) : the index of schooling is the same as the index of "Formal Education of Family" used in the UNZALPI analysis (Elliott, et al, 1970, pp.102-104) where it is said that "the basic conviction behind the index was that the education (schooling) of the head of the household would have paramount influence on agricultural decisions, while an educated wife would affect them more than educated children"; so the schooling of the wives and children was only taken into account when the cultivator had had no schooling himself.

1.4.4 Measurement of knowledge

The learning from educational experiences will have resulted in each individual having a "state of knowledge". Three main types of knowledge were distinguished[10] :

(i) General knowledge : a measure of the awareness of things outside the village environment;

(ii) Farming knowledge : a measure of the state of farming knowledge of the individual. This included both questions of fact (e.g. what is the current commercial price of a bag of maize?) and questions on the constraints to farming improvement;

(iii) Literacy : functional literacy can be defined as the ability to read and write symbols at a level of competence for carrying out the functions of the individual's role in the customary social system. This implies that a literate person in one society may not be literate in another. Literacy is knowledge in that it results from educational experiences, but it is also a skill which assists in further learning.

Measurements of General Knowledge and Farming Knowledge were each based on a series of questions put to UNZALPI co-operators. From these questions indexes were constructed in a similar manner to those for the educational experiences. Literacy was measured by asking the cultivators for self-assessments of their ability to read both in the vernacular language and in English.

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[10] Details of the measures of knowledge are found in Appendix I.

Another way to measure literacy is to ask the cultivators to read a standard sentence or sentences. Rogers (1969, p.75) used both methods in his Columbian study and found a statistically highly significant correlation of 0.784 between them. The correlation coefficient was very high considering that the self-assessment was in the form of "I can" or "I cannot". A similar result was found in an Indian study by Rogers (1969, p.91).

Chapter 2

SOME CONDITIONS NECESSARY FOR THE DEVELOPMENT OF FARMING

The improvement of farming, in a developing society, is not simply a matter of making available a number of methods and techniques which, if used properly, would give increased farm production. The new type of farming which goes with the use of the modern farm technology involves a change in the way of life of the people (Hunter, 1969b, p.166). Therefore in a study of the process of the improvement of farming it is necessary to understand the nature of the traditional way of life, including its agriculture.

2.1 The Traditional Society

Although there are differences between traditional societies they do have some similar characteristics. In addition the individuals in these societies develop similar types of personal characteristics. The characteristics of both the societies and the individuals will now be briefly discussed.

2.1.1 Some characteristics of traditional societies[1]

Four of the main characteristics of traditional societies which are relevant to this study are :

(i) Authority : the members of a tribe usually lived in a number of small villages some of which consisted only of an extended family. The headman of the village was usually chosen by a flexible system of inheritance and, together with the elders, formed the council of

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[1] There are very few tribal societies which are purely traditional, the vast majority having modernised to some extent.

the village. In its role of exercising authority the council dealt with all except the more serious offences, these being referred to the chief's court. Social control was exercised through a set of customs and taboos. Respect for the elders was very strong, a situation which ensured that they were cared for in their later years. The strong pressures of authority tended to make everybody conform to the norms, and status came more from conformity and co-operation rather than from individual initiative, the latter only being acceptable when it was for the benefit of the whole community;

(ii) Stress on survival : most of the time was spent by the village people in activities ensuring physical and social survival. The men were responsible for hunting and for protection of the villages from enemies, and the women for the growing, collecting and preparing of the food. In addition, much time was spent fulfilling social obligations. In this traditional type of society one way of ensuring survival was by the spreading of the farming risk through co-operative action, a good crop being shared by all those in need. Each family grew and harvested its own crop, but in a real sense the crop belonged to the whole village, because in an emergency it would be at the disposal of the village;

(iii) Religion : in a traditional society religion served two main purposes. Firstly, because they understood little of the nature of fertility or the science of agriculture, the people appealed to the gods to give them offspring and to protect their crops. Secondly it was a means of social control with the deviants being threatened with reprisals from the gods;

(iv) Education and socialisation : the important thing for a child to learn was his place in the kinship system, and how to act accordingly. Conformity to custom and mutual co-operation with other members of the village, rather than individual initiative, were stressed. The state of knowledge of the society changed only slowly relative to the changes in an industrial society, and so education could be carried on by the parents and grandparents, other adults having a role to play mainly on special occasions (e.g. initiation). The education was informal, individual and practical, the boys being apprentices of their fathers and of other men, and the girls of their mothers and of other women (Mwanakatwe, 1968, pp.2-3).

2.1.2 Personal characteristics of "peasants"

Even though each traditional society had special features of its own, there were certain personal characteristics which people living in these societies possessed to a greater or lesser extent. Rogers (1970, pp.115-127) has discussed these characteristics under ten main points, which together form his Sub-Culture of Peasantry. These ten points are :

(i) Mutual distrust in interpersonal relations : Rogers (1970, p.115) quotes Lewis (1960) as finding that "the typical peasants are individualists, withdrawn, self-reliant, reluctant to seek or give economic aid, or to co-operate with others", a view which he says is supported by research in other areas of the world. This view differs markedly from that expressed by African politicians, who say that traditional society is based on mutual trust and co-operation (Kaunda, 1968, p.5). Rogers does not mention Africa as having this mistrust, although Hunter does (1969a, p.40). These views are not in conflict if one realises that Kaunda and others are talking of the traditional ideal before the societies were influenced from outside, whereas Lewis and Hunter refer to traditional societies, which are reacting to those outside influences. To explain this mistrust, Foster (1962) has put forward the notion of "limited good", where he says that the village people think that all the desirable things in life (e.g. land, wealth, power, security) exist only in limited quantities, consequently, one person can only obtain more of the "good" at the expense of another. For this reason the people fear and distrust anyone who seems to be increasing his supply of the "good";

(ii) Lack of innovation : the village person, as with others, finds security in a system with which he is familiar, and prefers to continue within the system rather than venture into the unknown, especially as he has been brought up to fear the latter as the

province of the gods. As in an industrial society, there are differences in this characteristic due to differences in the personality and ability of individuals. The social controls of the community also prevent an individual from taking too much initiative. In short his cultural values are "self-imposed restrictions on his freedom of choice" (Patch, 1966, p.18);

(iii) Fatalism : this has often been called the main characteristic of individuals in a traditional society. Fals Borda (1955, p.245) says that Columbian peasants had developed "an ethos of passivity - that quality of moving only when acted upon by an outside force, or of receiving and enduring with little or no reaction". Many different reasons are given for this fatalism : the authoritarian family structure (Lewis, 1960, p.77) which produces passive and dependent children, the village people's ignorance of cause and effect (Levi, 1947, p.78) and their reliance upon religion to explain the unknown. The result of this fatalism is that they feel controlled by the environment, rather than being in control of it;

(iv) Low aspirational levels : there are two conflicting views on the levels of aspirations of village people. Rogers (1970, p.119) says that the level of aspiration is low, but in the same volume Firth (1970, p.23) says, "I am definitely on the side of those who think

that the lack of opportunity rather than failures of aspiration is a major retarding influence." This problem will be discussed in greater detail later in this chapter;

(v) Lack of deferred gratification : the village person does not forego immediate pleasure in anticipation of future rewards, but moves more by "impulse gratification". This could be due to the fact that he lives very close to the subsistence level and is mostly concerned with the satisfying of basic needs;

(vi) Limited time perspective : the village person thinks in terms of "cruder" time perspectives than in a modern society, so the need to work to an exact time schedule is not as strong;

(vii) Familism : the family rather than the individual is the basic reference group, and conformity to this group is essential. The aspirations of the individual are subject to the values of the group, making individual initiative and the acquisition of individual wealth difficult. The kinship ties are not as binding in East and Central Africa as in other parts of Africa or Asia (Hunter, 1969a, p.71), thus allowing the individual to have some reference groups outside those of his extended family;

(viii) Dependence on government authority : the individual's "perception of the possibility of self-help is low" (Rogers, 1970, p.124) and he has come to rely upon government sources for village and farming improvements, but at the same time he seems to mistrust them because they come from "outside" the village;

(ix) Localiteness : is the orientation of a society within itself rather than towards the wider society. The localiteness of village societies in developing countries is decreasing as development and improved communications expose them to external forces even though these forces are beyond their control, and often beyond their comprehension (Wharton, 1970, p.464). Britton (1966, p.28) comments that the two main features of village life in Europe are self-sufficiency and isolation, and he adds : "radio and television may span the distance (between the village and the city) but there is still lacking the frequent personal contact outside the narrow circle of family and neighbours which is so essential to the active acceptance and adoption of ideas which are powerful enough to transform a way of life. Mass communication in the form of newspapers, radio and television is important, but the communication with the external world must be on a more personal and deeper level if it is going to initiate social change". The same can be said of village life in Africa;

(x) Empathy : is defined as "the degree to which an individual is able to project himself into the roles of others" (Lerner, 1958, p.50). For village people, personality socialisation occurs in a restricted environment where there is a limited number of roles for them to learn (Rogers, 1970, p.127).

2.1.3 Traditional agriculture

In the majority of traditional societies, agriculture was part of the way of life of the people, and not just the occupation of a minority. Many of the people grew only sufficient food for consumption, for barter and for security against adverse conditions the following year. The methods and techniques used had been developed over the years to give the maximum security rather than maximum profits, i.e. the cultivator had developed a "survival algorithm", a group of practices which together ensured sufficient food for his survival (Lipton, 1969, p.20). His freedom of action was limited because he feared that a change in any part of the algorithm would reduce his production below that needed for survival (Galbraith, 1965, p.3).

As well as being grown, food was collected from the surrounding bushland, e.g. flying ants, field mice, wild plants and animals. Although the collection of this food was very time consuming, it was essential for the diet of the people.

Schultz discusses some of the characteristics of traditional agriculture (Schultz, 1964, pp.29-35). He says :

(i) It is a type of equilibrium where

(a) the state of the arts (including knowledge) is constant,

(b) the state of preferences and motives on income are constant;

(ii) There are low marginal returns to labour, i.e. any increases in labour input will not bring about substantial increases in production;

(iii) The rate of investment is low;

(iv) "There are comparatively few significant inefficiencies in the allocation of the factors of production" (Schultz, 1964, p.37).

What he is saying here is this: that traditional cultivators had made the best use of the resources and knowledge at their disposal. Ruthenburg (1968, p.329), in disputing Schultz' findings, says that agriculture in Tanzania is not static, but knowledge and technology are continually changing, and that production is being increased by the better allocation of resources and by investment. The difference between these views is that Ruthenburg is discussing a transitional agriculture rather than a traditional one. His point, that traditional agriculture in its "pure" state does not exist, is probably valid, but this does not prevent an understanding of it being useful to those studying its development into commercial agriculture.

2.2 Types of Improved Practices

The term "improved practices" will be used to describe all the inputs and techniques which can be introduced into developing countries to improve the traditional subsistence farming. These improved practices can be divided into a number of groups, some of which require major changes in farming practice. The main groups are :

(i) Improved techniques : e.g. better plant spacing, weeding and ridging. These are improvements to the present techniques, and do not require changes in the type of farming, nor do they require high capital investment;

(ii) Mechanisation : e.g. the use of tractors or oxen, and equipment. This is used more for extensive than intensive farming. With them the cultivator is able to extend considerably the acreage planted. This mechanisation requires high capital investment. In many developing countries including Zambia, the tractor, and to a lesser extent, oxen, has become a status symbol in farming and consequently is more open to misuse because it is obtained for social instead of for economic reasons. For example, tractors can be used as "cars" for visiting or for shopping. For this reason, and because it can be used as a labour saving device, it is a popular type of improved practice;

(iii) Biological : e.g. improved seeds, fertilisers and pesticides. It requires capital on an annual basis, and its success is determined to a large extent by climatic conditions as well as by good management. Its sensitivity to climatic conditions, and the fact that it requires significant changes in farming practice, means that it is not as popular as other types of improved practices. The unpopularity is also due to a misconception by some cultivators; that increased production comes only from planting a greater acreage and not from an increase in the yield per acre;

(iv) Cash cropping : e.g. cotton or tobacco growing. This probably requires the greatest change in traditional farming patterns, the highest level of

management and the greatest need for learning new skills. As well as the risk of crop failure there is the risk that the crop may not satisfy quality controls, and many rejected cash crops cannot be eaten on the farm nor easily be sold locally.

2.3 Adoption and Use of Improved Practices

The difference between good and poor cultivators is probably more marked in developing countries, where it ranges from the subsistence cultivators whose sole purpose is to grow enough food for the family, to the cultivators who farm to earn a substantial income.

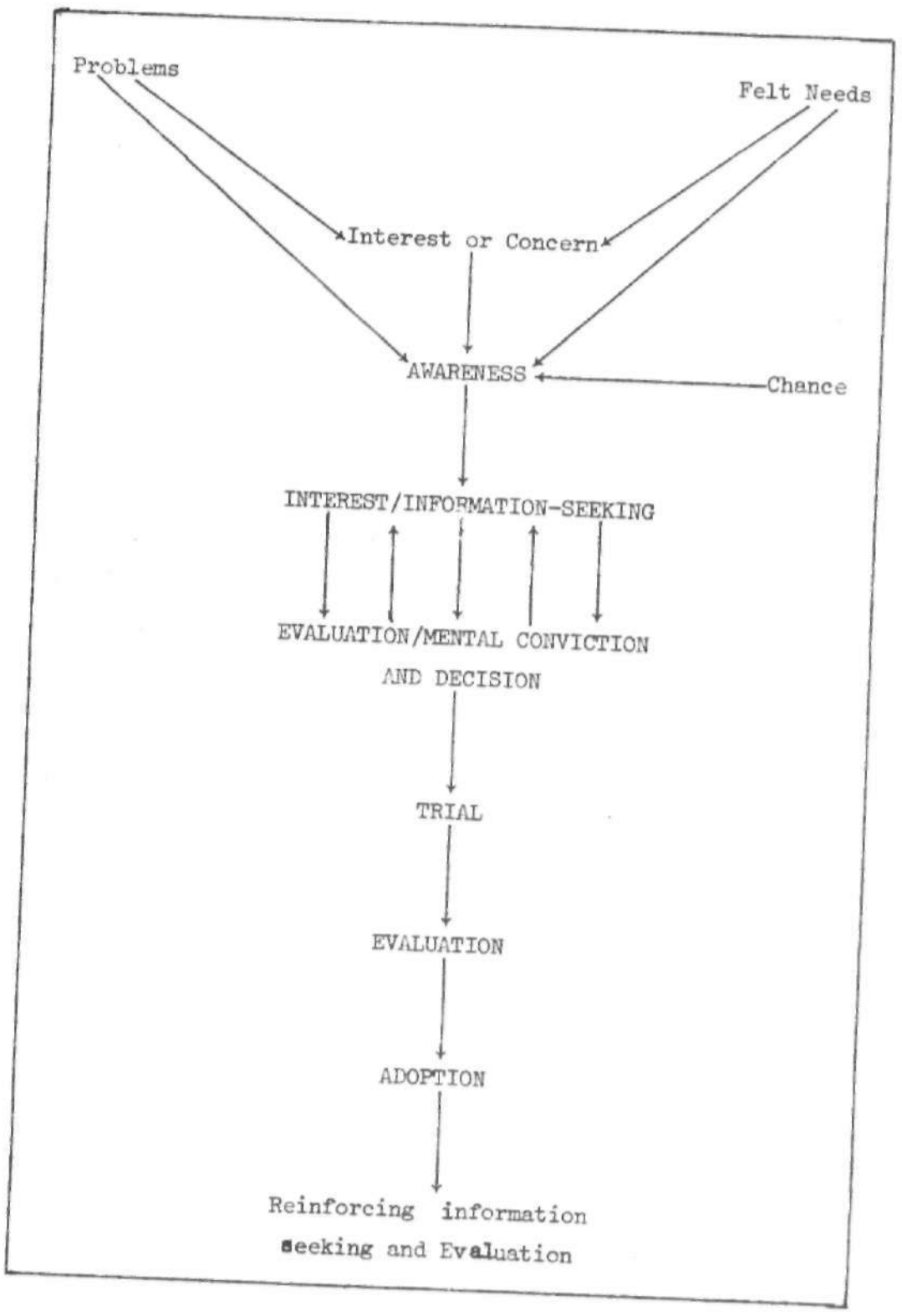
As has been mentioned (p.10), it is essential for a cultivator who wishes to increase his production substantially from the subsistence level, to use improved practices. The decision to adopt new ideas or techniques is usually not a snap decision, but a process taking place over a period of time (Jones, 1967, p.7). The commonly accepted adoption process, which is one involving five stages, is described by Jones (1967, p.9). Figure 2.1 gives his diagrammatical representation. The main stages of this process are :

(i) Awareness : the cultivator knows the existence of an improved practice, but lacks detailed knowledge of it;

(ii) Interest : the cultivator becomes interested in the improved practice and seeks information about it;

(iii) Evaluation/Decision : the cultivator decides whether the improved practice is applicable to his own situation;

Figure 2.1 The Adoption Process[1]



[1] Jones (1967, p.9)

(iv) Trial : a favourable evaluation and decision will lead to a trial, after which there will be a further evaluation:

(v) Adoption : the cultivator accepts the improved practice as a normal part of his farming operation.

From a study of the situation in Zambia, it appears that two other important stages must be added to this model of the adoption process :

(i) The motivation of the cultivator to enter the exchange economy and to obtain the necessary money through farming. This motivation is more than the "problems" and "felt needs" in the above model, it involves a change in values, making the cultivator aspire to earn money through farming. A model for a developing country differs here from one suitable for U.S.A. or for England, where all cultivators live in a modern society and are already motivated to farm for money;

(ii) The use made by the cultivators of the improved practices. It is often assumed that once a cultivator has made an improved practice "part of his farming operation" he will use it effectively, an assumption which is not necessarily true. It will be hypothesised that only cultivators, who have followed the adoption process outlined below, will continually and effectively use the improved practices. Others who have adopted the improved practices to save work or to raise their status, do not have sufficient motivation or understanding of them to do so.

The adoption process to be used in this study will have four main stages:

(i) Motivation;

(ii) Awareness, information and understanding;

(iii) Decision to adopt;

(iv) Effective use.

The second stage in this model represents the stages of Awareness, Interest/Information seeking and Evaluation of Jones' model. The "decision to adopt" stage has been kept separate from the "evaluation" stage, because it involves social and cultural factors as well as the economic factors involved in evaluation. The decision stage will include the first decision, the trial, the evaluation and the final adoption. These have been combined into the one stage because they are considered to form an entity. The cultivator who decides to adopt performs a trial, evaluates this trial, and decides whether to continue or discontinue the use of the improved practice. These four stages will now be discussed in more detail.

2.3.1 Motivation

(A) The nature of motivation[2]

A motivating force can be defined as a "compellor of action at a given point of time" (Rogers, 1970, p.114). Every living thing has a set of biogenic needs (e.g. for food and water), which are necessary for his survival. Man has, in addition, a set

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[2] No attempt is made here to give a detailed psychological study of motivation and its relationship to needs, drives and stimuli.

of sociogenic[3] needs (e.g. for status and social acceptance). When a need is unfulfilled a drive is produced which motivates the individual to some action to fulfil this need. Man has found that his needs can best be fulfilled by living in communities rather than by himself, a situation which has brought him into a conflict between his needs and those of other members of the community in which he is living. In order to lessen this conflict, societies have set up acceptable ways of fulfilling needs, and perhaps less formally, they have given the fulfilling of some needs priority over the fulfilling of others by the formulation of social values. These values differ between societies even though the biogenic and sociogenic needs are basically the same.

As a society changes from being traditional to being modern, as many in Africa are now doing, conflict can arise, firstly, within the community, between those who are adopting the values of the modern society and those who are not, and secondly, within the individual between the values of the traditional and the modern societies. This is occurring in Zambia, where traditional societies are changing as modern influences come to the villages through the government, through people returning from urban areas, and through the increase of movement from one area to another because of better communications.

There is not complete agreement amongst authorities about which characteristics of an individual in a traditional society need

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[3] Biogenic needs are those which originate in the physiological requirements of man, whereas sociogenic needs are those which are acquired in man's upbringing in a society (Sherif and Sherif, 1956, p.370).

changing, but the characteristics of the "sub-culture of peasantry" (pages 24-28) are some which need to be changed, as they constrain the individual's movement towards the modern way of life, and thus his motivation to improve his farming.

(B) The measurement of motivation

In order for a cultivator to participate in a modern society, he must have a continuing supply of money. To obtain this money he must either find employment or increase his farm production. Motivation, in this context, can be defined as a conscious desire to earn money regularly through farming or through employment, in order to participate in the modern way of life. This definition excludes those who wish to earn money but to remain "traditional", because for them a continuing source of money is not required, the money earned being used only for specific items like cattle or a bicycle, rather than for a general raising of their standard of living. This "target income" motivation, where the cultivator seeks to earn sufficient money to buy specific items, is common in many developing countries (de Wilde, 1967, p.58), but is not motivation, in the sense used in this study, because it does not lead to sustained motivation to earn money.

In terms of motivation, three categories of cultivators can be distinguished :

(i) Villagers : those who do not possess the motivation to earn money. Their only aim is to farm to feed their families. They do have some farming income, but this comes from selling the excess of their subsistence production;

(ii) Farmers : those who are motivated to earn money through farming to raise their standard of living;

(iii) Non-farm cash earners : those who are motivated to earn money to raise their standard of living through employment or a non-farm business enterprise, rather than by farming.

To the third group, farming is simply a means of growing food and something on which to fall back if they cease to be employed. In the sense that they want to earn money, their motivation is similar to that of farmers, but in farming matters their motivation is more like that of the villagers, who farm for subsistence only. In this study they will not be treated as a separate group in the analysis, but will be combined with the farmer group in the examination of the causes and correlates of motivation, and with the villager group in the study of the effect of motivation on farming..

The categorisation of cultivators into the above groups was done by three judges.[4] This method depends for its success on how well the judges know the cultivators. In UNZALPI they had known them for between one and three years, and during this time they had had regular contact with them. The method of categorisation by judges is an acceptable one in sociological research (Kerlinger, 1954, p.514).

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[4] The judges were the Field Officer, Senior Enumerators and one Enumerator.

The terms villager, farmer, and non-farm cash earner will be used in the specialised ways described above, and the term cultivator will be used when referring to all groups together.[5]

In addition to the measure of motivation based on the three categories, an Aspiration Index was constructed, based on the direct questioning of the cultivators. The questions ranged from those which tested the cultivator's aspiration to farm for a little money, to those which tested his aspiration to farm "commercially". To avoid the difficulty of subjective interpretation the vague open-ended type of question was not used. Instead, questions requiring direct and easily coded answers were given.[6]

The criterion used here to categorise cultivators has been motivation. Many other criteria have been used. Wharton (1970, pp.15-16) groups these criteria as follows :

(i) Economic criteria : the sale of farm products ratio, hired labour or purchased factor inputs ratio, level of technology, incomes and levels of living, and decision-making freedom;

(ii) Socio-cultural criteria : non-economic factors in decision-making, degree of "outside" contacts, nature of interpersonal relations and psychological differences;

(iii) Development criteria : the rate of change of patterns of production.

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[5] In the UNZALPI Report No. 3 (Elliott, et al., 1970, p.7) the terms villager and farmer only are used, the non-farm cash earners being included with the villagers.

[6] For details of the Aspiration Index see Appendix I.

Wharton goes on to point out that, whichever criterion is used, the same cultivators are usually classified into the same groups, i.e. as subsistence or commercial cultivators. The reason that this occurs is that the criteria used in all these cases are those which correlate with higher production or productivity, and so it is to be expected that they would be highly correlated with each other.

More important than the correlates of a successful cultivator are the causal factors. Motivation is an important causal factor as it concerns the cultivator's aspirations and not the results of his farming activities. The criterion in Wharton's list similar to the one used in this study is the "psychological differences" in the socio-cultural criteria. The two examples given by Wharton (1970, p.16) are McClelland's "achievement motivation" and Penny's "economic mindedness". Rogers (1970, p.120, footnote) defines "achievement motivation" as a "social value which emphasises a desire for excellence in order to obtain a sense of accomplishment". This is more of a personality characteristic and its interpretation is very subjective. It could either motivate the cultivator to obtain his sense of personal accomplishment through traditional means or motivate him to improve his farming. Penny (1970, p.152) bases his categorisation on whether the "farmers have become active participants in the development process". Those who have, he calls "economic-minded", and those who have not, he calls "subsistence-minded". His index is calculated from a set of questions on farming practices, which he claims show the cultivator's attitude to economic activity, but, because it is based on farming practices and results, this claim is open to question. Motivation can

only be identified with the results of farming if all the motivated cultivators proceed to improve their farming, a situation which does not occur in developing countries.

A concept of motivation similar to the one to be used in this study is the "Aspiration for Level of Living" concept described by Rogers (1970, p.120). According to this concept the motivation comes from the individual aspiring to a standard of living higher than his present level of living.[7]

Although motivation is influenced by economic factors (e.g. by production, or the improved practices adopted), as well as by the personal and cultural characteristics of an individual, it should not be measured by them. These economic factors include the degree to which the cultivators have been successful in overcoming the economic constraints as well as being a measure of motivation.

However, because the villager/farmer measure of motivation demands a prolonged contact with the cultivators, it is not a very practical measure for extension officers and others to use. It is important then to know the correlates of motivation, so that a farmer can be identified, but these correlates should be biographical ones. Correlating the motivation with economic factors may show the results of motivation but will not show the causes of it.

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[7] Level of living "is the actual degree to which a person's basic needs of nutrition, clothing, housing, health and sanitation are met over a period of time". The standard of living "is the desired degree to which a person's basic needs are met". (Rogers, 1970, p.120, footnote).

2.3.2 Awareness, information and understanding

If he is to succeed, a cultivator who is motivated to farm to earn money must know of the improved practices available to him and how they can be used to advantage.

His knowledge of improved practices can be at three levels :

(i) Awareness : the cultivator is aware of the existence of ways to improve his farming (e.g. mechanisation, better weeding, fertilisers), but lacks any detailed knowledge of them;

(ii) Information : the cultivator, desiring to improve his farming, seeks detailed information about improved practices;

(iii) Understanding : having obtained knowledge, the cultivator is able to evaluate the improved practices for use in his own situation. This involves an evaluation of costs, risk, and benefits, and of the human and mechanical resources at his disposal.

The knowledge a cultivator needs to farm commercially must also be of three types (Anderson, 1965, p.20) :

(i) Skills : He must be able to perform the various skills required for the use of the improved practices, i.e. techniques for a new crop, use of tractors or oxen. These skills can be learnt from other cultivators, from commercial firms, from the extension service or from farm training courses. This is an important type of knowledge because without it the improved practices cannot be used. However, the knowledge is, in most cases, relatively easily acquired;

(ii) Understanding of the use of improved practices : in addition to the skills required for the use of the improved practices, the cultivator must understand how they can be used in his situation, so that their use can be adapted from year to year under varying conditions;

(iii) Farm management : the adoption of the improved practices indicates that the farmer has a new approach to his farming: the farm being a business rather than just a means of producing food. Because of the wider range of resources upon which he is calling, each of which needs careful management, the farming process becomes more complex. The success or failure of this process depends, to a large extent, on the ability of the farmer to manage his resources. In urban areas a worker is given exact details of what to do, but a cultivator has to make most decisions for himself. The importance of farm management is clearly set out by Wilson (1967, p.10), when he says, ... 'farming does not only require technical knowledge and skills. It needs a lot of experience, because modern farming becomes more and more not so much how to grow a crop, as how to manage the total resources, how to find out market opportunities, how to integrate livestock with crops.". Much of this type of knowledge can be taught to the cultivator, but as Wilson (1967, p.10) points out; "farming is a complex, risky business and a successful and efficient farmer needs more than training;

maturity of judgement and experience which require a long time to acquire, are needed too.".

A cultivator's knowledge of farming has either been communicated to him, or derived from communicated knowledge. The channels of communication, or sources, through which he acquires this knowledge are thus extremely important. Three main categories of sources of knowledge can be distinguished :

(i) Mass media : including radio, television, newspapers, journals and books;

(ii) Interpersonal-cosmopolite sources : personal contacts with advisers or representatives of the agricultural extension service, or with commercial firms;

(iii) Interpersonal-localite sources : contacts with friends and neighbours who are usually other cultivators.

The first two sources are from outside the cultivator's social system (i.e. they are forms of external communication), whereas the third comes from within the system, from people with similar backgrounds and experiences to those of the cultivator.

Psychologists have studied the process of learning for many years, and it is beyond the scope of this study to discuss the process in any detail. However, one of the main findings of psychologists is that learning takes place more effectively when the person is motivated, a finding which applies from the simplest "classical conditioning" to the more complex types of learning (Shaffer and Shoben, 1956, pp.70-92). This principle

of learning has often been overlooked when it comes to the teaching of farming, and as a result there is a lot of teaching with little learning. It would be expected that farmers (i.e. those who are motivated to farm for money) will have gained a lot more knowledge of farming than villagers with the same educational experiences, especially at the levels of information and understanding. On the other hand, for a cultivator to be motivated, he must be able to see himself in the role of a "commercial farmer" and to do this must have some knowledge of the modern farming process. But this knowledge need only be at the general level of awareness.

The state of farming knowledge of the cultivators in a community depends on the external channels of communication, as well as on the general level of farming knowledge of all cultivators in a community.

2.3.3 Adoption of improved practices

The motivated cultivators (farmers), who have obtained knowledge and understanding of the farming process, must come to a decision as to whether or not they will adopt the improved practices necessary to farm commercially.

(A) The "economic threshold"

Cultivators make their farming decisions basically from the economic point of view (Jones, 1960, Schultz, 1964). Their first consideration is whether, with the conditions under which they operate and with the resources at their disposal, the improved practices will give them a sufficient increase in income. Individuals differ in the resources available to them (e.g. labour,

land, capital), and also in what they consider to be a "sufficient" increase in income. This increase has been called the "economic threshold" and has been estimated by different people as being between 40 per cent and 100 per cent (Mosher, 1966, p.78). The main factors which can raise or lower this threshold are :

(i) Motivation : the farmer will have a lower threshold than the villager, because of his stronger desire to farm for money;

(ii) Risk and uncertainty : because agriculture is affected by factors which cannot be controlled by the cultivator (e.g. the weather) there is more risk than there would be in industry. The traditional agricultural system maximised security rather than production and any change from this system would increase the uncertainty. But the cultivator must accept the higher level of uncertainty if he is to maximise profits. For cultivators near the subsistence level a failure can mean starvation, as they do not have adequate reserves and cannot afford to "take the chance" (Galbraith, 1965, p.3). A lot of uncertainty can be removed by a better knowledge and understanding of the improved practices and of the total farming process;

(iii) Perceived characteristics of improved practices : improved practices are more likely to be adopted if they are perceived by the cultivator as being similar to his present farming practices, because this lessens his uncertainty;

(iv) "Learned resistance" : cultivators have learnt from their own experiences and those of others, that many of the recommended improved practices do not bring the desired increases in income under their conditions (Byrnes, 1969, p.30). The reasons for the failures are not often appreciated by the cultivators; for example the failures could have been because of poor management, or a bad year. But, because of the failures, the improved practices are not so readily adopted by other cultivators and other improved practices are not adopted by those cultivators who have had these failures;

(v) Community values : a cultivator is a member of a community, and must take the values of that community into account when making decisions unless he wants to isolate himself from it. Some communities have values favourable to change, in which case the economic threshold would be lower than for communities whose values are such as to discourage change. The strength of the constraint of community values also depends on how close an individual's ties are with the village; i.e. whether he belongs to the "moral community" (Bailey, 1967, p.3) or just resides in the village. An individual, who has most of his relatives living within the village, is affected more by the community values than is an immigrant;

(vi) Personality : the effect of personality, as a direct factor, in the adoption of improved practices is still open to question. Psychologists, themselves,

have not agreed the exact nature of personality. There are certain "personality" characteristics, however, which have been shown not to be neutral to the adoption process, e.g. achievement motivation (McClelland, 1953), rationality and innovativeness. It is true to say that some individuals "naturally" have lower economic thresholds than others, because they are the type of people more willing to take risks;

(vii) Personal characteristics : the personal characteristics often related in research to the adoption of improved practices, may have their effects more through motivation or on knowledge and understanding, rather than directly on the decision to adopt, e.g. education, age, aspirations, empathy, religious affiliation;

(viii) Perceived ability : cultivators know that farming, using improved practices, demands a higher level of management and skills. Some cultivators do not want to be involved in the extra work and discipline; but others do not consider themselves to be capable of farming in this way.

(B) Measurement of adoption of improved practices

In research on the adoption of improved practices a basic necessity is a means of measuring the adoption behaviour of the cultivators. Jones (1966, pp.9-24) discusses some of the measures used, which range from indexes based on whether the cultivators have adopted a given specific improved practice or not, to those

based on the number of improved practices adopted, weighted according to the length of time they have been used. Some indexes are used as a measure of "innovativeness" (a personal characteristic), but this use is not valid because the adoption of the improved practices is determined by economic as well as personal factors.

Others have attempted more sophisticated measures of adoption, for example, the adoption quotient of Chattopadhyay and Pareek (1967), the "Farm Modernization Index" of Bowden and Moris (1969) and the index of Heyer and Ascroft (1970) based on the Guttman technique.

Most of the more sophisticated adoption indexes assume that improved practices were adopted in a definite sequence. This was not the case in the UNZALPI sample and so these types of index constructions could not be used. The time of adoption of an improved practice was not considered to be important because this study was not concerned with the diffusion of improved practices through the sample. The adoption index used was based on the number of improved practices adopted by the cultivator.[8]

2.3.4. Effective use of improved practices

The adoption of the improved practices is, in one sense, just the beginning of "commercial" farming. If he is to be successful, a cultivator must use the improved practices in such a way as to produce profitable returns. The adoption of improved practices does not necessarily mean that the cultivators will use them in this way.

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[8] For details of the improved practices used in the index, see Appendix I, and for the method of construction of the index, see Appendix II.

Apart from the inappropriateness of the improved practices, there are three main reasons for their ineffective use by cultivators. They are :

(i) Lack of supporting resources : the cultivator may find that he lacks sufficient labour, land or managerial ability to make their use effective, or he may not have the other practices which complement the ones he is using;

(ii) Lack of motivation : a villager adopting improved practices (especially mechanisation) may do so more for the purposes of acquiring status, or to save work, than to increase substantially his production, and so it is unlikely that he will make the best use of such practices;

(iii) Lack of knowledge and understanding : once improved practices have been adopted, the cultivator must be able to master the skills involved in their use, and generally to improve his level of management, if he is to use them effectively.

Ineffective use is usually due to the fact that the adoption has taken place before the cultivator was adequately motivated to improve his farming or had sufficient knowledge and understanding of the improved practices. The importance of ensuring the effective use of these practices is not often recognised, as will be shown later through the lack of research done on this topic in developing Africa.

If the improved practices are not used effectively to increase production then :

(i) The income will be less than expected and if it is not above the "economic threshold" the cultivator may decide to cease using the improved practice. This decision can take place during the trial period or later when the cultivator has made the improved practice a part of his farming process;

(ii) The non-use of other improved practices : the cultivator, who has not increased his production because he has not effectively used the improved practices he has adopted, will think that other improved practices will not be as economically rewarding as claimed, and will not be as prepared to adopt them;

(iii) Effect on other cultivators : other cultivators, seeing the improved practices failing to bring the anticipated economic returns, will be less eager to adopt them.

Chapter 3

THE CONTRIBUTION OF EDUCATION TO THE DEVELOPMENT OF FARMING

3.1 A Descriptive Model

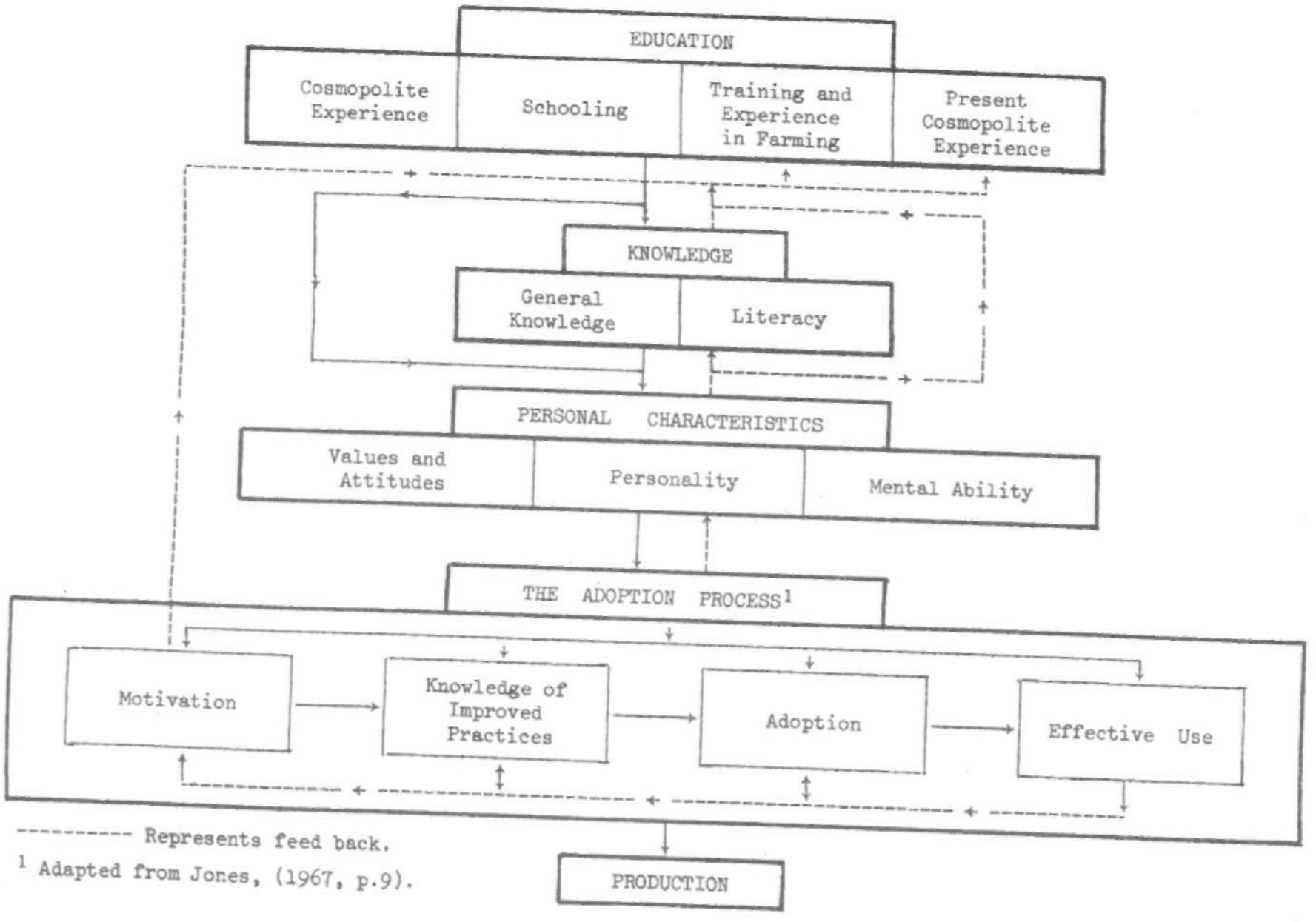
How can education contribute to the process of the improvement of farming? An important contribution can be made through the process of the adoption of improved practices outlined in the last chapter : as education, obviously, has a part to play in this adoption. Figure 3.1 is a diagrammatic representation of a model for studying this contribution and will be used as a basis for the analysis of the data.

The first contribution which education can make is to the acquisition of knowledge and literacy. For example, the "basic education" given in school results in a greater knowledge of the environment. Cosmopolite and other experiences also give opportunities for individuals to acquire a wider general knowledge. Additionally education, through the teaching of literacy, provides more channels of communication for an individual. Because he is able to read, he has access to books and newspapers and, by the reading of these, he can increase his knowledge. This ability also allows him to acquire knowledge in his own time and at his own rate, instead of being dependent on the radio or on formal teaching. The skills of literacy can be directly useful in farming in that the cultivator is able to read instructions and to keep accounts.

The second contribution which education can make is through changes in the personal characteristics of individuals. Many of the values and attitudes of individuals in developing societies,

Figure 3.1

Descriptive Model



---------- Represents feed back.

[1] Adapted from Jones, (1967, p.9).

discussed earlier under the heading of the "sub-culture of peasantry",[1] can be constraints to social change and to agricultural development, but "education pushes back the cultural limits or prohibitions (e.g. fatalism, lack of deferred gratification, localiteness, lack of empathy),[2] ..... it influences the choice of values or the goals an individual has, and therefore the activities which he carries out towards these goals" (Wharton, 1965, p.205). The education which the individual has experienced can help him to break out of the "mud walls" of the enclosed society of the village into the wider world (Hunter, 1969a, p.240), which helps to raise his level of aspiration and to give him the motivation to improve his standard of living. The relationship of education and personality is not clear, mainly because there is still dispute amongst psychologists as to the exact nature of personality. However, some acquired aspects of personality are influenced by the individual's educational experiences. Education also helps in the development of the intellect. An individual is able to develop an enquiring mind, to think more abstractly and rationally, and to gain a wider knowledge and understanding of the environment on which to base his decision making (Griffiths, 1968, p.22). Another contribution of the education is to the changing of the personal characteristics of an individual by making him literate. The achievement of literacy can remove the "personal shame" felt by an illiterate individual by replacing it with a sense of personal achievement and a general attitude of confidence in his own ability.

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[1] See Chapter 2.1.

[2] The words in brackets have been added.

The development of human resources as discussed here is not greatly affected by economic factors. The contribution of these resources to the adoption and use of improved practices, however, is considerably affected by the lack of economic resources (e.g. of land, labour or capital).

In this model, there is considerable feedback, which is shown by dotted lines. For example, the cultivator who is motivated to improve his farming (the farmer) may seek further farming experiences, i.e. he may contact the extension service for advice, or he may join a farming organisation. There is also some feedback in the stages of the adoption process; this was discussed in Chapter 2.3.

The purpose of this thesis is to examine how education can affect agricultural productivity and production using this conceptual model. Clearly there are effects other than these. For example, education can have negative effects on production through motivating the individual to leave farming in preference for non-farm employment or a non-farm business. This process of migration can deprive villages of some of their most able individuals. Again the educated cultivator, realising the value of learning, may prefer to spend his money on his children's schooling rather than to invest in farming. Conversely, education may motivate him to earn money through farming to give his children the opportunity of more schooling. This could, however, adversely affect his supply of labour especially at the peak period of demand.

As mentioned above, education may contribute in ways other than those outlined in the descriptive model. Prior to farming,

Because it was not possible in this study to measure these personal characteristics, this aspect of the problem, though recorded in the model, will not be included in the analysis.

3.2 Specific Contributions of Different Educational Experiences

Governments of developing countries in Africa have all provided opportunities for education. For children the main opportunity is through attendance at school; and for adults through community development, literacy and agricultural courses, and through evening courses at schools. In addition there are opportunities for informal education through community development and agricultural extension services. These educational experiences will now be discussed separately.

3.2.1 Schooling of children

Schooling takes place before the individual has chosen an occupation. It is a very general type of education preparing children for life in society, rather than for specific occupations. Full-time schooling at an early and impressionable age represents the most important single factor in the whole educational process. Consequently, the largest proportion of a government's allocation for education is spent on schooling.

(A) Aims of schooling

The general aims of schooling both in a developing and a developed country are basically similar. They can be stated as "to transmit, from one generation to the next, the accumulated wisdom and knowledge of the society, and to prepare young people for their future membership of the society and their active participation in its maintenance or development" (Nyerere, 1967, p.1). This statement of aim is "society orientated" in that it

conceives schooling as the development of the individual for the benefit of the society. Other statements of aim are orientated towards development of the individual. To Etheredge (1967, p.229), the aim is the "developing of the whole man who is conscious of the traditions and culture of his group as well as being adaptable to change in a changing world". While this definition of aim recognises that the individual is reared in a society, it gives priority to individual development. Although both aims accept the same basic principles of the role of education, they lead to different views on the nature of schooling. The latter leads to a system of general schooling for everybody because it is believed to be their right,[3] while the former leads to a system which provides schooling only for those who are needed by the society (calculated from manpower and other studies), and the schooling tends to be more vocational. This view is supported by Dumont (1968, p.163), since he believes that Africa cannot afford the luxury of educating everybody, particularly since many school-leavers will be unable to find employment at the present rate of economic growth. Instead, he says, a country should only provide the schooling which will be needed for its development. But this view ignores the fact that schooling can help initiate development since it is the means by which individual potential is realised.

The **specific aims** of schooling, and the methods of achieving these aims, will vary according to the type of society which already exists, or that towards which the people are aiming. Thus for Tanzania, President Nyerere says that the school system

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[3] Article 26 of the United Nations "Declaration of Human Rights" begins: "Every one has a right to education .....".

has to "foster the social goals of living together, and working together, for the common good. It has to prepare our young people to play a dynamic and constructive part in the development of a society ..... in which progress is measured in terms of human beings, not prestige buildings, cars or other things" (Nyerere, 1967, p.7), and "it must emphasise co-operative endeavour, not individual advancement" (ibid, p.7). Tanzania is to be a socialist and co-operative society and the school system must prepare the young people for life in that society.

The organisation of the school system will depend on the stage of development of the country concerned. During the early stages of development, a small proportion of young people will need to be highly educated for employment in government, industry and commerce, while the larger proportion, remaining as cultivators on the land, will need a suitable though different education. The school system will then have two purposes: to select the most promising for further education and to prepare them accordingly, and at the same time to provide a terminal education for those remaining in the rural areas.

These dual purposes were those adopted by the colonial government. The report of the advisory committee on education in British Tropical Africa (H.M.S.O., 1925) recommended that schooling should be mainly to conserve and improve tribal life and at the same time to provide for the training of the few who were needed for administrative and technical services (Cowan et al., 1965, pp.46-47). There was, however, a difference in emphasis between East and West Africa. In the latter the emphasis was on schooling for leadership, but in East and Central Africa, where there were more European settlers and so less need for Africans

to help in the administration, the emphasis was on the schooling of the masses (Brown, 1964, p.371). The recommendations by the colonial governments were similar in later reports (H.M.S.O., 1935 and H.M.S.O., 1948). The Addis Ababa Conference[4] also stressed the necessity of making efforts "to bring back the school to the countryside physically and in terms of a programme more in tune with rural needs and interests. This new direction will be an important factor in raising the productivity of the agricultural economy, in enriching the community life of the village and in increasing employment opportunities in rural areas. It will help diminish the number of school-leavers who flock to the towns and cities for employment" (Evans, 1962, pp.5-6).

The effect of the colonial school system however has been to set up an educated elite in the towns and cities who have become culturally, as well as physically, isolated from their kin in the rural areas. These people possessed wealth, prestige and power. Schooling came to be regarded as the key to membership of these groups, and so, naturally enough, the rural population began to demand more schooling for their children, in order that they too could escape from the village life with its low standard of living, to the town and a well-paid, well-respected job.

The failure of agriculture, as a subject in schools, to persuade students to become farmers was not on account of the students' intrinsic dislike of farming, but was for two main reasons. Firstly the Africans regarded agricultural teaching as an attempt

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[4] The Addis Ababa Conferences of African Education Ministers in May 1961 was organised jointly by Unesco and the Economic Commission of Africa (U.N.). It set out short and long term targets for schooling in Africa for 1960 to 1980.

to provide them with an "inferior type of local education that would preclude them from competing with the colonial elite for higher status occupations" (Foster, 1969, p.92), and secondly "the material and monetary rewards to be gained from such education were seen to be patently inferior to those obtained from academic schooling" (Mwingira, 1969, p.92).

The school system seemed to have been successful in transmitting "fundamental values ..... concerning human personality and the right to aspire to as high a standard of living as possible" (Evans, 1962, p.318). As this aspiration could not be satisfied by farming in a village, school-leavers migrated to the towns. This did not necessarily imply that the school system was anti-rural, for a similar system did not have this effect in the United States, Canada, Australia or New Zealand where farming was very profitable. If the educated youth are to be persuaded to farm in the rural areas they must be convinced that by doing so their economic and social aspirations can be met. Economic and social changes in rural areas can be assisted by the young school-leavers, but it is unrealistic to expect that a school "in the tropics or elsewhere, can produce considerable social change against the popular will of the community in which it finds itself" (Evans, 1962, p.317). In fact, it is more likely that the schools will take the values of the society of which they are a part, and, if the society as a whole does not respect farming as a way of life, these values should not be expected in the educated youth.

(B) Demand for more schooling

Colonial territories found, on gaining independence, that there was an increase in the pressure for more schooling. This

pressure came firstly from the leaders who were anxious to train quickly, indigenous people to take over the work previously done by expatriates and to assist in the expansion of the economy. In addition, the leaders had great faith in schooling as a means of promoting nationhood (Curle, 1969, p.82) and of removing tribalism. For them educational facilities had become a point of national prestige, especially following the Addis Ababa Conference which set very optimistic and expensive targets for schooling. Maté (1969, p.6) gives the long term targets (1960-1980) as :

" (i) Primary education to be universal, compulsory and free;

(ii) Education at the second level to be provided for 30 per cent of the children completing the primary education course;

(iii) Higher education to be provided mostly in Africa itself, to 20 per cent of those completing secondary education."

The leaders felt it necessary to reach, or even exceed, these targets, and generally this demanded considerable strain on the financial resources of the country.

Secondly, the pressure came from parents who wanted, for their children, the opportunity to join the modern, wealthy section of the society believing, as they did, that it was through schooling that these aspirations could be met (Curle, 1969, p.81).

(C) Problems of expanded school facilities

The rapid expansion of the school system in developing countries has created two main problems :

(i) Provision of finance: the expansion necessary to meet the Addis Ababa targets has resulted in a large proportion of the national budgets being spent on schooling, often at the expense of other sections of the economy. For example, during 1967 Tanzania spent 13.8 per cent of its government expenditure on schooling, and Zambia, 14.7 per cent (United Nations, 1971, pp.643-647);[5]

(ii) Provision of job opportunities: the rapid expansion of primary schooling has meant that many of the primary school-leavers who are unable to continue on to secondary education are without the employment they were led to expect during their time at school. In some countries (e.g. Nigeria and Ghana) some secondary school-leavers are unable to find employment, and in some Asian countries (e.g. India and Ceylon) this same situation exists also for some university graduates. The reason for this is that the supply of educated, potential employees has not been regulated to the pace of economic development as reflected in job opportunities. Not only does this result in a waste of resources, but it also creates, among the unemployed school-leavers, a source of political unrest. This situation puts the African governments in a political dilemma - should they restrict the number of places in schools against the wishes of the people, or should they satisfy the wishes of the people and face the problems of a rising mass of young, educated unemployed?

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[5] The equivalent figure for the United Kingdom in 1967 was 12.5 per cent (United Nations, 1971, p.698).

3.2.2 Adult education

Because of the need to change the rural society in such a way as to accommodate the school-leavers who are not able to find employment, it is important to educate the adults living in the villages. Otherwise the educated youth who return to the villages will be frustrated in their attempts to make significant changes in the society against the will of their elders and, as a result, will settle back into traditional grooves. The education must be such as to encourage the adults to make the social and economic changes necessary for the development of their societies, and to give them the skills to make these changes. This education must be both general and vocational. Only then can the adults and youth work together in harmony towards the development of the society.

Some adult education is available in all African countries, but it is relatively small in proportion to the total educational effort. Bennett (1970, p.93) estimates that over 80 per cent of the educational effort in developing countries in Africa is directed towards children. The main agencies for adult education are the extension services of the departments of agriculture and of community development, both of which use mass media to further their objectives. These will be discussed in more detail.

(A) Community development

In rural areas the community development extension agents have, as their aim, the general welfare of the people, and as such are not directly concerned with the increasing of their monetary incomes. Rather, these agents are concerned with the raising of the nutritional and health standards, through the teaching of cooking, hygiene, sewing, etc. In addition, they teach adults to read and

write. Even though they are concerned more with the social than the economic aspects of development, they do contribute indirectly to the latter. For example, improved health, through the teaching of better nutrition, will enable people to work harder.

(B) Farm training

There are four main agencies involved in farm training: agricultural colleges and schools, practical training schemes (e.g. Youth Service), the extension service and farm training centres. The first two are for school-leavers and are a type of vocational training, whereas the latter two are for those who are already farming, and therefore are more relevant here.

(1) The Extension Service

> The essence of extension "is that it is an out-of-school educational process working with rural people along those lines of their current interest and need which are closely related to gaining a livelihood, improving the physical level of living and fostering community welfare" (Mosher, 1958, p.12). It is concerned not with the teaching of a set syllabus as in a school but with finding the interests and needs of the people and concentrating on them. The unstructured teaching situation makes it more difficult for the extension officer than for the teacher following a lesson plan in a classroom, because he must be able to assess the situation for himself and act accordingly. He must also be trusted to work by himself without supervision, which is difficult if he has not had adequate training (Mosher, 1958, p.24).

The extension process is at two levels: at the first level there is the knowledge of, and skills for, the improved practices and new techniques, and at the second level the

teaching of farm management (helping the cultivator to make the best choice of the alternatives open to him) (Makings, 1967, p.62). In most developing countries, the extension service has tended to concentrate on the first level (Wharton, 1965, p.214; Dillon, 1971, p.12). During the colonial administration in countries like Zambia, the extension service spent a high proportion of its time on the conservation of natural resources, the cultivators being compelled to adopt certain conservation farming techniques (e.g. in the eastern areas of Zambia contour ridging was made compulsory), often without any attempt being made to explain why these techniques should be adopted. To-day more is being explained to the cultivators, but the colonial approach still lingers in many areas. The teaching of farm management is more difficult than the teaching of knowledge and skills; and consequently needs more highly qualified extension personnel; and because in Zambia there is a shortage of this personnel, it often remains untaught.

Apart from the problem of what advice the cultivators are to receive from the extension service, there is the question of who is to receive it. In developing countries in Africa the ratio of extension service workers to cultivators is between one for every 1500 to 2000 cultivators (Hunter, 1969a, p.172). This compares unfavourably with the ratio in developed countries which is one extension worker for about every 500 cultivators (*Ibid*, p.173), and as a result it is not possible for all cultivators to be adequately assisted. Two views prevail as to who should receive extension assistance. They are :

(i) Everybody should receive a little assistance; the purely subsistence cultivator receiving help so that he can produce his food a little more efficiently, and the commercial farmer receiving assistance to increase his saleable surplus;

(ii) The other, and more widely held view, is that only the farmers, who have already made improvements to their farming, should be helped. This is the "reinforcement of success" policy which has been adopted by many extension services.

In many developing countries there is a move to integrate the agricultural extension service with the community development extension service. This may be a wise administrational move, but the agricultural extension service must remain essentially a technical service, helping cultivators to increase their monetary incomes through farming, while the community development extension service is concerned more with the social welfare of the people. The move to integrate the two, however, is a recognition of the fact that the economic and social welfare of the people are mutually interdependent.

(2) Farm Training Centres

These centres have recently been introduced to organise short courses for cultivators on specific farming topics. The courses normally last for between three and 14 days and so a large number of cultivators can be taught. Those attending courses are only absent from their farms for a short period at a time and are able to implement the acquired

knowledge immediately they return home. These courses are only successful if they are integrated into the programme of the extension service so that there can be an effective follow-up.[6]

(C) Mass media

Both the community development and the agricultural extension services use mass media for the propagation of knowledge and for encouraging a change in attitudes. Radio farm-forum organises groups of cultivators under an extension agent to listen to an agricultural programme and afterwards to discuss it. By this method expert knowledge can be given to a large number of cultivators, who can, at the same time, apply it to their own situation.

Written material has an advantage over radio in that it can be read at one's convenience, but its use is limited in developing countries as the majority of rural people are not able to read.

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[6] For a detailed discussion of Farm Training Centres see Moris, (1967, pp.350-360).

Chapter 4

THE CONTRIBUTION OF EDUCATION TO THE DEVELOPMENT OF FARMING : A REVIEW OF RESEARCH

4.1 Introduction

Researchers from different academic disciplines have studied the contribution of education to the improvement of farming in developing countries. Educationists have concentrated firstly on the descriptive analyses of schooling, community development, and formal adult education, and secondly on the national and regional planning of formal education. Agricultural economists, on the other hand, have concentrated more on farm training, through courses and through the agricultural extension service, although those concerned with the contribution of social as well as economic factors to the improvement of farming have often included one or more other education variables in their analysis. Some sociologists, studying social and agricultural change in developing countries, have also included education variables in their research.

The majority of educationists have concentrated, in the course of their research, on descriptive analysis, and very few of them have included farm-level statistical analysis. The descriptive analyses will not be discussed here but later, together with the results of the present study. Most of the research reviewed in this chapter is that done by agricultural economists and sociologists. These researchers included education as a variable only to help increase the proportion of the variance explained in their models, and as a result the findings concerning education were not discussed in any detail, often the significance level only being given.

This review will discuss the results of research which included the contribution of education to increasing production or productivity, both at the national and regional levels, and at the farm level. It will also examine research which included the contribution of education at the different stages of the adoption process as outlined in Chapter 2. Studies as a whole will not be discussed, nor will detailed analysis be made of the methods and techniques used.

4.2 The Contribution of Education to Production : National and Regional Studies

The early use of production functions for the study of the inputs important to agricultural production was concerned mainly with the basic economic inputs of land, labour and capital. The unexplained variance from these analyses was usually called "technological change" (Griliches, 1963, p.331), and because in most cases it was large, attempts were made to explain it or to reduce its size by the inclusion of other variables in the production functions. For example, Griliches (1964), working with data from the United States, introduced into his production functions three such variables: education (schooling), economy of size, and research and extension. He used a Cobb-Douglas function with regional data from 1949, 1954 and 1959, but combined the data from the three years as he found no significant difference between them. The marginal productivity of education (the number of years at school) was statistically significant. By including schooling in the production function he was able to explain more of the variance, and he thus concluded that regions with higher agricultural production also had agricultural workers who had been to school for a longer period of time. The research and extension variable, as

measured by the expenditure on these inputs in the region, was also significant, giving a 1300 per cent return to investment. The reason for this, however, could have been that areas which had higher agricultural production demanded a better extension service, rather than that the extension service was the cause of the higher production.

In an attempt to look at causal relationships at a national level, Ruscoe (1963) studied the relationship between gross national product and school enrolment in Jamaica, by correlating a series of the former with a series of the latter. In the first instance, he used school enrolment figures for ten years preceding those of gross national product, because of the time lag between attendance at school and its economic pay-off. He found the low correlation coefficient of 0.27. Secondly, he used school enrolment figures for the ten years subsequent to those for gross national product, and found the very high correlation coefficient of 0.99. He concluded that, over the years, increases in school enrolment had followed economic growth, and so were a consequence rather than a cause of it. But it must be remembered that Ruscoe was studying national trends in school enrolments and not the individual effect of schooling on economic growth. His results, therefore, do not indicate that individuals with more schooling do not contribute more to economic growth, but rather that correlations between school enrolment and economic growth cannot be used to prove that schooling is the cause of this growth.

The most systematic research on the effect of schooling on agricultural growth in developing countries was that by Chaudhri (1968) in India. He used four measures of education : the number of literate farm workers, the number of farm workers who had completed lower primary school, the number of farm workers who had completed ten years of schooling, and the total number of years for which

farm workers had attended school. These measures of education were conceptually similar, e.g. the cultivators included in the second measure were also included in the first, and consequently the highly significant correlation coefficients between these four measures (ranging from 0.42 to 0.98) were to be expected. In his analysis Chaudhri made comparisons between states, between districts within the same state, and between villages in the same district. For the inter-village comparisons he chose nine villages in a relatively advanced area of the Panjab state,[1] and ten villages in a relatively backward area of the Uttar Pradesh state.

The education measures were separately included in regressions, firstly with the gross value of produce per acre of cultivated land in the area, and secondly with the amount of chemical fertiliser used per acre of cultivated land, as dependent variables. The range of explained variances in each case is summarised in Table 4.1.

All the measures of schooling were significant in the first set of regressions (at P = 0.01), at the state and district levels and for the Panjab villages, but none was significant in the less developed villages of Uttar Pradesh. Similar results were found by regressing the use of chemical fertiliser per acre on each education measure, the proportion of variance explained being greater than for the previous regressions at the inter-state and inter-district levels, but less for the inter-village comparisons, where only two measures of education were significant in the Panjab and none in Uttar Pradesh.

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[1] Chaudhri used this spelling rather than the Punjab, which is more common in English.

Table 4.1 Variance Explained by Schooling[1]

Source of data	Range of explained variance (%)	
	Gross value of produce per acre of cultivated land	Chemical fertiliser used per acre of cultivated land
Inter-state	46 - 69	75 - 89
Inter-district	25 - 36	42 - 58
Panjab	41 - 59	19 - 46[2]
Uttar Pradesh	9 - 33[3]	0.3 - 9[3]

[1] From results in Chaudhri (1968).

[2] Only two of the measures of schooling were significant at P = 0.01.

[3] No measures of schooling were significant at P = 0.01.

Chaudhri then included a measure of education with economic variables in four Cobb-Douglas production functions. The variance of production explained by education was very similar in all functions, ranging from 93 per cent to 95 per cent for the inter-state data, and being identical at 79 per cent for inter-district data. For the former only the rainfall and land variables were significant, but the variables were multicollinear.

In general Chaudhri found that yield per acre, and the use of chemical fertiliser per acre, were associated with the schooling variables of farm workers. The strengths of the relationships were greatest for the inter-state comparisons, and smallest for the smallest units (i.e. inter-village comparisons). Because of this trend it must be asked whether there would have been any significant relationships at all if individual families had been used as the unit? In the larger units other factors could have been the cause of the relationship; for example the states with better schooling could also have had a better extension service, or better supply facilities, and these could have been the cause of the higher production or the greater use of fertiliser per acre. This argument is supported by the fact that the relationships with the education measures at the village level were stronger for the more developed area of Panjab than for the less developed area of Uttar Pradesh (Chaudhri, 1968, p.112). A limitation of the study is that it took no account of other educational factors (e.g. cosmopolite experience, extension service, or farmer training).

These national and regional studies have shown that schooling and other educational factors were significantly related to increases in production and productivity, that areas

of relatively high schooling also had higher agricultural production, and that increases in agricultural production over a period of time cannot be attributed solely to economic factors. The next section will review research which has been conducted on the relationships of education to production and productivity at the farm level.

4.3 The Contribution of Education to Production : Farm Level Studies

Agricultural researchers in developing countries, working at the farm level, have also found that economic factors alone did not offer a satisfactory explanation of the constraints to the improvement of farming. Ruthenburg (1968, p.328), summing up a number of case studies in Tanzania, reported that, in most cases, the explained variance of production was generally low (less than 50 per cent). The reason he gave for these low figures was that only economic factors were included in the regressions, no account being taken of the "quality" of labour (by which he meant social factors). The agricultural economists who have included education in their analyses have done so in an attempt to increase the proportion of variance explained, and not because they were interested in education's effect as such.

A number of education variables were included by Saylor (1970) in a study of the effect of the extension service on the yields of cotton in 12 areas of Sukumaland near Lake Victoria in Tanzania. He analysed the data using a "step-wise regression" technique with both yield of cotton per hectare of land and yield of cotton per unit of labour as dependent variables. Three education variables : schooling (measured by the number of years at school), cosmopolite experience (measured by the number of years worked in urban areas), and contact with the

extension service[2] were included with a modernisation index (after Bowden and Moris, 1969), area of cotton planted, and improved cotton practices used (time of planting, spacing, etc.). His preliminary analysis showed "no discernible relationship or simple correlation" (Saylor, 1970, p.8) between the yield measures and either schooling or cosmopolite experience, and so these variables were not included in the step-wise regressions. Contact with the extension service was to be measured by the number of visits made by extension staff to the cultivators, but because so few were visited, he added five variables on which cultivators were given a score of one or zero. They were : Whether the cultivator knew of the local extension officer, knew his name, had met him face to face, talked to him about farming, and knew where he could be found if needed.

In the step-wise regression, with yield per hectare as the dependent variable, two of the 12 areas had extension contact included, one of the regression coefficients being negative, but only the positive coefficient was significant. Using yield per unit of available labour as the dependent variable, the extension contact variable appeared in three regressions (in one of which the regression coefficient was negative), but only one of the positive coefficients was significant. Saylor did not describe the areas in detail, and consequently it is not possible to give reasons why the two areas had significant coefficients and the others did not. The conclusions which can be drawn from this study, from the educational point of view, are that schooling, cosmopolite experience, and contact with the extension service did not generally contribute significantly to

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[2] Saylor did not use the term "education variables" for the latter two measures.

the explanation of the variance of the cotton yields. It would have been useful to have repeated the analysis using as the dependent variable the total production of cotton, as some cultivators may have grown a greater area rather than aim for a high yield per acre. The use of improved cotton practices could also have been used as a dependent variable.

In a socio-economic survey of 153 cultivators in six villages in south-western Nigeria, Upton (1968b) examined the effect of social and psychological factors on farm production and farm income. One of the factors in which he was particularly interested was the broadened outlook of a cultivator as a result of his experiences, a factor which he called "mental urbanism". It consisted of six aspects[3] : whether the cultivator listened to the radio, was a church member, was a member of a modern organisation, had more than two years of schooling, had an "urban" second occupation, and read newspapers. As a measure of the cultivator's susceptibility to change, Upton used an "innovation" measure, which included an aspect of education, namely whether the cultivator had met the extension agent more than once during the previous year. In addition it included whether the cultivator intended to adopt, or had adopted, improved practices. It was thus a heterogeneous measure.[4] The other sociological variables which he considered were progressiveness (attitude to change), personal control (the extent to which the cultivator thought that events were controllable), status (traditional), and integration (contentment with present farming life).

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[3] All these aspects could be classified as education as defined in Chapter 1.4.3.

[4] The coefficient of reproducibility was 0.95 showing that all aspects of the index were highly inter-related.

Using correlation analysis he found that the mental urbanism index was not significantly correlated with the progressiveness, personal control, traditional status or integration measures, indicating that education (as combined in "mental urbanism") did not make the cultivator more progressive, nor make him less content with his present way of life. However, "mental urbanism" was significantly correlated with innovativeness, indicating that the educated cultivators had had more contact with the extension service and had adopted, or intended to adopt, improved practices. The mental urbanism index was also significantly correlated with the economic factors of area of tree crops (but not area of arable land), with labour input, with gross margin, and with total income. These relationships may be due, to a large extent, to the relationship between mental urbanism and the adoption of improved practices, but Upton did not investigate this.

Using the same data, Upton (1970) applied to it the technique of principal component analysis. The first component, which explained 19 per cent of the variance, he called the "management factor". The three main contributing variables to this factor were (in approximately equal proportions) the sophistication index (the "mental urbanism" of his earlier work), the innovation index (the same as in the earlier work) and independence of thought. This latter was a measure of the cultivator's tendency not to say "yes" in answer to the questions asked.

Upton then regressed gross margin on the economic variables by themselves, and in combination with the management factor and with the main components of this factor (sophistication, innovativeness and independence of thought). The variance explained in each case was :

for economic variables	65 per cent,
for economic variables and the management factor	71 per cent,
for economic variables and the sophistication index	66 per cent,
for economic variables and the innovation index	69 per cent,
for economic variables and the independence of thought index	70 per cent.

The partial regression coefficients for the management factor, the independence of thought index and the innovation index were all significant at P = 0.01, whereas that for the sophistication index was significant only at P = 0.05. Consequently the former measures were more consistently associated with particular levels of gross margin than was the sophistication index. If it is assumed that the relations between these variables and gross margin are causal then it can be argued that contact with the extension service (included in the innovation index) was more important a contributor to gross margin than were mass media, membership of a modern organisation, or schooling, all of which were included in the sophistication index.

Even though Upton's purpose was to study the "management factor", he could have obtained more from the study if he had used all three significant components in the analysis, instead of only the first one.

Saylor, using yield as the dependent variable, found very little relationship between it and schooling, cosmopolite experience, or contact with the extension agents; whereas Upton found a significant relationship between education (as measured in the "mental urbanism" index) and both acreage and production,

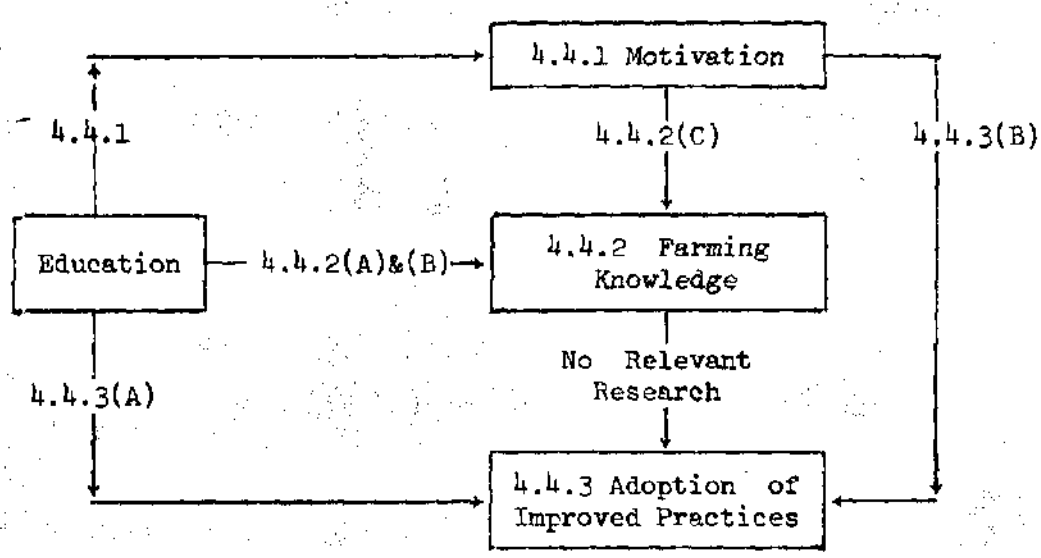
although it was not significant in a multiple regression with other economic variables. His innovation index, including extension service contact, was significant.

The next section will examine the research which has been done on the effect of education, not directly on production or productivity, but on the stages of farming improvement through the adoption and use of improved practices.

4.4 The Contribution of Education through the Stages of the Adoption Process

No research has been done which was primarily concerned with the effect of education on the adoption of improved practices in developing areas of Africa. This section will, therefore, discuss the relevant parts of research (mainly sociological) which associated one or more measures of education (as defined in Chapter 1.4) with the stages of the adoption process. The research will be discussed under the different stages as shown in Figure 4.1 and, where more than one stage has been included in a research project, each stage will be discussed separately under the relevant sub-section.

Figure 4.1 Organisation of Section 4.4



4.4.1 The motivation of cultivators

Most of the research in developing countries which has studied the motivation of cultivators to improve their farming has measured it using achievement motivation. Other measures have been used but these have not been very satisfactory. For example, Naylor and Ascroft (1966), from a study in the Embu district of Kenya, found that the schooling of a cultivator was correlated with the "felt need" for irrigation and with plans for increasing the area under cultivation. Madigan (Anderson, 1965, p.22), working in the Philippines, found that literacy was weakly, but significantly and negatively, correlated with a "resistance to change" scale ($r = -0.25$). Bose (1962), and Chattopadhyay and Pareek (1967), all working in India, studied the effects of traditional and modern values on the adoption of improved practices. These two studies will be discussed in more detail in Section 4.3. Penny (1970), using data from North Sumatra, measured motivation as the "economic mindedness" of the cultivators but, as pointed out in Chapter 2.3.1, this measure combined motivation with adoption behaviour. In these studies only Naylor and Ascroft, and Madigan related education to motivation measures, and then only in passing.

Achievement motivation differs from the concept of motivation used in this present study in that achievement motivation is a "social value" and not a "conscious desire to improve farming". Despite this difference in the concepts, the measurement of achievement motivation by the sentence-completion method [5] used

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[5] Achievement motivation was first measured using Thermatic Apperception Tests (McClelland, 1953). Later sentence-completion methods were used (Morrison, 1965). In the latter method the subjects are given sentences to complete (e.g. The most important thing in life is .....). From the answers the subject's achievement motivation is calculated.

by Rogers and others is similar to that used for the Aspiration Index in this study. Rogers (1969, p.251) sets out 14 questions to measure achievement motivation, most of which are concerned with the cultivator's level of aspiration, or with his desire to earn money through the improvement of his farming. He used this measure as a "social value" and not as a "level of aspiration". Rogers (1969) in his research in two traditional and four modern villages in Columbia,[6] regressed achievement motivation on a number of education variables. The results which he obtained are shown in Table 4.2. From these it can be seen that the proportion of explained variance was higher in the traditional villages than in the modern ones. Each of the education variables was important in at least one of the villages, but there were large differences between the villages, a situation which makes it difficult to draw any general conclusions. It can be seen, however, that literacy was generally more important than schooling, and that exposure to mass media was important only in the traditional villages, where it explained over 16 per cent of the variance in each case. The higher proportion of variance explained in the traditional villages indicates that these variables were more important contributors to increasing motivation in the less developed villages. In the most modern villages, the motivation most probably came more from a desire to follow those who had already begun to modernise.

In an Indian study by Roy (Rogers, 1969, p.267) of 702 cultivators in eight villages in the Uttar Pradesh state of India, nine

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[6] The modern villages were those with more active programmes in agriculture, schooling, community development, and which have better health facilities and communications which make them less socially isolated (Rogers, 1969, pp.62-63).

Table 4.2 Multiple Regression Analysis with Achievement Motivation[1]

Independent variables	Explained variance[2] (%)					
	Modern villages				Traditional villages	
	1	2	3	4	1	2
Schooling	8.32	-0.98	-0.50	-1.29	1.34	8.78
Literacy	7.68	3.80	-3.27	9.52	2.87	1.23
Social Status	-	0.24	-2.27	9.03	-3.11	10.16
Mass media	0.67	0.93	4.23	-1.94	16.97	16.51
Cosmopoliteness	0.37	4.40	7.15	0.09	-1.28	3.13
Empathy	-	4.52	23.61	6.41	13.77	3.85
Total variance	17.04	12.91	28.95	21.82	30.56	43.66

- : indicates that the variable was not included in the regression.

[1] Adapted from Rogers (1969, p.264).

[2] Although he does not say so, it appears that Rogers has used "coefficients of separate determination" to calculate explained variances for the individual variables. Details of the use of this coefficient can be found in Ezekiel (1941, pp.498-500).

variables were correlated with achievement motivation. Again, large differences in the correlation coefficients were found between the villages. Cosmopoliteness was significant in two villages, mass media, change-agent contact, and literacy each in three villages, and schooling in five villages. Only political knowledgeability and empathy were generally significant, each in seven of the nine villages.

The above research shows that education variables contributed to the explanation of motivation, but that this contribution varied considerably from one village to another, depending on the "development attitude" in the village as a whole. Education was more important in the more traditionally-orientated villages.

4.4.2 Knowledge of improved farming

Most of the research on the state of farming knowledge of cultivators in developing countries has been concentrated on the sources of this knowledge; and consequently a discussion of this research will form the major part of this section. A brief examination will also be made of the results of two other studies, one on schooling and farming knowledge and the other on motivation and farming knowledge.

(A) Sources of farming knowledge

The three main sources of farming knowledge are interpersonal-localite (communication with other members of the village society), interpersonal-cosmopolite (communication with those outside the village society, e.g. extension service or members of other government agencies), and mass media (radio and newspapers).

A number of studies have been carried out in Africa on the sources of farming knowledge. These are discussed below and the results are summarised in Table 4.3.

Kidd (1968) reporting on the survey in Western Nigeria of the Consortium for the Study of Nigerian Rural Development, gave the sources of eight improved practices used in the cultivation of maize, cocoa, cotton, tobacco and in mechanisation. Half of the cultivators in the survey gave the agricultural extension service as their main source of information of the improved practices (i.e. interpersonal-cosmopolite source), a quarter gave other cultivators (i.e. interpersonal-localite source) and a tenth the mass media. The others gave commercial agencies (also interpersonal-cosmopolite) as their main source of information. But Williams (1969), also working in the Western State of Nigeria, reported that only 32 per cent of the cultivators interviewed gave the agricultural extension service as their main source of farm information, 15 per cent gave other cultivators, and 29 per cent gave mass media (mainly radio broadcasts). The high proportion giving mass media as their main source is unusual in developing countries as this source is not available to many. The same cultivators reported that, for further discussion on the knowledge obtained, 50 per cent consulted the agricultural extension service and 27 per cent other cultivators. Basu (1969), also from research in Western Nigeria, reported that 72 per cent of the cultivators whom he interviewed gave the extension service as their main source of farming information.

From research in the Embu district of Kenya, Watts (1968) reported findings similar to those of Kidd. The extension service was the main source for 55 per cent of the cultivators,

Table 4.3 Sources of Farming Knowledge

	Percentage of cultivators giving as their main source :			
	Interpersonal -cosmopolite		Interpersonal -localite	Mass media
	Agricultural extension	Commercial firms	Other cultivators	
Kidd (Western Nigeria)	50	15	25	10
Williams (Western Nigeria)	32	-	15	29
Basu (Western Nigeria)	72	-	-	-
Watts (Kenya)	67	-	33	0

- : indicates that this source was not mentioned in the study.

field days and research stations for 12 per cent, and other cultivators for 33 per cent. No cultivator gave the mass media as his main source of information. The percentages given were for the total of seven improved practices, but there were no significant differences between the practices.

In the above studies schooling was not mentioned as a source of farming knowledge.

Some research in other parts of the developing world have been concerned with the sources of knowledge at different levels. These are discussed below and the results are summarised in Table 4.4.

Rogers (1969), in his Columbian research, used five different levels of knowledge : awareness, interest, persuasion, trial and adoption, and he found that the interpersonal-cosmopolite sources were most important at the awareness level, being the main source for 44 per cent of the cultivators, whereas they were only the main source for 15 per cent of the cultivators at the persuasion level. Localite sources, on the other hand, were the main source for 56 per cent of the cultivators at the awareness level, rising to 85 per cent at the persuasion level. Localite and cosmopolite sources were equally important at the trial level. No cultivators gave mass media as an important source of knowledge at any level.

Sawhney (1967), from a survey in the intensive cultivation scheme near New Delhi in India, reported findings similar to those of Rogers. For eight improved practices, cosmopolite sources were important for 59 per cent of the cultivators at the awareness

Table 4.4 Sources of Farming Knowledge at Different Levels

	Level of knowledge	Percentages of cultivators with main source :		
		Interpersonal -cosmopolite	Interpersonal -localite	Mass media
Rogers (Columbia)	Awareness	44	56	0
	Interest	34	66	0
	Persuasion	15	85	0
	Trial	50	50	0
	Adoption	-	-	-
Sawhney (India)	Awareness	59	30	12
	Interest	69	18	13
	Persuasion	78	17	5
	Trial	72	25	3
	Adoption	76	24	-

- : Indicates that no results were recorded.

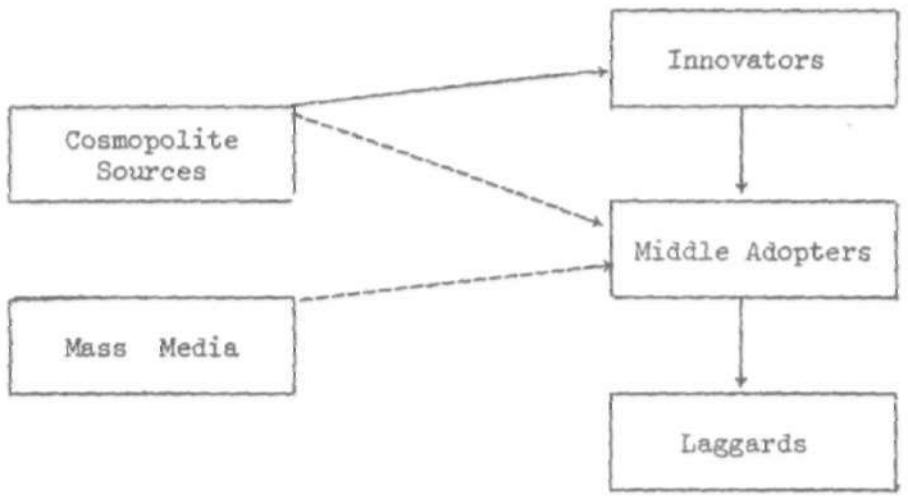
level, rising to 72 per cent at the trial level, whereas localite sources were important for 30 per cent of cultivators at the awareness level and for 25 per cent at the trial level. Mass media accounted for only 12 per cent of the cultivators at the awareness level, falling to three per cent at the trial level. Sawhney concluded that, generally, cosmopolite sources were more important than localite ones.

Both Rogers and Sawhney found that the more schooling the cultivators had, the more they used interpersonal-cosmopolite sources for their farming knowledge, i.e. their main source was more often the extension service. Sawhney compared those with one to four years of schooling with those having more than four years and found that the latter used cosmopolite sources of information significantly more often than the former.

Research has shown that early adopters use different sources of knowledge from the later ones. Rogers (1969) found that early adopters tended to use cosmopolite sources. This is to be expected since they do not have neighbours from whom to learn, whereas later adopters see the increases in production of those who have already adopted improved practices and learn in this way. The flow of knowledge seems to be as shown in Figure 4.2. If this flow occurs, then the profitable use of an improved practice by the innovators is essential to its diffusion through a community.

The results of the research carried out in developed countries contrasted with those reported above, mainly in the importance of the mass media as a source of farming knowledge. Jones (1967, pp.17-18), reviewing the research on this topic, says

Figure 4.2 Flow of Knowledge



that for the early adopters "mass media .... are important throughout the adoption process, but particularly during the early stages" and then goes on to say (ibid., p.18) that for the majority of cultivators in the middle section of the diffusion process, mass media are important mainly at the awareness stage. For the laggards, interpersonal contacts are more important and the mass media less important. Rogers (1969, pp.130-131) compared the results of his study in Columbia with those of his work with Beal in Iowa in the United States. In the Iowa study, mass media were the primary source for 51 per cent of the repondents at the awareness stage, and for 15 per cent at the persuasion stage, but no cultivator in the Columbian study gave mass media as his primary source of farming knowledge. Copp, Sill and Brown (1958) found that, for 115 cultivators in Pennsylvania in the United States, mass media were important for the majority of the cultivators at the awareness stage and, although less important at the later stages, were nevertheless still important for a third of the cultivators. The lesser importance of mass media as a source

of farming knowledge is to be expected since, in developing countries, the majority of rural people are illiterate and do not possess radios.

The differences between developing and developed countries indicates that when rural people in the former learn to read, and buy more radios, the mass media will become an important source of information.

(B) Education and farming knowledge

The only research carried out on the effect of education on farming knowledge in developing countries of Africa is that by Heijnen (1969) in the Mwanza district of Tanzania. He compared the knowledge of cotton growing techniques of the cultivators who had never been to school with that of those who had completed grade 7. The results showed both that knowledge of planting, spacing and use of fertilisers on cotton was very low (only 24 of the 202 cultivators knew the proper spacing and only 30 of the 87 who had just bought fertiliser knew how to use it), and also that there were no significant differences in this knowledge between those who had completed grade 7, and those who had never been to school. However, he did find significant differences in farming knowledge between those who had attended a farm training course on cotton and those who had not. But, as will be discussed later, the course did not result in any improvement in the cotton growing practices of the farmer. This, Heijnen (1969, p.16) claims, is because the level of knowledge was only that of facts and skills, and the cultivators lacked an understanding of the whole farming process. One reason for the lack of difference in cotton growing techniques, between those having completed

grade 7 and those who had not been to school, is that the primary schools did not teach farming.

(C) Motivation and farming knowledge

There has been no research in the developing countries of Africa on the effect of motivation on the acquisition of knowledge of farming. In the United States, Photiadas (1962), in a study in South Dakota, showed that there was a higher correlation between extension contacts and the knowledge of, and the attitudes to, improved practices for the cultivators who possessed a high level of motivation than for the others. The lack of research is probably due to the fact that it is the psychologists and educationists who are most concerned with the effect of motivation on learning, but these people are not often concerned with farming in developing countries.

4.4.3 Adoption of improved practices

Most of the research on the effect of sociological variables on the improvement of farming has been concerned with the adoption of improved practices. This work commenced in the United States just over twenty years ago, and from there spread to India and other developing countries, but only recently has any similar work been done in Africa.

The first studies of this type used basic variables in the analyses, e.g. for economic variables, farm size and total production were used, and for social variables, schooling, social status, contact with extension agents and age were used. Later, in seeking to increase the amount of variance explained, more abstract variables were constructed, e.g. mental urbanism, change orientation, professionalism, and empathy. These vari-

ables increased the proportion of variance explained but made the interpretation for policy more difficult, because the components of these more abstract variables were not known.

In the early studies the data were usually analysed using chi square and correlation techniques, but the later studies used regression, factor analysis, and principal component techniques.

This section of the review will look mainly at the research in Africa, which has included the effect of education variables on the adoption of improved practices, but will also include some research done in India and in other developing countries for purposes of comparison.

(A) Education and the adoption of improved practices

The research studies in Africa on education and the adoption of improved farming practices, which included a number of education measures in the analyses, were those done by Basu (1969) in Nigeria and Bowden and Moris (1969) in Uganda. The others included only one or two education measures. The main results of the studies discussed below are summarised in Table 4.5.

Basu (1969) studied the adoption of recommended improved practices in the Western state of Nigeria. The percentage of cultivators who had adopted the improved practices ranged from 84 per cent to 36 per cent. Basu interviewed 108 randomly selected cultivators and, using chi square analysis, found that contact with extension agents, non-farm occupations, visits to friends and relatives, and participation in formal organisations were significantly different for the low and high adopters of the improved practices. There were no significant differences,

Table 4.5 Education and the Adoption of Improved Practices : Results of Research in Africa[1]

	(1)	(2)	(3)	(4)	(5)
Schooling	n.s.	n.s.	s.	n.s.	s.
Farming experience	n.s.			s.	
Extension contacts	s.				
Sources of information	n.s.				
Contacts with friends and relatives	s.			s.	
Adult literacy classes	n.s.				
Participation in formal organisations	s.				
Farm training courses		n.s.		s.	
Cosmopolite experience	s.			s.	s.
Literacy				s.	

(1) Basu : Nigeria

(2) Heijnen : Tanzania

(3) Heyer and Ascroft : Kenya

(4) Bowden and Moris : Uganda

(5) Lawson : Ghana

[1] n.s. : not significant at P = 0.05.
s. : significant at P = 0.05.
A blank means that the variable was not included in the study.

however, for schooling, farming experience, sources of information and attendance at adult literacy classes.

Heijnen (1969), in the same study as that mentioned in section 4.2 in the Mwanza district of Tanzania, compared those who had not been to school with those who had completed seven years of primary schooling in respect of their adoption of improved practices for the cultivation of cotton. He found that the number of cultivators who had adopted the improved practices was very low (for example only 16 per cent of the cultivators planted cotton at the recommended time). There was no significant difference, between the two schooling groups, in planting time, in the use of good spacing of cotton plants, or in the use of artificial fertilisers. When discussing the relationship, Heijnen (1969, pp.120-122) used the expression, "there is a slight tendency" which would seem to imply non-significant relationships. On looking at the effect on adoption behaviour of a training course teaching cotton growing techniques, he found that those who had attended the course did not plant at a better time, nor space the plants better, nor use more artificial fertilisers. He argued that this was because the courses taught specific skills only, and that the cultivators did not have the managerial ability to put these skills into practice and to make the right decisions (Heijnen, 1969, p.16).

Heyer and Ascroft (1970) reported results from a very comprehensive survey in 14 districts of Kenya. Their index of adoption was based on the Guttman technique (Guttman, 1958). This assumes that there is an order in the adoption of improved practices, and only those improved practices which follow this order (within an error of 10 per cent) can be included in the

index. In many farming communities there is a choice of improved practices, i.e. one cultivator may intensify by investing in fertiliser, whereas another may invest in mechanisation, and consequently this technique cannot be applied. This, Heyer and Ascroft found to be so in their survey; and of the 16 improved practices investigated, in one district three only could be included in the index, and the maximum number included in any district was eight. Basing the formation of an index on this technique, therefore, introduces a serious bias. The cultivators in each district were divided into high and low adopters on the basis of their scores on the adoption index, and the personal characteristics of the groups were compared. The comparison was not done statistically, but only with the use of two way tables. With reference to schooling, Heyer and Ascroft (1970, pp.25-26) concluded that ..... "among those who had no education (schooling) there are much higher percentages of low adopters except in Meru and Taita (districts), but there are relatively high percentages even of high adopters in ....." six of the districts. "In most districts it appears to be much more significant to have had 1-4 years" of schooling. From these results it can be concluded that more high than low adopters had schooling, but the relationship was not very strong since many with no schooling had become high adopters.

Bowden and Moris (1969) constructed a Farm Modernisation Index as a measure of adoption, which gave greater weight to the practices which were adopted only by the cultivators who had already adopted a greater number of other improved practices. This approach was similar to that of Heyer and Ascroft, in that they both used an index based on an order of adoption. Using

this method of distinguishing "progressive" cultivators from the others, they found that there was no significant difference in the number of years which the twc groups had spent at school. But the "progressive" cultivators were more likely to have had non-farm employment and to have lived in a town, to have had a non-farm skill, and to have had some training at a farm institute. They also visited the nearest city more frequently and, even though they had not been to school more often, they were more often literate. This literacy, therefore, must have been obtained through their experiences in the towns, or through other informal educational experiences. Although schooling did not explain differences in the adoption behaviour, other educational experiences did, i.e. cosmopolite experience, literacy and farm training.

Lawson (1967), studying the changes which took place between 1954 and 1965 in the Lower Volta area of Ghana, concluded his article by saying that "potential innovators in this area who have made some attempt to improve their lot are those who have had an education (schooling) above the average, and who have held occupations outside agriculture" (p.148). This was the general impression which he gained when he returned to the area after an absence of ten years, and was not the result of a statistical analysis.

These studies seem to indicate that, on the whole, the association between schooling and the adoption of improved practices was weak, and that farm training, contact with the extension service, cosmopolite experience are more important in explaining the adoption of these practices.

It is difficult to compare studies in different areas, especially on different continents, since the social situations are different. Even when comparing villages in the same area, their social climates can affect the relationships in different ways. However, there are similarities between different traditional societies (see Chapter 2.1) and this allows some comparisons to be made. A few studies from India and South America will be described briefly for purposes of comparison. As for the research in Africa, education variables have not been the main centre of interest, and so have not been discussed in any detail. The results of the studies are summarised in Table 4.6.

Desai and Sharma (1966) studying the effect of literacy, as measured by the amount of schooling, on the use and non-use of fertilisers, found no significant relationships.

Six improved practices were studied by Choudhary and Maharaja (1966) in the Poli district of Rajasthan state of India, where they noted that literate cultivators adopted a greater number of improved practices than non-literate ones. No mention was made in the article as to how literacy was measured, but the study mentioned schooling in the conclusions, and it is assumed that this was the measure of literacy.

Rahadkar (1962), studying 106 cultivators in the Bhadravati National Extension Service Block in Chandi district of the Maharashtra state of India during 1958, measured adoption behaviour by an index of the number of suitable practices adopted, e.g. improved implements, improved seeds, use of insecticides, inoculations of cattle, "bunding" of fields and cattle breeding. The only education variable he used in the chi square analysis was schooling and

Table 4.6 Education and the Adoption of Improved Practices : Results of some Research in Asia and South America[1]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Schooling	n.s.	s.	s.		s.		n.s.
Cosmopolite experience				s.		s.	n.s.
Extension contact					n.s.		n.s.
Literacy					s.	s.	n.s.
School teacher contact							s.

(1) Desai and Sharma : India

(2) Choudhary and Maharaja : India

(3) Rahadkar : India

(4) Unesco : India

(5) Shetty : India

(6) Goldsen and Ralis : Thailand

(7) Rogers : Columbia

[1] n.s. : not significant at P = 0.05.
s. : significant at P = 0.05.
A blank means that the variable was not included in the study.

this he found to be significant. Age, social status (caste) and size of farm were not significant.

In the Thailand study organised by Cornell University, Goldsen and Ralis (1957) found that, in an area where only half the people were literate, there were significant differences in adoption behaviour between the literate and non-literate cultivators. For the first practice, 86 per cent of the former adopted the improved practice and 51 per cent of the latter, for the second practice the percentages were 62 per cent and 35 per cent, for the third practice 20 per cent and 11 per cent, and for the fourth practice 46 per cent and 27 per cent. All the differences between the percentages were significant, but the large number of non-literate cultivators adopting improved practices indicated that literacy was not the only factor; contact with the city and with urban customs (cosmopolite experiences) were also as important as literacy in bringing about better production practices.

Rogers (1969), again using education and adoption variables as personal characteristics, found that in the six villages studied in Columbia, agricultural innovativeness (index of number of improved practices adopted) and cosmopoliteness were significantly correlated in all villages, but they were more highly correlated in the traditional villages. Literacy was significantly correlated with innovativeness in only one modern village. In a multiple regression analysis, the only non-economic variables which were significant predictors of innovativeness were, in the modern villages, empathy, opinion leadership and school teacher contact, whereas in the traditional villages mass media exposure, empathy, opinion leadership and self-perceived

innovativeness were significant. Other educational variables, e.g. schooling, literacy, cosmopoliteness and extension agent contact were not significantly related to innovativeness in either group of villages. Rogers (1969, p.165) also quoted results of a Unesco study in India, where cosmopoliteness was, however, significantly correlated with adoption of improved practices.

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The effects of economic and social variables on the adoption of three improved practices for rice (improved seed, chemical fertiliser and the Japanese method of cultivation) were studied in India by Shetty (1969). Those who had adopted the improved practices, he divided into two groups, innovators and imitators, on the basis of when they had adopted these practices. The non-adopters formed a third group. Using chi square analysis he compared the three groups in respect of economic and social variables, and found that for the three improved practices studied, schooling of the cultivator, schooling of the family, and family literacy had significant chi square values between all groups. Extension service contact was only significant between the groups for the Japanese method of cultivation.

In the studies reviewed here, schooling (or literacy) was more often significantly related to adoption behaviour than in the studies in Africa. By contrast, cosmopolite experience was not significant in one of the studies in which it was included but was significant in all the African studies. The two studies above which included extension agent contact found that it was not significant. This is surprising since the studies of the main sources of knowledge of improved practices (Section 4.2(A)) showed that the extension service was very

important, and consequently it would be expected that contact with the service would be important if cultivators were to adopt improved practices. The one study in Africa, which included extension service contact as a variable, found it to be significant, although one of the two studies in Africa, which included farm training courses, found that they were not significantly related to the adoption of improved practices.

(B) Motivation and the adoption of improved practices

The association between the personal values of Indian cultivators and their adoption of improved practices was studied by Bose (1962) where he found that for the Hindus in the sample, business attitudes, rationality and scientific outlook were significantly and negatively correlated with it. For the Moslems, business attitudes, scientific outlook (but not rationality) were significantly correlated, and traditional and religious inclination were significantly and negatively correlated. Familism was not significantly correlated with adoption in either case. He concluded that there was some association in both the Hindu and Moslem groups between "modern" attitudes and the adoption of improved practices.

A similar study was conducted in India by Chattopadhyay and Pareek (1967) where they found that "fatalism, conservatism, authoritarianism, change-proneness and level of aspiration" all correlated significantly with an adoption quotient, the first two having negative correlation coefficients. Using multiple correlation analysis they concluded that fatalism, conservatism and authoritarianism were the significant variables explaining adoption, and that these together explained 59 per cent of the variance. The level of aspiration, which is similar to the

motivation variables used in this thesis, was not significant when the effects of the other variables were removed, and only had a correlation coefficient of 0.22 with the adoption quotient.

Using data from the Delhi state of India, and multiple regression techniques, Moulik, Hrabovszky and Rao (1966) studied the value of some psychological factors in the prediction of adoption behaviour. Included in the regressions were, a self-rating of "personality" containing the cultivator's assessment of his own innovative proneness, and a measure of his economic motivation (his desire to earn money). Both these factors were found to be significant predictors of adoption behaviour.

Rogers (1969), working in Columbia, found that in the more traditional villages the correlation coefficient between achievement motivation and innovativeness was significant, but this was not so for the modern villages, indicating that where the whole village was modern most of the cultivators would follow the leaders even though they did not have a strong desire themselves to adopt improved practices, whereas in the more traditional villages individual motivation was necessary for improved practices to be adopted.

Brock (1969) reported a different type of study by Mafeji in the Ganda area of Uganda. Mafeji studied the 110 cultivators who had the biggest farms in the area. From a detailed study of these cultivators he concluded that their success was because of their motivation. He said that they "actively seek out new ideas where they may be found" (ibid., p.23), because of their desire to improve. Most had had contact with the outside world in towns and cities (cosmopolite experience), but only half of them had

been to school. He claimed that these men were traditional, older, and, on the whole, uneducated, but they had made a success of farming. While his results may be interesting, he has taken a special case and therefore his results are not generally applicable.

"Few of the attitudinal-motivational variables (like achievement motivation) ..... explain significant amounts of variance in farm innovativeness, when the effects of all other variables are removed" (Rogers, 1969, p.305) was Rogers' conclusion from his multiple regression analysis using innovativeness as the dependent variable and 35 economic and social variables as independent variables. But, as Rogers admits (ibid., p.308), his analysis does not account for any interactions between the motivation variables and the economic and other social ones, through which motivation may make its contribution. It appears from the results of research that those who adopt improved practices have values which are more modern than those who do not.

4.5 The Factor Analysis Approach to Modernisation

In a developing society, all the educational experiences which rural cultivators receive tend to orientate them towards the modern society. Attempts have been made to study the interrelations between social and psychological variables which contribute to this modernisation.

The most comprehensive research of this nature is the one to which reference has been made many times, namely that by Rogers (1969) in Columbia. Applying correlation and factor analysis techniques to the data, he attempted to extract

general factors from the complex of inter-relations between the variables associated with the modernisation process (ibid., pp.334-344). The three factors which he isolated were external communication (highly correlated with education variables), orientation to change and innovative leadership.

Although this approach contributes to the general theory of modernisation, it is not suitable to the study of a specific set of variables such as education because it tends to allocate them all to the same factor. For example results of research using the factor analysis technique on data collected in developing countries (Deutschmann and Fals Borda (1962), Ascroft (1966), Whiting et al., (1967) and Rogers (1969)) placed schooling, literacy and print media in one factor, normally called "the ability to understand communication".[7] Cosmopolite experience (visits to city) and exposure to electronic mass media were sometimes included in a separate factor.[7]

4.6 Summary

The first section of this review was concerned with studies at national and regional levels and has demonstrated what was generally believed: that areas of higher education have higher farm production. It is not possible from the results of these studies to argue that education is the cause of the higher farm production, since it may be that education is related to other factors (e.g. the general development of the area) which themselves may be the cause of the higher farm production.

The second section dealt with research in some developing areas of Africa in which education was related to production and productivity, at the level of the individual cultivator.

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[7] Print media refer to the media of the printed word (e.g. newspapers and books and government pamphlets), whereas electronic mass media refer to radio and television.

The results of this research are equivocal. Saylor (1970), for example, using a Cobb-Douglas production function, found only a slight relationship between education variables and the yield of cotton, whereas Upton (1970), by combining different aspects of education into a single component, which he called mental urbanism, found that they were significantly related to production. Upton, however, did not continue the analysis to test the significance of the various aspects of education included in the mental urbanism component, but demonstrated only that they were inter-related.

Instead of studying the effect of education on the end-product of farming improvement, i.e. production or productivity, other researchers have concentrated on the stages leading to increased production, namely motivation, acquisition of farming knowledge and the adoption of improved practices. Although they have found that education was related to the motivation of the cultivators, they have not investigated, in detail, how education can contribute to the changing of traditional values and attitudes to those which are more modern. The results of research have also shown that education contributes more to achievement motivation and level of aspiration in traditional than in modern villages.

The results of the research on the sources of farming knowledge of cultivators in developing countries are consistent : the extension service being the main source, followed in importance by other cultivators. The mass media were relatively unimportant sources. The one study relating education to farming knowledge found that the cultivators with more schooling did not have more farming knowledge. No research in developing countries of Africa has been done on the relationship of motivation to the acquisition of farming knowledge.

Federal Government.[3] If the Zambians in each area are compared, the percentage in Mumbwa who were attending school was higher than that in Katete. Even though there were these considerable differences in percentages, the mean number of years attended in each area was approximately the same.

The schooling of the wives showed a similar pattern to that of the cultivators (i.e. a higher percentage in Mumbwa than in Katete), except that the percentages were lower. In both areas the educated wives tended to be married to the educated cultivators. In fact, only seven uneducated cultivators had married educated women.

According to the 1963 census (Zambian Manpower Report),[4] 40 per cent of all rural adult males, and 20 per cent of all rural adult females, in Zambia had attended school. These percentages were approximately the same as those in the Mumbwa sample, but higher than those in the Katete sample.

Only one cultivator, a Rhodesian, had been to secondary school, and he had left at the end of the first form. In the analysis he will be included with those who had completed the upper primary school course. A considerable number of Mumbwa cultivators had been to boarding school (41 per cent) of whom half were Rhodesians. In Katete, however, only three cultivators had been to boarding school.

The school facilities in the Eastern Province were less developed than those in the Central Province or those in Rhodesia,

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[3] The Federal Government was that of the Federation of Rhodesia and Nyasaland, and ruled from 1953 to 1963.

[4] Office of the Vice-President (1969), Zambian Manpower Report, Lusaka, p.89.

and consequently fewer Katete cultivators had the opportunity to attend school. Another reason for fewer of them having been to school was that migration to the "line of rail", and to the Copperbelt, has been greater in Katete than in Mumbwa. Those migrating tended to have higher than average schooling than that obtaining in the areas as a whole. Although no exact figures for this migration are available, the general trend can be seen, weakly, by the higher ratio of adult females to adult males in the Katete sample (1.44 to one in Katete, and 1.22 to one in Mumbwa),[5] and more strongly, by the fact that more men had migrated from the Katete area than had from the Mumbwa area. Kay (1967, p.78) shows, in a general map, that between 50 per cent and 60 per cent of taxable males in the Katete area had migrated to urban areas, whereas the equivalent figure for Mumbwa was between 40 per cent and 50 per cent.

There was only a slight, but significant, tendency for the younger cultivators, in both Mumbwa and Katete, to have had more schooling (the correlation coefficient between schooling and age was -0.25, which was significant at P = 0.05). It might have been expected that this relationship would have been stronger because of the rapid increase in the school facilities which has recently given more children the opportunity to attend school, but most school-leavers obtained employment in urban areas. This was the case, for example, for the vast majority of cultivators' children who had attended school.[6]

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[5] For this comparison, those of 18 years of age and above were included as adults.

[6] For details see Table 7.3.

7.1.2 Schooling of cultivators' children of an employable age[7]

The schooling of the cultivators' children, of an employable age at the time of the survey and shown in Table 7.2, has a pattern similar to that of the cultivators themselves, i.e. a higher percentage in Mumbwa than in Katete had been to school, as had a higher percentage of sons than of daughters. It must be emphasised here that this table includes children who were working in urban areas at the time of the survey and who, consequently, were not included in the sample. These children generally had more schooling than did the children who remained in the villages.

The majority of the educated children, in both areas, had migrated from their respective districts. The situation was the same for many of the uneducated children in Katete, whereas in Mumbwa most of these children remained in the district of origin (Table 7.3). Since most of the educated children left the villages after schooling and only had contact with their parents when on holiday, their schooling was of little value to their parents, or to the village as a whole. There were educated children, however, who had remained in the villages. In Mumbwa, eight of the 54 males with upper primary schooling had remained, as had five of the 27 females. In Katete, five of the 25 males and none of the five females had remained.

The employment of these children (Table 7.4) was as expected. The majority of those with no, or minimal, schooling had their own farms, helped their parents or had rural trades, while only a few had unskilled occupations in urban areas. On the other hand,

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7 "An employable age" is an age when the children are old enough to obtain work other than assisting their parents on the farm. They were not regarded as having reached this age if they were still attending school.

Table 7.2 Cultivators' Children of an Employable Age : Standard of Schooling Reached

Standard of schooling reached	Mumbwa				Katete			
	Males		Females		Males		Females	
	Number	%	Number	%	Number	%	Number	%
None	18	17	67	51	74	62	100	81
Lower primary	23	22	35	26	6	5	18	14
Upper primary	54	51	27	20	25	21	5	4
Secondary	10	9	2	2	14	12	1	1
Don't know	1	1	1	1	-	-	-	-
Total	106	100	132	100	119	100	124	100

Table 7.3 Cultivators' Children of Employable Age : Standard of Schooling Reached and Place of Residence

Place of residence	Standard of schooling reached									
	None		Lower primary		Upper primary		Secondary		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
	Number of cultivators									
Mumbwa										
Same village	6	22	4	11	8	5	1	-	19	38
Same district	6	15	5	5	5	6	-	-	16	26
Same province	1	5	1	1	4	3	1	-	7	9
Line of rail	3	10	8	7	17	5	6	2	34	24
Elsewhere in Zambia[1]	1	12	4	4	10	5	1	-	16	21
Outside Zambia	1	3	1	7	10	3	1	-	13	13
Total	18	67	23	35	54	27	10	2	105	131
Katete										
Same village	23	48	3	8	5	-	1	-	32	56
Same district	9	16	2	2	3	-	1	-	15	18
Same province	9	10	1	3	2	-	1	-	13	13
Line of rail	30	25	-	5	13	5	10	1	53	36
Elsewhere in Zambia	-	-	-	-	1	-	-	-	1	-
Outside Zambia	3	1	-	-	1	-	1	-	5	1
Total	74	100	6	18	25	5	14	1	119	124

[1] The schooling of two children was not known by their parents.

Table 7.4 Cultivators' Children of an Employable Age : Standard of Schooling Reached and Occupation

Occupation	Standard of schooling reached									
	None		Lower primary		Upper primary		Secondary		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
	Number of cultivators									
Mumbwa										
"Farmer"	5	4	3	2	3	2	-	-	11	8
Help parents on farm	-	2	1	5	3	2	1	-	5	9
European farm	-	-	2	-	-	-	-	-	2	-
Rural trade	2	-	3	-	2	-	-	-	7	-
Government	2	-	-	-	15	1	4	1	21	2
Teacher	-	-	-	-	1	1	-	-	1	1
Medical	-	-	-	-	1	-	-	-	1	-
Industry	2	-	6	-	18	-	3	-	29	-
Commerce	-	-	1	-	2	-	1	-	4	-
Domestic service	1	1	2	-	-	3	-	-	3	4
Own business	-	1	1	-	4	-	-	-	5	1
None[1,2]	5	58	3	28	4	18	-	1	12	105
Don't know	1	1	1	-	1	-	1	-	4	1
Total	18	67	23	35	54	27	10	2	105	131
Katete										
"Farmer"	36	21	3	2	3	-	-	-	42	23
Help parents on farm	5	14	1	3	1	-	-	-	7	17
European farm	2	-	-	-	-	-	-	-	2	-
Rural trade	4	-	1	1	5	-	2	-	12	1
Government	4	-	1	-	7	-	9	-	21	-
Teacher	-	-	-	-	-	-	3	-	3	-
Medical	-	-	-	-	1	1	-	-	1	1
Industry	5	-	-	-	2	-	-	-	7	-
Commerce	-	-	-	-	4	-	-	-	4	-
Domestic service	3	-	-	-	-	-	-	-	3	-
Own business	-	-	-	-	-	-	-	-	-	-
None[2]	2	63	-	12	1	4	-	1	3	80
Don't know	13	2	-	-	1	-	-	-	14	2
Total	74	100	6	18	25	5	14	1	119	124

[1] Two cultivators did not know how much schooling their children had completed.

[2] "None" included housewives.

most of those with upper primary or secondary schooling were employed by the government or in industry, and lived in urban areas.

Few of the female children had any wage-earning occupation. Most of them either assisted their parents, farmed on their own or, if married, were housewives.[8]

Perhaps a surprising feature is the small number of educated children who had become teachers or medical workers. From Mumbwa there were only two teachers and one medical worker, and from Katete, three teachers and two medical workers. As will be shown later, nearly all the cultivators gave teaching or medical work as their occupational aspiration for their children.

A number of the uneducated children living in urban areas had lost contact with their parents. In Katete, the parents of 15 of them did not know in what occupation their children were employed, whereas the parents of only one educated child did not know his occupation. There is no evidence here to support the widely held view that educated children cut themselves off from their parents. On the contrary, from this slight evidence, they seem to keep in contact with their parents more then the children who had not been to school.

Of the children farming on their own, only one (in Katete) was not married. Children usually remained with their parents while they were single and only started farming on their own once they were married. This situation will be discussed further in the more specific context of the school-leaver problem.

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[8] Housewives include the wives who helped their husbands on their farms.

7.1.3 The schooling of cultivators' children of school age

In the survey sample most of the children who were qualified to do so attended school, as can be seen from Table 7.5. For this table the children were divided into three age groups, which would be roughly equivalent to lower primary, upper primary and secondary schooling if they had all commenced school at the recommended age of seven years. Because this was not so, no strict age-grade comparisons can be made. The relatively low percentage of children attending school in the lowest age group was due to the late starting of many children, whereas the low percentage in the 15 to 17 year age group was because there were not sufficient places for many of them in upper primary and secondary schools. As there were no day secondary schools in either area, children in this upper age group attending day school were still at primary school, either because they started school at a later age, or because they had to repeat one or more grades.

The best indication of the proportion of children in the survey attending primary school was the percentage in the 11 to 14 year age group. In this group nearly 90 per cent of the boys and 71 per cent of the girls in Mumbwa went to school. The corresponding percentages in Katete were lower : 71 per cent for boys and 67 per cent for girls. In both areas the percentages were higher than their respective provincial values reported in the 1969 census (Central Statistical Office, 1970, p.B51) which, for the ten to 14 year age group, were : Central Province - 68 per cent for boys and 62 per cent for girls, and Eastern Province - 58 per cent for boys and 53 per cent for girls.

Table 7.5 Cultivators' Children of School Age : Attendance at School by Age Groups, 1969

	Age, years	Not at school		Day school		Boarding school		Total (at school)	
		Number	%	Number	%	Number	%	Number	%
Mumbwa									
	7-10	18	36	30	60	2	4	32	64
Boys	11-14	6	12	31	62	13	26	44	88
	15-17	6	33	4	22	8	45	12	67
	7-10	32	49	30	46	3	5	33	51
Girls	11-14	8	29	11	39	9	32	20	71
	15-17	13	52	2	8	10	40	12	48
Katete									
	7-10	15	60	8	32	2	8	10	40
Boys	11-14	7	29	12	50	5	21	17	71
	15-17	4	25	7	44	5	31	12	75
	7-10	15	47	14	44	3	9	17	53
Girls	11-14	8	33	13	54	3	13	16	67
	15-17	8	80	-	-	2	20	2	20

The higher percentage of boys than girls attending school in the 15 to 17 year age group indicates that the parents were still more positive in their attitudes to the schooling of boys than of girls. The lower proportion of the latter attending meant either that their parents prevented them from doing so, or that their desire to do so was lowered by community norms.

Cultivators were asked whether they thought that all children should go to school. Their responses are shown in Table 7.6, and the reasons for their attitudes in Table 7.7. The overwhelming reason for the cultivators' desire for their children to attend school was in order that they might obtain a well-paid, well-respected occupation. There were two main reasons for this : firstly they realised that there was no future for their children on the land, and secondly they thought that their children would have money to support them in later life. This support is necessary in Zambia since the government does not have a pension scheme for "farmers" as it does for employees.[9]

The reasons why some cultivators thought that not all children should attend school are given in Table 7.8.. The most important reason was that some children were needed to help at home. Because schooling was free, the cost was not really a factor, except perhaps for the cost of the lost labour. This latter cost was behind the desire that some children should help in the home rather than attend school. Despite this, most children who were eligible attended school, and, as the number of places increases, it is anticipated that, in the near future, virtually all eligible children will attend school for at least seven years.

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[9] The Zambian National Provident Fund, a type of superannuation fund, is compulsory for employees earning above a minimum wage.

Table 7.6 Attitudes of Cultivators to the Schooling of Children

Proportion of children whom cultivators think should attend school	Mumbwa		Katete	
	Boys	Girls	Boys	Girls
	Number of cultivators			
All	131	120	81	61
Some	2	10	23	40
None	-	2	-	3
Total[1]	133	132	104	104

[1] In Mumbwa two and three cultivators did not respond to the question for boys and for girls respectively.

Table 7.7 Cultivators' Reasons for Thinking that Children should Attend School[1]

Reason	Mumbwa		Katete	
	For boys	For girls	For boys	For girls
	Number of responses			
Highly paid / Respected job	167	161	160	152
A necessity	4	5	2	1
To assist country	8	2	7	7
Education is good	12	8	-	-
To support family	1	-	-	-
To be good mother	-	1	-	-
To obtain a good husband	-	36	-	-
Total	192	213	169	160

[1] More than one reason could have been given.

Table 7.8 Cultivators' Reasons for Thinking that Not All Children should Attend School[1]

Reason	Mumbwa		Katete	
	For boys	For girls	For boys	For girls
	Number of responses			
Only some are intelligent enough	-	1	3	3
Too expensive	2	3	7	4
Country needs only some educated	-	-	1	1
Some needed at home	1	14	16	35
Total	3	18	27	43

[1] More than one reason could have been given.

More Mumbwa cultivators favoured schooling for all children than did those in Katete and, in both areas, a higher proportion favoured schooling for all boys than did for all girls.

The cultivators' occupational aspirations for their children are shown in Table 7.9. These aspirations were expressed as being strongly in favour of the highly paid, well-respected occupations. The educated cultivators did not seem to differ from the others in their occupational aspirations for their children.

If the occupations, in which the employed sons were engaged, were any indication, the parents' aspirations for their younger sons were unrealistic. The vast majority of them wanted their sons to enter either the teaching or medical professions, while a significant proportion preferred government service for them. These aspirations came from their contacts with educated people through schools, hospitals or government administration. But, as shown, only a few of their sons had entered these occupations. In Mumbwa there was more awareness of the various opportunities for employment, and a large number desired that their sons enter industry and other similar occupations. A number of them also preferred their sons to remain in farming (19 as independent cultivators and five to assist their parents). Of these, 14 were Rhodesians and, not being citizens, realised that it would be difficult for their sons to obtain non-farm employment and so considered that there was more security for them on the land. The others were Zambians who were making a reasonable profit from their farming. Both the Rhodesian and Zambian cultivators, who wanted their sons to farm after they had left school, were, on the whole, the better cultivators. In a ranking, by total production of crops (in terms of maize equivalent),[10] of all culti-

[10] For details of the calculation of maize equivalents see Chapter 9.1.

Table 7.9 Cultivators' Occupational Aspirations for their Sons and Daughters

Occupation	Mumbwa		Katete	
	For sons	For daughters	For sons	For daughters
	Number of responses[1]			
Farming	19	7	-	1
Helping on farm	5	1	-	3
Crop demonstrator	2	-	1	-
Government	54	11	35	7
Teaching	50	40	91	79
Industry	29	3	3	-
Medical	34	99	68	95
Professional[2]	9	-	-	-
Domestic service	2	8	-	-
Rural trade	1	-	-	-
Commerce	5	6	1	-
Own business	1	-	-	-
Marriage	-	7	-	-
No special aspiration	2	-	1	-
Total responses	213	182	200	185

[1] Cultivators were able to respond with more than one occupation.

[2] Professional included all professions except medical and teaching.

Table 7.10 Reasons given by Cultivators for their Children not Attending School

Reason	Mumbwa	Katete
	Number of responses	
Cannot afford to send them	1	3
No places available	12	4
Have physical/mental infirmity	1	1
Do not want child to attend school	-	5
Total cultivators[1]	13	10

[1] Some cultivators responded with more than one reason.

vators in Mumbwa, the Rhodesians, and all except one of the Zambians, ranked in the top half.

The cultivators' aspirations for their daughters, within the broad categories shown in Table 7.9, were similar to those for their sons.

The survey included 23 families in which not all the children of school age attended school. The main reason for this (Table 7.10) was that there were no places available, a situation which was confirmed by the teachers at the schools concerned. In fact, as was pointed out in Chapter 6, only three quarters of those in Mumbwa applying for entry to Grade 1 could be accepted. In Katete those rejected were all from the same village which was three miles from the school. This school was only able to accept half the suitable applicants for Grade 1. In contrast, the schools near two other villages in the survey were not able to fill all the vacancies. Five cultivators in Katete did not want all their children to attend school. In these cases, it was mainly the decision of the wife and not of the cultivator himself.

From this discussion it can be seen that the cultivators were, on the whole, very positive in their attitudes to schooling for their sons and slightly less so for their daughters. Some were caught between the desire for their children to have a well-paid, well-respected occupation in an urban area, and the desire to have their assistance on the farm. The responses give some hope for the future, in that some of the better cultivators may not encourage their children to find urban employment, but may persuade them to stay in the village. The children are also more likely to stay if they can see that their parents make money

from farming. As pointed out in Chapter 3 this mutual respect between parents and children is essential if the children are to contemplate farming as a way of life.

7.2 Cosmopolite Experience

7.2.1 Urban employment and unemployment

The majority of cultivators, in both Mumbwa and Katete, had been employed in urban areas, as is shown in Table 7.11. Very few of them remained, for any length of time, in these areas without employment.

Of the cultivators who had previously been employed in urban areas, only a small proportion had been so employed since 1960, as is shown in Table 7.12 (28 per cent in Mumbwa and 10 per cent in Katete). The changing nature of employment is probably responsible for this pattern. Urban employment has recently become more permanent, and instead of the cultivators returning to their villages after a fixed period of time, the tendency now is for them to return, if at all, only to retire. This trend can also be seen in Kenya and other developing countries in Africa, where the employed workers are investing in houses in urban areas, instead of in the land, a trend which contrasts with the pattern shown in Table 7.12, where most cultivators returned to their villages at a fairly early age. For example, all except two cultivators, who were between 50 and 59 years of age during the last year of the survey, returned to their villages before they were 50 and many of them at a much younger age. Cultivators, therefore, who returned from urban areas were not too old to make a living from farming. But, if this new trend in urban employment continues, as it is expected to, cosmopolite experience will

Table 7.11 The Urban Employment and Unemployment of Cultivators

	Urban employment		Urban unemployment	
	Number of cultivators	Mean number of years	Number of cultivators	Mean number of years
Mumbwa	82	11.2	12	5.8
Katete	59	9.2	5	2.6

Table 7.12 Urban Employment of Cultivators : By Age and Date of Return to Village

Age of cultivators, years	Number of cultivators, last year of employment						
	After 1964	1960-1964	1950-1959	1940-1949	1930-1939	Before 1930	Total
Mumbwa							
Less than 30	1	1	-	-	-	-	2
30 - 39	1	5	4	-	-	-	10
40 - 49	3	10	8	7	1	-	29
50 - 59	1	1	9	4	6	-	21
60 and above	-	-	4	6	7	3	20
Total	6	17	25	17	14	3	82
Katete							
Less than 30	1	2	1	-	-	-	4
30 -39	1	-	4	-	-	-	5
40 - 49	-	-	6	7	2	-	15
50 - 59	1	-	4	8	5	1	19
60 and above	-	1	1	7	5	2	16
Total	3	3	16	22	12	3	59

not contribute to the improvement of farming, for the simple reason that those in urban employment will not return to the villages until they are of retirement age.

7.2.2 Rural non-farm employment[11]

By contrast with urban employment, the rural non-farm employment of the cultivators was very recent. Of the ten cultivators in Katete who had been thus employed in a rural area, nine had worked since 1964, and a number were still so employed during the survey. In Mumbwa half the 29 cultivators who had had rural employment had been so working since 1964. It cannot be argued from this that more cultivators, in recent years, have changed from urban to rural employment, since those from the survey villages working in urban areas during the survey were not included in the sample. It is true, however, to say that, over the last ten years, opportunities for rural non-farm employment have increased and this explains, to some extent, why a larger number of cultivators have been employed in rural areas since that time.

7.3 Present Cosmopolite Experience

The Present Cosmopolite Experience Index consisted of information about four "separate" experiences : visits away from the village for at least one night, attendance at church, attendance at community development meetings, and participation in adult education courses. The cultivators' experiences in these four areas during 1967/68 and 1968/69 are shown in Table 7.13 and will be briefly discussed.

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[11] Most rural non-farm employment available to the cultivators was unskilled work (e.g. repairing roads, clearing bush).

Table 7.13 The Present Cosmopolite Experience of Cultivators : 1967/68 and 1968/69

Nights spent away from village visiting friends and relatives						
	Nights away, Number of cultivators					
	0	1-10	11-20	21-50	Above 50	Total
Mumbwa	16	34	28	25	32	135
Katete	11	19	19	28	27	104
Church meetings						
	Hours of attending church, Number of cultivators					
	0	1-20	21-140	141-330	Above 330	Total
Mumbwa	35	30	23	21	26	135
Katete	15	16	30	26	17	104
Community development meetings						
	Hours of attending meetings, Number of cultivators					
	0	1-6	7-12	13-24	Above 24	Total
Mumbwa	53	11	20	24	27	135
Katete	52	12	19	18	3	104

Adult education courses

Type of education	Mumbwa		Katete	
	Number of cultivators	Number of family members	Number of cultivators	Number of family members
Literacy classes	-	-	1	2
Correspondence courses	-	-	1	-
Evening school classes	1	3	2	-

primary or lower secondary courses. Very few of the cultivators took the opportunity to participate in the classes or courses and so the experience contributed little to the Present Cosmopolite Experience Index.

7.4 Training and Experience in Farming

7.4.1 Cultivators' contact with the extension service during the survey

The agricultural extension service had contact with the cultivators through visits to individuals and through meetings at demonstration plots.

The number of cultivators visited by extension staff during the 1967/68 and 1968/69 agricultural seasons was small, as can be seen from Table 7.14. Except for Katete, in 1967/68 the vast majority of cultivators visited were farmers. Visits by extension staff to Katete villagers during 1967/68 were for the purpose of persuading them to apply for loans, but none of them did so. The crops or activities with which the extension visits during 1968/69 were associated are shown in Table 7.15. The visits recorded in the table under the heading of cattle were for inoculations to prevent trypanosomiasis, except in one case in Katete in which the cattle were sick and needed treatment.

The other extension visits during the 1968/69 agricultural season were mainly concerned with cotton and chickens in Mumbwa, and with cotton and tobacco in Katete; in both areas, all those growing the crops or raising the chickens were visited.[12] There

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[12] In Mumbwa 59 per cent of all extension visits were concerned with cotton or chickens, but if the visits in connection with cattle inoculations are excluded, the percentage rises to 72. In Katete, 80 per cent of all visits were concerned with cotton or tobacco.

Table 7.14 Extension Service Visits to Cultivators : 1967/68 and 1968/69 Agricultural Seasons

Number of visits	Mumbwa				Katete			
	1967/1968		1968/1969		1967/1968		1968/1969	
	Villagers	Farmers	Villagers	Farmers[1]	Villagers	Farmers	Villagers	Farmers
	Number of cultivators							
1	1	1	-	10	4	3	-	2
2	-	2	-	5	4	4	-	-
3	-	-	-	2	3	2	-	2
4	-	-	-	1	-	2	-	1
5	-	-	-	-	-	-	-	3
6 - 10	-	-	-	4	-	1	-	-
Above 10	-	-	-	1	-	-	-	4
Total	1	3	-	23	11	12	-	12

[1] Includes visits to 12 farmers regarding cattle inoculations and to 6 farmers who were establishing commercial chicken runs.

Table 7.15 Extension Service Visits to Cultivators : By Crop, 1968/69 Agricultural Season

Crop or Livestock	Mumbwa			Katete		
	Number of cultivators	Number of visits	Average visits per cultivator	Number of cultivators	Number of visits	Average visits per cultivator
Cotton	4	12	3.0	4	25	6.3
Burley tobacco	-	-	-	6	43	7.2
Vegetables	2	8	4.0	-	-	-
Cattle	12	13	1.0	5	6	1.2
Chickens	6	31	5,2	-	-	-
General	3	9	3.0	2	11[1]	5.5
Cultivators visited	23	-	-	12	-	-

[1] Includes eight visits to a farmer who was growing demonstration plots of maize and groundnuts for the extension service.

were, on the whole, a greater number of visits to each cultivator in Katete than in Mumbwa. The concentration on cotton, Burley tobacco and chickens was in line with the extension service policy.

Either during, or previous to, the survey less than half the cultivators in each area had attended meetings organised by the extension service at demonstration plots. Most of them claimed that they did not know about these meetings. Others, in Mumbwa, did not go because they thought it was a waste of time, while another group claimed that they were too busy. Although one or two may have been busy on the day of the meeting, the latter excuse probably meant that they did not consider the meetings worthwhile. The crops on the demonstration plots were grown to show the results of using the best methods of growing crops, e.g. by the use of fertilisers and better seeds, and timeliness of operations; but only 11 of the cultivators attending these meetings said that their reason for going was to see the effects of fertilisers. The others gave the general answer that they went because they found them helpful or interesting. The percentage of farmers attending meetings at demonstration plots was over twice that of the villagers, and overall attendances in Katete were higher than in Mumbwa. During the period of the survey, two cultivators in Katete each grew an acre of maize for the extension service, as a demonstration plot, but in each case the production did not cover the cost of seed and fertiliser and, probably because of this, no meetings were held at these plots. Almost all of the 63 cultivators in Katete, who did not go to the demonstration plots, said that they did not know about them.

On the whole these were villagers (54 of the 63) who may have heard vaguely about the meetings but were not formally asked to attend. If they had been, it is only speculation whether they would have attended. If the crops grown at the demonstration plots had been more successful, more meetings might have been held. The failure of these plots must have had a negative effect on the cultivators who saw them. They must have wondered how they could succeed if their fellow cultivators, with concentrated assistance from the extension service, could not produce sufficient maize to cover the cost of the inputs which were purchased.

7.4.2 Attendance at farm training courses

Only 26 cultivators had attended farm training courses, either before or during the survey, as can be seen from Table 7.16. All except three of them were farmers. Of the two Mumbwa villagers who had attended, one was a commodity demonstrator for cotton, and the other had recently decided to change to a non-farm enterprise as a money-making venture. The Katete villager had previously been a member of the Peasant Farming Scheme, but resigned due to illness. In Mumbwa all cotton growers, and all those with chicken runs, had attended training courses, and in Katete five of the six Burley tobacco growers had also been to courses. The courses on other topics ranged from those on specific crops to those teaching general farming techniques (e.g. plant spacing or cultivation techniques).

7.4.3 Farm experience

Because of the larger number of European farmers in the Katete area than in the Mumbwa area in the past, a larger

Table 7.16 Farm Training Courses Attended by Cultivators : By Type of Course

Nature of course[1]	Mumbwa		Katete	
	Villagers	Farmers	Villagers	Farmers
	Number of cultivators			
Cereal crops	-	3	-	1
Legumes	-	5	-	3[2]
Tobacco	-	-	-	5
Cotton	1	6	-	1[2]
Vegetables and fruit	-	1	-	-
Cultivation	-	5	-	2
Plant spacing	2	4	1	3
Weeding	-	-	-	1
Crop rotation	2	1	-	1
Fertilisers	1	2	-	-
Use of implements	-	3	-	1
Accounting	-	1	-	-
Poultry	-	6	-	1
Cattle	1	3	1	1
Total attending courses[3]	2	13	1	10

[1] Some courses dealt with more than one topic.

[2] Includes a cultivator who attended a course during 1968/69.

[3] Some cultivators attended more than one course.

Table 7.16 Farm Training Courses Attended by Cultivators : By Type of Course

Nature of course[1]	Mumbwa		Katete	
	Villagers	Farmers	Villagers	Farmers
	Number of cultivators			
Cereal crops	-	3	-	1
Legumes	-	5	-	3[2]
Tobacco	-	-	-	5
Cotton	1	6	-	1[2]
Vegetables and fruit	-	1	-	-
Cultivation	-	5	-	2
Plant spacing	2	4	1	3
Weeding	-	-	-	1
Crop rotation	2	1	-	1
Fertilisers	1	2	-	-
Use of implements	-	3	-	1
Accounting	-	1	-	-
Poultry	-	6	-	1
Cattle	1	3	1	1
Total attending courses[3]	2	13	1	10

[1] Some courses dealt with more than one topic.

[2] Includes a cultivator who attended a course during 1968/69.

[3] Some cultivators attended more than one course.

proportion of the Katete cultivators have worked on these European farms. Most of them had left this type of employment by 1960, as by then most of the European farmers had left both areas. Of the Mumbwa cultivators who had worked on European farms, half were villagers and half farmers. Eleven of the 25 were Rhodesians and worked on European farms before migrating to the then Northern Rhodesia and, as they were all farmers, it meant that only two of the farmers who had worked on a European farm were Zambians. In Katete, 16 of the 27 farmers had worked on a European farm, but only 27 of the 77 villagers. The mean number of years worked by the cultivators was about five in each area, and was lower than for urban employment.

A number of cultivators had, in the past, received special assistance from the extension service through special farming schemes. The Peasant Farming Scheme in the Eastern Province and the Improved Farming Scheme in the Central Province were designed to assist subsistence cultivators to become "commercial farmers".[13] Both of these schemes had come to an end before the UNZALPI survey began in 1966. Of the total of 16 cultivators who had been members of the schemes, 11 were in Mumbwa (six Rhodesians) and five in Katete. Two main reasons were given for joining the schemes : they wanted advice on how to improve their farming, or they were told that if they did not join they would have to move from their land. Half of the cultivators left the schemes before they had finished, mainly because they were dissatisfied with them, or, in two cases, because they were ill. The others remained in the schemes until they ended.

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[13] The Improved Farming Scheme was to help cultivators on their own land, whereas the Peasant Farming Scheme settled them on blocks of state land.

The formation of production co-operatives was just beginning in the Katete area at the time of the survey. These co-operatives were to consist of groups of ten cultivators who would apply for a loan, for a tractor and implements. Up to the end of the survey four cultivators had joined co-operatives of this nature, but none of the co-operatives had been given a loan. One Mumbwa cultivator belonged to a production co-operative which was in operation.

The other type of co-operative, in the Katete area, was the marketing co-operative society, affiliated to the Eastern Province Co-operative Marketing Association (E.P.C.M.A.). Six villagers and 18 farmers were members. Except for one farmer, who was a committee member, and another who was secretary, none of the cultivators had much contact with a society. Before the survey the societies were very active, but during the time of the survey they only organised village markets on behalf of the E.P.C.M.A. Apart from this they were of little assistance to the cultivators in the area.

Chapter 8

ANALYSIS OF THE EDUCATION AND KNOWLEDGE VARIABLES

The last chapter contained a description of the educational experiences of the cultivators and their families. In this chapter a more detailed analysis will be carried out, using the education and knowledge indexes described in Chapter 1.4.3.

8.1 The Education Variables

To examine the inter-relations between the education variables, zero-order correlation matrices were constructed for the total sample, and for the Mumbwa and Katete samples separately (Table 8.1). An examination of these matrices shows that there were differences in the coefficients between the two areas and, for this reason, the areas will be discussed separately.

8.1.1 Mumbwa

All the correlation coefficients between each pair of education variables were statistically significant[1] with the exception of that between Cosmopolite Experience and Present Cosmopolite Experience. However, the proportion of variance explained was small, in each case being less than 20 per cent.

Apart from the socialising experiences, which were not measured in this study, schooling would have been the first educational experience which a cultivator would have obtained. Not until this was complete would he have had Cosmopolite Experience (mainly urban and rural employment), Training and Experience in Farming (mainly contact with the extension service through extension visits or farm training courses), or Present

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[1] At P = 0.05.

Table 8.1 Zero-order Correlation Matrices : Education Variables

All Cultivators				
	A	B	C	D
A. Cosmopolite experience	1.00	0.30*	0.29*	0.06
B. Training and experience in farming		1.00	0.31*	0.23*
C. Schooling			1.00	0.27*
D. Present cosmopolite experience				1.00

Mumbwa				
	A	B	C	D
A. Cosmopolite experience	1.00	0.27*	0.31*	0.07
B. Training and experience in farming		1.00	0.40*	0.31*
C. Schooling			1.00	0.23*
D. Present cosmopolite experience				1.00

Katete				
	A	B	C	D
A. Cosmopolite experience	1.00	0.31*	0.13	0.02
B. Training and experience in farming		1.00	0.13	0.10
C. Schooling			1.00	0.34*
D. Present cosmopolite experience				1.00

* Significant at P = 0.05.

Cosmopolite Experience (cosmopolite experience during the survey).[2] Therefore, it can be said that the cultivator who had been to school was more likely to have obtained other educational experiences. One reason that he was more likely to have obtained urban and rural employment is evident : educated people were more in demand for most occupations. But there is another reason : if schooling raises the level of aspiration of an individual for a higher standard of living, he will probably seek urban or rural employment in order to earn the money necessary to reach this standard of living.

The significant correlation coefficient between Training and Experience in Farming and Schooling can be explained by the fact that the educated person, who did not seek urban and rural employment, may have desired to raise his standard of living by earning money through better farming and, for this, he sought the assistance of the extension service. If this is so, then the effect of such schooling was primarily to motivate the person to raise his standard of living and, through this, to seek other educational experiences. Further discussion of this point will be left until Chapter 9.

There was also a significant correlation coefficient between Training and Experience in Farming and Cosmopolite Experience, indicating that those cultivators, who had been employed in urban or rural areas, had also had more contact with extension officers. This was due, to some extent, to the relationship between Schooling and Cosmopolite Experience, as the three variables under

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[2] As only a small number of cultivators had been unemployed in urban areas and for short periods of time (Table 7.11), urban and rural employment were the main contributors to the Cosmopolite Experience Index. Most of the Training and Experience Index was concerned with the extension service. For details of the indexes see Appendix I.

consideration were inter-related. The first-order correlation coefficient between Training and Experience in Farming and Cosmopolite Experience, with the effect of Schooling removed, was only 0.17 compared with 0.27 for the direct relationship between them. However, since this first-order correlation coefficient was significant (at P = 0.05), urban and rural employment was also directly related to contact with the extension service.

The cultivators, who participated more in cosmopolite experience during the survey (i.e. those with a high Present Cosmopolite Experience Index score), tended to be those who had been to school (r = 0.23), and who had been more in contact with the extension service (r = 0.31), but not those who had been in urban or rural employment.

8.1.2 Katete

The inter-relations between the education variables were not as strong in Katete as in Mumbwa. Schooling, for example, was not significantly correlated with Cosmopolite Experience or with Training and Experience in Farming. These results mean that cultivators with schooling did not obtain urban or rural employment more often than did the others, nor did they have contact more often with extension staff.

Throughout the discussion concerning Schooling in Katete, it must be remembered that only 15 cultivators had been to school (the Schooling Index mean for Katete was only 35.6 compared with 58.3 in Mumbwa). Therefore, most of the Schooling Index scores in Katete were based on the Schooling of wives and children, and, consequently, it is not surprising to find that the index was not significantly correlated with Cosmopolite Experience nor with Training and Experience in Farming.

As in Mumbwa, the cultivators who had been employed in urban or rural areas tended also to have had contact with extension staff more often (r = 0.31). Cultivators who had been to school tended to participate more often in cosmopolite experiences during the survey (i.e. they had higher Present Cosmopolite Experience scores), but this was not so for those who had been employed, nor for those who had had more contact with extension staff.

Schooling, in Katete, was not the basic educational experience which it appeared to be in Mumbwa, where those who had been to school were more likely to have been employed and to have had more contact with extension staff.

8.1.3 A comparison with the results of other research[3]

Upton (1968b) used a variable, "mental urbanism", which consisted of aspects of education. He was able to combine these aspects into one index since he found them to be highly inter-related. This association between the variables was much higher than in either Mumbwa or Katete. One reason for this was that Upton omitted any variable which was not strongly associated with the others. No other research has dealt with the inter-relatedness of the various aspects of education amongst cultivators in developing countries.

8.2 The Knowledge Variables

Three variables were distinguished for the purpose of examining knowledge : General Knowledge, Literacy, and Farming

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[3] For a discussion of this research, see Chapter 4.3.

Knowledge.[4] The indexes formed to represent these variables were highly inter-related (Table 8.2), with the correlation coefficients for Mumbwa being generally higher than those for Katete.

The General Knowledge Index is a variable to represent how aware the cultivator was of the world outside his village. A cultivator scoring highly on this index is one who was more orientated outside his village society. The Farming Knowledge Index is based on questions which tested whether the cultivator was aware of general farming facts and constraints. It does not test detailed knowledge of farming methods or techniques. The highly significant correlation coefficient between these two indexes (0.56 for Mumbwa and 0.49 for Katete) means that a cultivator who was more generally aware of what was happening outside his village was also likely to be aware of modern farming techniques.

The inter-relationships between these three knowledge variables will be explained in the next section in terms of their relationships with the education variables.

8.3 The Sources of General Knowledge and Literacy[5]

Knowledge comes from an individual's educational experiences, both formal and informal. Therefore, any significant relationships between the education and the knowledge variables can be considered to be causal. Since it was not possible to measure the socialising experiences, or the quality of the educational experiences, this section will deal only with the relationships

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[4] For details see Chapter 1.4.3.

[5] Farming Knowledge will be discussed in Chapter 9.4.

Table 8.2 Zero-order Correlation Matrices : Knowledge Variables

	All Cultivators		
	A	B	C
A. General knowledge	1.00	0.59*	0.54*
B. Literacy		1.00	0.49*
C. Farming knowledge			1.00

	Mumbwa		
	A	B	C
A. General knowledge	1.00	0.58*	0.56*
B. Literacy		1.00	0.53*
C. Farming knowledge			1.00

	Katete		
	A	B	C
A. General knowledge	1.00	0.49*	0.49*
B. Literacy		1.00	0.38*
C. Farming knowledge			1.00

* Significant at P = 0.05.

of the General Knowledge and Literacy Indexes with the education variables. Intelligence is an important factor in the determination of the knowledge which an individual is able to gain from an educational experience. Obviously, an individual with high intelligence will normally gain more from an experience than will one with lower intelligence, even though a considerable proportion of intelligence is acquired as a result of learning. During the survey it was not possible to measure the intelligence of the cultivators and, consequently, it was not included in the present analysis.

The education variables may be considered to be important sources of General Knowledge and Literacy, since all the correlation coefficients were significant (Table 8.3). General Knowledge and Literacy were each regressed on the education variables. The results of these regressions are presented in Table 8.4.

8.3.1 General knowledge

Since the General Knowledge Index is a measure of the cultivator's broadened outlook, it would be expected that those cultivators scoring highly on the index would be orientated towards the modern society and would have acquired more of the values and attitudes of this society. Therefore, they would have lost some of their "peasant characteristics".[6] For example, those with this broadened outlook would have identified more with groups outside the village environment and might be less constrained by family and other traditional ties. In addition they might be less "localite" and possess more empathy.[6]

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[6] See Chapter 2.1.2 for a discussion of "peasant characteristics".

Table 8.3 Zero-order Correlation Coefficients : Education with Knowledge Variables

	General knowledge		Literacy	
	Mumbwa	Katete	Mumbwa	Katete
Cosmopolite experience	0.39*	0.35*	0.46*	0.37*
Training and experience in farming	0.45*	0.42*	0.53*	0.33*
Schooling	0.45*	0.43*	0.56*	0.51*
Present cosmopolite experience	0.36*	0.38*	0.31*	0.25*

Table 8.4 Multiple Regression : General Knowledge and Literacy on Education Variables

Independent variables	Dependent variable : General knowledge			
	Mumbwa		Katete	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	0.2032*	0.0619	0.2092*	0.0763
Training and experience in farming	0.1973*	0.0707	0.2535*	0.0701
Schooling	0.2070*	0.0668	0.2997*	0.0898
Present cosmopolite experience	0.1829*	0.0614	0.2724*	0.0887
Determination, R^2 (%)	38.22		41.56	
Standard error of estimate	20.60		20.68	

Independent variables	Dependent variable : Literacy			
	Mumbwa		Katete	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	0.2807*	0.0670	0.2527*	0.0817
Training and experience in farming	0.2968*	0.0766	0.1777*	0.0751
Schooling	0.3514*	0.0723	0.4918*	0.0962
Present cosmopolite experience	0.1337*	0.0664	0.0879	0.0950
Determination, R^2 (%)	50.50		39.84	
Standard error of estimate	22.31		22.15	

* Significant at P = 0.05.

All the education variables contributed significantly to the explanation of the variance of General Knowledge, and together they explained about 40 per cent of the variance in each area. It is to be expected that all the education variables would contribute to the cultivator's general awareness of what is occurring outside his village. At school, he would have learnt more of societies different from his own. In addition, this schooling would have brought him into contact with the values of these societies and would have raised his level of aspiration to learn more of them. His employment, in urban or rural areas, would also have brought him into direct contact with a society different from his own (as opposed to the indirect contact at school through lessons), and his living or working in this society would necessarily make him more aware of its values and characteristics. In a similar manner, contact with the extension service, which is an agent of the wider society, would contribute to his awareness of this society. Present Cosmopolite Experience, although an experience durihg the survey, would most probably be similar to that in the years immediately preceding the survey, and consequently contacts through the church, community development, education courses and visits to other areas would also have contributed to this broadened outlook.

Although employment in urban and rural areas, contact with the extension service and cosmopolite experience during the survey all contributed to the general knowledge of the cultivator, they explained less than half the variance. Allowing for the fact that the education indexes did not measure the quality of the experiences and that intelligence was not taken into account, it can still be argued that the socialising experiences of the

cultivators, and their general informal contacts in the villages, were also important sources of this general knowledge. The acquisition of this knowledge depends, to a large extent, on the general level of awareness within the village. If the village is isolated from the general development in the country, then socialising and other general, informal experiences available to the cultivator are limited.

Because there is a large proportion of the variance of General Knowledge which can be explained only by the socialising and other informal experiences of the cultivators, the General Knowledge Index can be used as a "crude" measure of these educational experiences.[7] The index will be used for this purpose in the regressions in the next chapter.

8.3.2 Literacy[8]

Apart from adult education courses in the Present Cosmopolite Experience Index, schooling was the only educational experience in which individuals were formally taught to read and write. It is therefore not surprising to find that schooling was the education variable which was most highly correlated with Literacy in both survey areas (Table 8.3). But, because in both areas it explained only half the variance, other sources must have been important. The regression analysis (Table 8.4) shows that, in both areas, Cosmopolite Experience was significant. Urban and rural employment, therefore, were

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[7] This approach is only valid when the General Knowledge Index is used in a multiple regression analysis with the education variables. Only then will the significance of the regression coefficients indicate that the informal educational experiences are significant.

[8] The reader is referred to Appendix I for a cautionary note on the use of the Literacy Index.

important sources of Literacy. Present Cosmopolite Experience was the only education variable which was not significant in the regressions. Because of the nature of the variable, this is to be expected.[9]

Because of the importance of schooling to the ability of the cultivators to read and write, the relation between it and literacy will be examined in more detail. Table 8.5 gives this relationship in tabular form. The Unesco standard is that four years of schooling is necessary for a person to obtain "permanent literacy", if he has opportunities to read and write after leaving school. In the survey, 32 per cent in the Mumbwa sample and 17 per cent in Katete with less than this amount of schooling were functionally literate in the vernacular language. For them other sources of literacy must, presumably, have been important. Of the 30 Mumbwa cultivators with less than four years of schooling, who were functionally literate in the vernacular language, seven had attended school for either two or three years. A further 19 of them had been employed for a considerable time in urban or rural areas (their mean for Cosmopolite Experience was 78.6 compared with 53.2 for the Mumbwa sample as a whole). Of the remainder, one had attended church courses and three had children or relatives who were educated. In Katete only 16 cultivators, who had not completed at least four years of schooling, were functionally literate in the vernacular. Four of them had attended school for at least two years and nine had considerable Cosmopolite Experience (their mean was 75.2 compared

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[9] The adult education courses formed only a small proportion of the Present Cosmopolite Experience Index. See Chapter 7, Table 7.13.

Table 8.5 Schooling and Literacy of Cultivators

Schooling	Mumbwa					
	English			Vernacular		
	Illiterate	Semi-literate	Literate	Illiterate	Semi-literate	Literate
	Number of cultivators					
None	68	3	-	34	18	19
Grade 1	6	-	-	1	1	4
Grade 2	8	-	-	1	6	1
Grade 3	6	3	1	2	2	6
Grade 4	8	3	1	1	3	8
Grade 5	2	6	-	-	1	7
Grade 6	1	5	5	-	-	11
Grades 7 and 8	-	6	3	-	-	9
Total	99	26	10	39	31	65

Schooling	Katete					
	English			Vernacular		
	Illiterate	Semi-literate	Literate	Illiterate	Semi-literate	Literate
	Number of cultivators					
None	87	2	-	55	22	12
Grade 1	-	-	-	-	-	-
Grade 2	2	2	-	1	1	2
Grade 3	2	1	-	-	1	2
Grade 4	3	1	-	-	2	2
Grade 5	-	1	-	-	-	1
Grade 6	-	1	1	-	-	2
Grades 7 and 8	-	-	1	-	-	1
Total	94	8	2	56	26	22

with 41.3 for the Katete sample as a whole). The remaining three had attended church or farm training courses.

Most of those who were functionally literate, and who had not been to school for at least two years, had had considerable urban or rural employment experience and this, most probably, was how they gained their ability to read and write. Only a few who were functionally literate did not have Schooling or Cosmopolite Experience, and those cultivators had special experiences through which they may have become literate.[10]

Only five of the 40 Mumbwa cultivators, and two of the eight Katete cultivators, with four years or more of schooling were not functionally literate in the vernacular. This indicates that, although schooling was not the only source of literacy, it was the most important one. These findings are similar to those of Heijnen (1968, p.43) from his research in the Bukumbi village near Mwanza in Tanzania. Here, less than ten per cent of those with more than four years of schooling had any difficulty reading and writing in Kiswahili. Even though schooling was not the only source of literacy in his research, all except a few with four years or more of schooling had retained their literacy.

For a cultivator to remain literate he should have opportunities to read and write. Only a small percentage of cultivators (39.3 per cent in Mumbwa and 22.1 per cent in Katete) possessed books, and the majority of them possessed books of less than five Kwacha in value.[11] Most of these books were religious, a

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[10] Data were not collected during the UNZALPI survey on past adult education or literacy courses. These courses in the past had not been readily available to rural people.

[11] One Kwacha = 58p sterling.

situation similar to that found by Heijnen (1968, p.44). Many of those possessing books were not literate and, in many cases, this was also true of members of their families. The use of books as a source of knowledge was not important, except perhaps for religious knowledge, although, in the Mumbwa area in particular, there were opportunities to read newspapers and government information leaflets.

8.4 Summary

In summary two important points must be stressed :

(i) The educational experiences were, on the whole, more highly related with each other in Mumbwa than they were in Katete. For example, Schooling was significantly correlated with Cosmopolite Experience and Training and Experience in Farming, i.e. those who had been to school had also more often been employed in urban or rural areas, and had contact more often with the extension service. This was not so in Katete.

(ii) Although, in the regressions of General Knowledge on the education variables, all the regression coefficients were significant, the explained variance was only about 40 per cent in each area. Therefore the informal experiences not measured by the indexes were also important, and the General Knowledge Index can be used to represent these experiences when used in regression analysis in conjunction with the education indexes.

Chapter 9

EDUCATION AND THE DEVELOPMENT OF FARMING IN MUMBWA AND KATETE : ANALYSIS OF DATA

9.1 Introduction

At the national level, education is necessary for the development of Zambia. Without it, for example, the technological economy could never function. This chapter is not concerned, however, with the relationship between education and the national economy, but with the contribution which education has made in two rural communities, and it will investigate whether education has contributed, in these areas, to the improvement of the family farms which Kaunda claims to be the basis of Zambian agriculture. The data to be used in this investigation will be those collected during the UNZALPI survey.

For the analysis the four education variables described in Chapter 1, and discussed in Chapter 8, will be used. They are :

(i) Cosmopolite experience : the main experiences contributing to this variable were urban and rural employment;

(ii) Schooling : the standard of schooling reached by the cultivator, or if he had not been to school, by his wife or children;

(iii) Training and experience in farming : this consisted mainly of the cultivators' contacts with the agricultural extension service through personal visits, meetings, or farm training courses;

(iv) Present cosmopolite experience : this consisted mainly of attendance at community development meetings and church, and visits to friends and relatives.

In addition to these education variables, the General Knowledge Index will be included in the analysis. The other two knowledge variables, which were discussed in Chapter 1, will not be included in the analysis as independent variables : Literacy, because it was found in the preliminary analysis not to contribute to the improvement of farming in either Mumbwa or Katete, and Farming Knowledge, because it will be discussed as a stage of the adoption process.[1]

This chapter will discuss firstly the contribution of the education variables and General Knowledge to the increase of farm production (Section 9.2), and secondly (because it is believed that substantial increases in production come mainly from the adoption and use of improved practices (see Chapter 2)) the contribution of the education variables and General Knowledge to the four stages of the adoption process as outlined in Chapter 2.3, namely, motivation, farming knowledge, adoption, and effective use (Sections 9.3-9.6).

When an investigation is made of small-scale farming, one of the first problems to be overcome is the difficulty of finding a suitable method of measuring the level of farming. A number of different methods have been used : area of land cultivated, production, gross margin, yield per acre and yield

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[1] For a discussion of the nature and limitations of the indexes based on rectangular distributions see Appendix II.

per man-hour. Although all measure farming success, each one measures a slightly different aspect of it. Production, for example, takes account only of the crops produced, without allowing for the cost of the resources used (e.g. seeds and fertilisers). Gross margin takes these resources into account, but does not normally include the crop produced for subsistence, although, for a number of studies in developing countries, the value of subsistence production has been included in gross margin. Efficiency in terms of yield per acre or yield per man-hour does not allow for differences in the size of the farming enterprise.

In Section 9.2 two measures of the level of farming will be used : farm production, and gross margin (including subsistence production). Land area will not be used since it does not take into account the labour requirements of the different crops. Burley tobacco, for example, requires a greater labour input per acre than does maize. Generally, there was no shortage of land in either Mumbwa or Katete, but much of the new land had to be cleared. The shortage of land, therefore, was not a constraint in the way that it is in many parts of Asia.

Because, in both areas (although more in Katete than in Mumbwa), there was specialisation in the crops grown, it was not possible to base the analysis on the production of one or two crops. Therefore the production considered was the total production from the farm. In order to evaluate the production for each crop, its weight was converted to the weight of an

equivalent value of maize.[2] The production of each farm was then expressed in terms of Maize Equivalent (M.E.) units. Livestock production was not important in either area and so was not included in the production figure. Production in terms of M.E. ranged from 170 to 110,000 pounds of maize.

The gross margin was the value of the production (M.E.), including the crops produced for subsistence, less the direct costs of production (e.g. for seeds and fertilisers).

For the discussion of motivation in Section 9.3 two dummy motivation variables based on the villager, farmer and non-farm cash earner categories discussed in Chapter 2[3] will be used :

(i) Non-wealth/wealth : for this indicator the farmers and non-farm cash earners will be combined to form the "wealth" groups because both desire to earn money in order to raise their standard of living. The non-wealth cultivators will be the villagers;

(ii) Villager/farmer : for this indicator the villagers will include the villager and non-farm cash earner categories because neither category desires to earn money by improved farming. The farmers will be the same as the farmer group discussed in Chapter 2. The villager/farmer indicator will be the same as that in the third UNZALPI report (Elliott et al., 1970).

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[2] For example, in Katete the maize equivalent of Burley tobacco was 14.8. A crop of 100 pounds of Burley tobacco was equivalent in value to 14.8 x 100 (1480) pounds of maize. The maize equivalent values of crops are given in Appendix III.

[3] For a discussion of villagers, farmers and non-farm cash earners, see Chapter 2.3.1, pp.37-38.

The latter variable is one of motivation to acquire wealth by improved farming, and so will be the main motivation variable used in the analysis. In the discussion, unless otherwise stated, the term "motivation" will refer to the differentiation embodied in the villager/farmer concept. In addition to the above two dummy variables, an index (the Aspiration Index) will be used as a measure of a cultivator's general level of aspiration to improve his farming. The purpose of including this index is to compare this general level of aspiration with the more definite motivation as measured by the villager/farmer dummy.

In addition to studying the contribution of the education variables and General Knowledge to the motivation of the cultivators, Section 9.3 will discuss the community constraints to motivation, and will investigate whether education has contributed to the cultivators' desire for consumer goods, and through this to his motivation. For this latter investigation, a Level of Living Index was constructed to represent the possession of these consumer goods.[4]

The section on farming knowledge (Section 9.4) will study the nature of the cultivators' farming knowledge, and their sources of this knowledge. In addition it will discuss the attitudes of the cultivators to the extension service, which was the main source of the knowledge of improved practices. Since it was not possible, from the data collected during the UNZALPI survey, to construct variables which measured the cultivators' farming knowledge at the levels of "information" and

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[4] For details of the Level of Living Index, see Appendix I.

"understanding",[5] this section will deal only with the relationship between farming knowledge at the level of awareness, and the education variables and General Knowledge. This awareness is usually not sufficiently detailed to lead to adoption and, therefore, it will not be possible to argue any causal links between farming awareness and the adoption of improved practices.

The section on the adoption of improved practices (Section 9.5) will discuss the types of improved practices adopted by the cultivators (using the classification described in Chapter 2.2, namely, improved techniques, mechanisation, biological inputs and cash crops), and will study the contribution of the education variables and General Knowledge to this adoption behaviour. For this analysis, an Improved Farm Practice Index will be used.[6] Since the education variables and General Knowledge will be shown to be related to motivation, as well as to the adoption behaviour of cultivators, this section will also attempt to locate the independent variables (i.e. education and General Knowledge) which have contributed directly to adoption behaviour, and those which have contributed to adoption behaviour through motivating the cultivator to improve his farming.

It is beyond the scope of the present study to investigate fully how effectively each improved practice was used, and whether education made any contribution to the effectiveness of its use. Section 9.6 will therefore only comment briefly on the problem.

The statistical analysis will be in terms of descriptive tables, correlation and multiple regression analyses. Although

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[5] For a discussion of the levels of knowledge, see Chapter 2.3.2.

[6] For a discussion of this index, see Chapter 2.3.3, page 49, and for details of the questions on which the index is based, see Appendix I.

these techniques show the relationships which exist between variables, they are unable to prove that one variable is the cause or the effect of another. Causality and effect are problems of logic and not of statistical inference. In Chapter 3 a logical framework was discussed showing how education could contribute to the improvement of farming through the adoption of improved practices. The purpose of the statistical analysis is to demonstrate whether or not these relationships exist. If they do, then the causality will be supported through the implications of logic.

9.2 Education and Farm Production

Most of the education and knowledge variables were significantly correlated with farm production (Table 9.1). The exceptions were Cosmopolite Experience in Mumbwa, and Schooling in Katete. The variable most highly correlated with production, in both areas, was Training and Experience in Farming.

Production was regressed on the four education variables alone, and also on the four education variables and General Knowledge. The regression results, presented in Table 9.2, show that the proportion of explained variance was higher in Katete than in Mumbwa. However, only two education variables (Training and Experience in Farming and Present Cosmopolite Experience) were significant in the Katete regression. The significance of the former variable was to be expected since the extension service aimed to provide cultivators with the necessary knowledge and skills of modern farming. The significance of Present Cosmopolite Experience indicated that the

Table 9.1 Zero-order Correlations : Production with Education Variables and General Knowledge

	Zero-order correlation coefficients	
	Mumbwa	Katete
Cosmopolite experience	0.05	0.27*
Training and experience in farming	0.41*	0.57*
Schooling	0.37*	0.13
Present cosmopolite experience	0.33*	0.35*
General knowledge	0.26*	0.49*

* Significant at P = 0.05.

Table 9.2 Multiple Regression : Production on Education Variables and General Knowledge

Mumbwa				
Independent variables	Dependent variable : Production			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	- 70.33	48.56	- 69.39	50.73
Training and experience in farming	183.18*	55.51	184.09*	57.36
Schooling	152.03*	52.41	152.99*	54.52
Present cosmopolite experience	119.27*	48.17	120.76*	49.98
General knowledge			- 4.59	69.11
Determination, R^2 (%)[1]	26.82		26.83	

Katete				
Independent variables	Dependent variable : Production			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	24.71	16.96	13.82	17.20
Training and experience in farming	101.08*	15.59	87.89*	16.21
Schooling	- 15.70	19.98	- 31.30	20.59
Present cosmopolite experience	77.83*	19.72	63.66*	20.17
General knowledge			52.03*	21.85
Determination, R^2 (%)[1]	43.35		46.48	

A : Regression on education variables.

B : Regression on education variables and General Knowledge.

* Significant at P = 0.05.

[1] The standard error of estimate has been omitted since the distribution of values over the correlation surface was markedly skewed, thus invalidating the interpretation of the standard error.

higher producers participated in community activities during the survey, and, therefore, most probably had also done so in the years immediately preceding it. But whether participation in the church, or in community development activities, or visits away from the village, was a cause of, or just associated with, higher production, it is not possible to say.

When the General Knowledge Index was included in the Katete regression, the explained variance did not increase significantly, even though General Knowledge was significant. Both Training and Experience in Farming and Present Cosmopolite Experience remained significant although their regression coefficients were lower. It would appear, then, that general knowledge contributed to production through its association with the education variables, and not because of a direct influence on production.

In Mumbwa, the explained variances of production were lower than those in the Katete regressions. Despite this, Schooling was significant, in addition to Training and Experience in Farming and Present Cosmopolite Experience. When General Knowledge was included in the regression, there was little change in the explained variance or in the size of the regression coefficients. Therefore, in both areas, the informal experiences (i.e. the general knowledge which was not explained by the education variables) were not important in the explanation of the variance of production.

The important variables in the explanation of the variance of production in Mumbwa were : Schooling, Training and Experience in Farming, and Present Cosmopolite Experience; and in Katete :

Training and Experience in Farming and Present Cosmopolite Experience.[7]

The importance of schooling, urban and rural employment and contact with the extension service would seem to be more important in this study than in that conducted by Saylor in Tanzania (see Chapter 4.3). No direct comparisons are possible since Saylor used yield of cotton per hectare and yield of cotton per unit of available labour as dependent variables. In addition he included a number of improved practice variables and, since the extension service is most likely to be associated with the use of these practices, the extension service would not appear as a significant factor in his analysis.

As reported in Chapter 4.3, Upton found that "mental urbanism" was related to gross margin. His index combined aspects of Cosmopolite Experience, Schooling and Present Cosmopolite Experience. In a later study, however, with the same data, Upton (1970) included the "mental urbanism" index (which he termed sophistication) with economic variables in a production function, but the explained variance increased by only one per cent. This indicates that the effect of the index had already been accounted for in the economic variables. For this reason, economic and social variables (other than education and general knowledge) were not included in the regressions in this analysis. The regressions test the significance of the education variables and General Knowledge on production irrespective of the path of their contribution.

Chaudhri (1968) found that the schooling was more highly related to yield per acre in the more advanced area of the Panjab

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[7] The regressions of gross margin on the education variables and General Knowledge were similar to those in which production was the dependent variable. Therefore the latter regressions only are discussed in the analysis.

state of India than in the less developed state of Uttar Pradesh. Similarly the results of this present study show that schooling was more highly related to production in Mumbwa than in Katete, where the level of farming was higher in Mumbwa.

The fact that some education variables were significant in explaining the variation in production does not prove that these experiences caused the increases in production. Other variables associated with both education and production could have been the cause, as was pointed out in Chapter 4 in the discussion of Chaudhri's work.

In order to connect education more closely with farm production, the next sections will study in some detail the contribution of education at the various stages of the process of the adoption of improved practices.

9.3 The Motivation of Cultivators

A cultivator may become motivated to earn money by farming, or by obtaining non-farm employment, either through his experiences within his immediate family or through those within the wider community. Because data on the family background of the cultivators co-operating with the UNZALPI survey were not collected, it is not possible to say whether the background of the motivated cultivators was different from that of the others. When the cultivators were growing up 30 to 40 years ago,[8] modernisation of village life was only beginning and therefore it can be assumed that only a small number of the cultivators' parents would have been motivated to enter the modern exchange economy. This does not mean to say

[8] The average age of the cultivators in the survey was 50 years.

that there were no differences between these parents in their desire to acquire wealth, but that this wealth was more often acquired by traditional means (e.g. by barter) than by the adoption of modern farm technology. There may have been a few cases in which the younger farmers grew up in a family where farming was carried on with modern techniques, but the vast majority were first generation farmers (in the sense that the word farmer is used in this study).

The number of cultivators who were classified as villagers, farmers and non-farm cash earners is shown in Table 9.3. In Mumbwa it was a majority which was motivated to earn money from farming or from non-farm employment, but in Katete only a minority. This situation reflects the state of farming as a whole in the areas under review (see Chapter 5.1.3). The general level of farming in the Mumbwa district was higher than that in Katete. Because of this difference, it might be expected that a different attitude to farming would have existed in the two areas.

9.3.1 Education and motivation

The education which cultivators have experienced might be expected to contribute to the formation of their values and attitudes. For example, it would seem reasonable to expect that those who have been to school would aspire to the higher standard of living about which they were taught while at school, and that those who had been employed in urban or rural areas would have been motivated to continue to earn money since they would have become accustomed to a way of life in which the necessities could only be bought with money.

Table 9.3 Villagers, Farmers and Non-Farm Cash Earners in the UNZALPI Survey

Category	Number of cultivators		
	Mumbwa	Katete	Total
Villager	60	66	126
Farmer[1]	67	27	94
Non-farm cash earner	8	11	19
Total	135	104	239

[1] Some farmers were also earning money from non-farm business enterprises.

The correlation coefficients, presented in Table 9.4, show that most of the education and knowledge variables were significantly correlated with both the non-wealth/wealth and the villager/farmer variables.

Schooling was more highly associated with both these motivation variables in Mumbwa than in Katete. In this latter area, Schooling was significantly correlated with non-wealth/wealth but not with the villager/farmer variable. At the time when the majority of cultivators were of school age, very few of them would have had the opportunity of attending school. Those who did had been encouraged to do so by parents who were able to afford to send them. Consequently, schooling reflects to some extent the progressiveness and wealth of the parents. It is commonly acknowledged in a developed society that parents with a higher socio-economic status provide a better educational environment in the home for their children than do those of lower socio-economic status (Berstein, 1961, p.288). The same might be expected of parents in a developing society. The cultivators who had the opportunity of attending school, therefore, were also more likely to have had a better socialising education. Despite this association, the significant correlation coefficient between Schooling and the motivation variables indicates that, in Mumbwa, schooling has been a contributor to motivation. For Katete, schooling would seem to have been a contributor to the motivation to earn money, not through farming, but rather through non-farm employment or through investment in a business enterprise. Those who were not able to fulfil their aspirations by these means appeared to lose their motivation and to re-adhere to the values and

Table 9.4 Zero-order Correlation Coefficients : Education Variables and General Knowledge with the Villager/Farmer and the Non-wealth/Wealth Variables

	Zero-order correlation coefficients[1]			
	Mumbwa		Katete	
	Non-wealth/ wealth	Villager/ farmer	Non-wealth/ wealth	Villager/ farmer
Cosmopolite experience	0.20*	0.08	0.42*	0.21*
Training and experience in farming	0.51*	0.48*	0.55*	0.52*
Schooling	0.52*	0.43*	0.28*	0.12
Present cosmopolite experience	0.26*	0.31*	0.16	0.16
General knowledge	0.43*	0.35*	0.51*	0.36*

[1] The correlation coefficients presented in this table are point biserial correlation coefficients. See Guildford (1965, pp.322-325) for a discussion of these coefficients.

* Significant at P = 0.05.

attitudes of a villager. One reason for the lack of a significant correlation coefficient between Schooling and villager/farmer in Katete could have been the small number of cultivators who had been to school.[9]

The fact that Cosmopolite Experience (mainly experience in urban and rural employment) was more highly associated with the non-wealth/wealth variable than with the villager/farmer variable could have been because the former motivation variable included a number of non-farm cash earners who were in non-farm employment during the survey. For the Mumbwa cultivators an association was found between Cosmopolite Experience and Schooling (see Chapter 8.1.1). Since it has been shown that an association also existed between Schooling and the villager/farmer concept of motivation, it might be expected that this concept would be associated with Cosmpolite Experience; but this was not so. For the Katete cultivators Cosmopolite Experience was just significantly correlated with the villager/farmer variable[10] indicating that those who had been in non-farm employment were more often motivated to earn money by farming, but this relationship was not very strong. The first-order correlation coefficient between Cosmopolite Experience and villager/farmer with Schooling held constant (0.19) was only 0.02 below that of the zero-order correlation coefficient, and was still significant, indicating that urban and rural employment (Cosmopolite Experience) was directly associated with motivation and not

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[9] In Mumbwa 20 villagers (29 per cent) and 48 farmers (66 per cent) had been to school. The equivalent figures in Katete were 10 villagers (13 per cent) and 5 farmers (18 per cent).

[10] A correlation coefficient of 0.19 was necessary for it to be significantly different from zero at P = 0.05.

because those who had been employed had previously been to school.

Present Cosmopolite Experience in Mumbwa was significantly correlated with both the non-wealth/wealth and villager/farmer variables. No such relationships were found in Katete. Therefore, in Mumbwa, the farmers tended to participate more in church meetings, community development meetings, and also tended to visit away from their villages more often than did the villagers. Since one of the main purposes of these activities was to fulfil social obligations, it can be argued that farmers did not consider social and community constraints to be any less important than did the villagers.

Training and Experience in Farming was significantly correlated with the non-wealth/wealth and the villager/farmer variables, in both Mumbwa and Katete. Since most of the experiences in this Training and Experience in Farming Index were concerned with contact with the extension service, the significant correlations indicate that the farmers had more contact with the extension service than had the villagers. Although some visits by extension staff may have been to persuade cultivators to improve their farming, most visits were for the purpose of assisting farmers who had already adopted, or desired to adopt, improved practices. Therefore, contact with the extension service was more likely to be a result of motivation and not a cause of it.[11]

General Knowledge was also significantly correlated with both measures of motivation in Mumbwa and in Katete. The General Knowledge index is a measure of the cultivator's

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[11] For details of extension service visits to cultivators, see Chapter 7.4.1.

awareness of the world outside his village. It is valid to assume that a cultivator with a high General Knowledge score had, through his experiences, gained a broader outlook on life and had identified himself more with the outside world. The significant correlation coefficients show that the motivated cultivators possessed this broadened outlook to a greater extent than did the others, i.e. as well as being motivated to earn money by farming or by non-farm employment, they had accepted more often the values of modern society. Much of this General Knowledge Index can be explained in terms of the educational experiences of the cultivators (see Chapter 8.3) and, consequently, the relationship is due to some extent to the educational differences between the two groups of cultivators.

9.3.2 Motivation and the general level of aspiration

There is a difference between the general aspiration which a cultivator may have to improve his farming as a means of obtaining money, and the more definite reactions which motivate him to take action to achieve such an end (see Chapter 2.3.1). This latter is the motivation measured by the villager/farmer indicator. To measure the former, an Aspiration Index was constructed from questions concerning the cultivators' aspirations to achieve a higher level of farming.[12]

Although the Aspiration Index was related to the villager/farmer dummy (the correlation coefficient was 0.38 for Mumbwa and 0.52 for Katete), the relationship was not very strong,

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[12] See Appendix I for details of the questions from which the index was constructed.

indicating that many cultivators who had a vague aspiration to improve their farming had not acquired the values which would motivate them to make this improvement. The Mumbwa cultivators had a higher level of aspiration than those in Katete, but the relationship between this level of aspiration and the villager/farmer variable was closer in Katete than it was in Mumbwa. Since the mean score for the Mumbwa cultivators (49.8) was very close to the theoretical mean (50), it can be argued that these villagers possessed a general desire to improve their farming, but that they had not acquired the values of a farmer.

The correlation coefficients between the Aspiration Index and the education variables and General Knowledge were similar to those between these variables and the villager/farmer dummy (Table 9.5). All the correlations which were significant with the Aspiration Index were also significant with the villager/farmer variable, except for Schooling in Katete. This schooling appeared to contribute to the general level of aspiration, but the aspiration did not lead to the acquisition of the values of a farmer.

The results of the regression analysis with the Aspiration Index as the dependent variable (Table 9.6) show that the education variables contributed less than 50 per cent to the explanation of the variance of the Aspiration Index. In Mumbwa the explained variance was only 16 per cent and in Katete 36 per cent. The education variables which were significant in the regressions were, for Mumbwa, Training and Experience in Farming and Schooling, and for Katete, Training and Experience in Farming, Schooling and Cosmopolite Experience. When General

Table 9.5 Zero-Order Correlation Coefficients : Education with the Villager/Farmer Variable and Education with the Aspiration Index

Education variables	Zero-order correlation coefficients[1]			
	Mumbwa		Katete	
	Villager/ farmer	Aspira-tion	Villager/ farmer	Aspira-tion
Cosmopolite experience	0.08	0.07	0.21*	0.39*
Training and experience in farming	0.48*	0.36*	0.52*	0.51*
Schooling	0.43*	0.29*	0.12	0.28*
Present cosmopolite experience	0.31*	0.18*	0.16	0.15

[1] The correlation coefficients of education variables with the villager/farmer measure are point biserial correlation coefficients.

Table 9.6 Multiple Regression : Aspiration Index on Education Variables and General Knowledge

Independent variables	Dependent variable : Aspiration Index			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
M u m b w a				
Cosmopolite experience	-0.0460	0.0616	-0.0606	0.0642
Training and experience in farming	0.2164*	0.0745	0.2023*	0.0726
Schooling	0.1360*	0.0665	0.1211	0.0690
Present cosmopolite experience	0.0356	0.0611	0.0225	0.0633
General knowledge			0.0719	0.0875
Determination, R^2 (%)	15.88		16.32	
Standard error of estimate	20.49		20.47	
K a t e t e				
Cosmopolite experience	0.2660*	0.0941	0.1668	0.0960
Training and experience in farming	0.4116*	0.0850	0.2915*	0.0854
Schooling	0.2368*	0.1108	0.0947	0.1085
Present cosmopolite experience	0.0601	0.1094	-0.0690	0.1063
General knowledge			0.4740*	0.1151
Determination, R^2 (%)	35.81		45.28	
Standard error of estimate	22.41		23.56	

A : Regression on education variables.

B : Regression on education variables and General Knowledge.

* Significant at P = 0.05.

Knowledge was included as an additional independent variable in the regressions, the explained variance for Mumbwa increased only slightly and General Knowledge was not significant, whereas for Katete, the explained variance increased by nearly ten per cent and General Knowledge was significant, but Schooling and Cosmopolite Experience were not. Since the proportion of explained variance was less than 50 per cent in both areas it can be assumed that much of the aspiration was acquired from the general level of aspiration of the society in which the cultivators lived, rather than from their past educational experiences.

9.3.3 The community constraint to motivation

Because the general attitudes of those in a community appear to be important for the acquisition of motivation in an individual, this section will deal with the constraint which a community places on the individuals in it. In the past, the headman and elders of a traditional village had considerable power and influence (see Chapter 2.1), but much of this has now been replaced by the government and organisations external to the village. For example, the authority of the headman has been decreased by the introduction of local government courts, the traditional religion is not as important as it was before the introduction of Christianity, and the education of the child from the age of seven years has been largely taken over by schools. Since the people are now not as close to the subsistence level as previously, there is not the same need for them to act as a unit in order to survive. As a result of this modernisation, the characteristics of the traditional society (as discussed in Chapter 2.1.1) existed in the survey villages only to a limited

degree, but the headmen and elders had retained some power and influence over members of their villages; often because of their kinship ties.

Because of the influence of the headmen and elders, their attitude to modernisation is important. In Mumbwa, a smaller proportion of the headmen and elders than of the other cultivators were motivated to farm for money (Table 9.7).[13] However the two most progressive villages, mainly composed of Rhodesians, did not have official headmen or elders. These villages would most certainly have chosen farmers as their leaders. The importance of the traditional structures in Mumbwa was greatly reduced by the fact that the area was tribally heterogeneous. In Katete, where the importance of traditional structures was greater, since the vast majority of cultivators belonged to one tribe, a larger proportion of headmen and elders (considered jointly) than of the other cultivators were motivated[14] and therefore they did not appear to be a constraining influence.

An attempt was made to test the importance of the community constraint to the earning of money by asking the cultivators whether they would still be liked if they became rich through their farming. Their responses, recorded in Table 9.8, indicated that in Mumbwa, for all except two small villages, most cultivators thought that they would still be liked. The villages in which a majority thought that they would not be

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[13] The chi square value was 6.98 and was significant at $P = 0.05$.

[14] The chi square value was 9.08 and was significant at $P = 0.05$.

Table 9.7 Traditional Status and Motivation

Area	Category	Headmen and assistant headmen	Elders	Total
		Number of cultivators		
Mumbwa	Villagers	6	13	19
	Farmers	7	1	8
	Total	13	14	27
Katete	Villagers	5	20	25
	Farmers	2	16	18
	Total	7	36	43
Total	Villagers	11	33	44
	Farmers	9	17	26
	Total	20	50	70

Table 9.8 Responses to the Question "Will others like you if you become rich through farming?"

Area	Village	Yes	No	Total
		Number of cultivators		
Mumbwa	1	20	1	21
	2	19	2	21
	3	15	3	18
	4	1	4	5
	5	4	6	10
	6	19	1	20
	7	20	-	20
	8	20	-	20
	Total	118	17	135
Katete	1	7	10	17
	2	8	2	10
	3	10	4	14
	4	7	14	21
	5	11	5	16
	6	8	18	26
	Total	51	53	104

liked were the two most modern villages and in these villages the Field Officer noticed that there was considerable internal jealousy.

In Katete it was again in the more modern villages that most cultivators said that they would not be liked if they became rich through farming. During the survey more jealousy was noticed in these villages than in the others in Katete.

Since the Mumbwa cultivators responded more frequently than did those in Katete that they would still be liked (the chi square value of 43.5 was significant at P = 0.05), it can be assumed that they did not consider that community values and attitudes were a constraining influence in the same way as did those in Katete. In both areas the villagers replied more often than the farmers that they would still be liked if they became rich through farming (chi square value for Mumbwa was 8.5 and for Katete 5.0, both of which were significant at P = 0.05), indicating that while a cultivator remained within the traditional structure and acted as a villager he did not come into a conflict situation between modern and traditional values, but once he had become a farmer, conflict situations did arise. These conflicts were caused both by personal jealousy between the motivated cultivators and by a conflict between those who adhered to modern, and those who adhered to traditional values.

Wide differences existed between villages in the proportion of cultivators who were classified as villagers and farmers (Table 9.9). The range was from 15 to 93 per cent in Mumbwa and from ten to 47 per cent in Katete, so there

Table 9.9 Villagers and Farmers : By Enumerating Unit[1]

Enumerating unit	Mumbwa		Katete		Mumbwa	Katete
	Villagers	Farmers	Villagers	Farmers		
	Number of cultivators				Percentage of farmers	
1	12	9	9	8	43	47
2	3	18	9	1	86	10
3	12	6	11	3	33	21
4	1	14	17	4	93	19
5	17	3	11	5	15	31
6	11	9	20	6	45	23
7	12	8	-	-	40	-
Total	68	67	77	27		

[1] The enumerating unit was normally the village, although in some cases two small villages were combined into one unit, and, in one case, a large village was divided into two units.

must have been varying degrees of community constraint experienced by cultivators. In a village where most cultivators were motivated to improve their farming the others would strive to be accepted into this new group, whereas in the villages where only a minority of cultivators were so motivated, and therefore where the people were less modern, the cultivator would have to think twice before considering whether to join this minority group.

The discussion in this section has shown that the community constraint to improved farming appeared to be stronger in Katete than in Mumbwa, and stronger in some villages than in others, although the general attitude in both areas was towards modernisation, and consequently the community constraint was not very strong even in the least modern villages. Therefore, individuals returning to the villages from school or from an urban area where they were employed would find some community resistance to their desire to fulfil their aspirations for acquiring wealth, although this resistance did not appear to be strong enough to have a decisive influence.

9.3.4 Level of living, motivation and education

Earlier it was suggested that the motivation which a cultivator possessed may have been occasioned by his desire to earn money in order to raise his level of living. This section will examine the relationships between motivation, education and the level of living.

The cultivator's level of living was measured by an index[15] which was based on his possession of non-farm capital items and

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[15] Details of the Level of Living Index are found in Appendix I.

consumer durables (e.g. watch, radio, improved house). The Mumbwa cultivators obtained a higher score than those in Katete, and, in each area, the Level of Living Index was significantly correlated with the villager/farmer variable (r = 0.40 in each area), indicating that farmers had acquired more of these items than had the villagers. These correlations do not mean that the desire for consumer durables (many of which may be considered to be luxuries by Zambian village standards) had motivated cultivators to increase their monetary income by improved farming. However, since the farmers had spent more money on the items listed in the Level of Living Index, it is valid to assume that the desire for them would make some contribution to their motivation.

All the education variables were significantly correlated with the Level of Living Index. Those who were educated, therefore, had acquired more consumer durables. But was this only because the better educated had higher farm production? This did not appear to be so in Mumbwa, since all except one of the first-order correlation coefficients between Level of Living and the education variables and General Knowledge were significant with production held constant (Table 9.10). Even in the case of the association between Cosmopolite Experience and Level of Living, the first-order correlation coefficient was only 0.01 lower than the zero-order value. The education variables and General Knowledge, therefore, were important in explaining the level of living of cultivators, irrespective of the level of their production. In Katete only Schooling and Cosmopolite Experience were significantly correlated with Level of Living with production held constant. The significant correlation between Cosmopolite Experience and Level of Living can be partly explained by the fact

Table 9.10 Zero-order and First-order Correlation Coefficients of Level of Living Index with Education Variables and General Knowledge

	Correlation coefficients			
	Mumbwa		Katete	
	Zero-order correlation coefficient	First-order correlation coefficient (Production held constant)	Zero-order correlation coefficient	First-order correlation coefficient (Production held constant)
Cosmopolite experience	0.17*	0.16	0.31*	0.19*
Training and experience in farming	0.36*	0.22*	0.36*	0.05
Schooling	0.31*	0.18*	0.26*	0.24*
Present cosmopolite experience	0.43*	0.33*	0.28*	0.11
General knowledge	0.51*	0.46*	0.40*	0.29*

* Significant at P = 0.05.

that those in non-farm employment during the survey spent a considerable proportion of their monthly income on consumer durables. Schooling, even though it was not significantly correlated with production (Table 9.1), was important in explaining the level of living of a cultivator. Consequently, it can be argued that schooling produced in the Katete cultivators a desire to acquire a higher material level of living, but this motivated them to acquire this level of living through wage employment, or a non-farm business enterprise, and not by improved farming.

In both areas the General Knowledge Index was important in the explanation of the cultivators' level of living. Those who were aware of theworld outside their village tended to acquire the consumer durables which were accepted as status symbols in that world.

The cultivators were asked what they would do if they received a gift of 200 Kwacha (£116) or a gift of 16 Kwacha (£9.28) per month. Their responses (Table 9.11) show that more of them would use the capital sum of 200 Kwacha for farming and the buying of cattle than if they received the monthly gift. In this latter case, more would buy consumer goods (e.g. food or furniture) or would save the money. A practical confirmation of this was seen in those who had regular employment during the survey. These cultivators spent more on consumer goods than did those who earned a similar annual sum from farming. An important difference between the villagers and farmers in Mumbwa was that more of the former would use the money to hire labour and equipment, whereas more of the latter would invest the money in the purchase of farm equipment. It is evident that the villagers thought of saving work on their

Table 9.11 Cultivators' Stated Use of Money which was Received as a Gift

Expenditure category	Received a gift of :							
	200 Kwacha				16 Kwacha per month			
	Mumbwa		Katete		Mumbwa		Katete	
	V	F	V	F	V	F	V	F
	Number of Responses[1]							
Farming capital	14	32	22	9	13	22	8	3
Farming - hire	48	11	32	16	41	11	31	10
Cattle	15	14	45	9	8	10	29	12
Consumer goods	28	24	57	12	34	46	86	24
Savings	5	9	2	4	7	12	7	9
Total, cultivators	68	67	77	27	68	67	77	27
	Percentage distribution							
Farming capital	13	35	15	18	12	22	5	5
Farming - hire	43	12	20	32	40	11	19	17
Cattle	14	16	28	18	8	10	18	21
Consumer goods	25	27	36	24	33	45	54	41
Savings	5	10	1	8	7	12	4	16
Total	100	100	100	100	100	100	100	100

V : Villager.

F : Farmer.

[1] Cultivators could respond with more than one use.

farms while the farmers thought more in terms of investing for a sustained increase in production. This difference between villagers and farmers was not apparent in the responses in Katete, although a higher proportion of Katete farmers than villagers said that they would spend the money on farming. Only in Katete would a higher proportion of villagers than farmers spend the money on consumer goods.

The responses to the above questions would seem to show that both villagers and farmers would spend money on consumer goods. In addition the farmers would invest the money in farming, and save for the future, whereas the villagers would hire labour or equipment, and buy cattle. Again, this is confirmation of the farmers' ability to plan for long-term rewards rather than only for short-term goals.[16]

9.3.5 A summary

In order for a cultivator to be motivated to farm for money he needs more than just a general aspiration to improve his level of living. In addition he must have acquired the values which make him strive after the achievement of this aspiration. This latter, which in Chapter 2 was called a conscious desire to improve farming, was measured by the villager/farmer concept.

In Mumbwa, it appeared that schooling was an important contributor to this motivation, but that the experience in urban and rural employment was not. Associated with this motivation, although not necessarily a cause of it, was the time spent at

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[16] They therefore possessed "deferred gratification" (see Chapter 2.1.2).

church, at community development meetings, and in visits to other villages, during the period of the survey. In Katete, the experience in urban and rural employment was a contributor to the motivation but schooling was not. In both areas, contact with the extension service, as measured by the Training and Experience in Farming Index, was associated with motivation, but, as explained, this experience was more a result of motivation than a cause.

One reason why the educational experiences did not have as great an effect on motivation as might be expected could have been the constraint put on individuals by the community. Although this constraint did not appear to be very strong (it was stronger in Katete than it was in Mumbwa), it was of sufficient strength to need consideration as a factor. On the other hand, it might be expected that one cause of motivation would be the desire to purchase consumer durables. This desire was present, and those who had been to school, or had been in non-farm employment, possessed more of these durable goods, even when the effect of differences in production had been removed.

9.4 Farming Knowledge

This section will be concerned with an examination of the nature of the cultivators' farming knowledge, the sources of this knowledge and its relationship with the motivation of the cultivator. It will conclude with an examination of the main source of the knowledge of improved practices, the extension service. As mentioned in the introduction to this chapter, the farming knowledge discussed will be that at the level of awareness, and not at the levels of information and understanding.

9.4.1 Details of the farming knowledge of cultivators

A commonly held belief is that cultivators in developing countries do not have sufficient knowledge of modern farming to be able to farm in that way. The cultivators in the UNZALPI sample, however, did not consider that their lack of knowledge was a constraint to the improvement of their farming. When they were asked what was necessary for them to improve their farming, only a few were unable to give an answer. These answers (recorded in Table 9.12) show that two sets of attributes served as indicators of good farming : the availability of resources, and the level of performance achieved.

Both villagers and farmers had similar ideas about the indicators of good farming. Many of them regarded the level of performance as the best indicator, the most important of which was farm production. The resources mentioned as being indicators were labour, tractors and equipment in Mumbwa, and labour and oxen in Katete. The difference between the areas in the type of motive power which was thought to be associated with good farming illustrates the difference in the levels of farming between these areas. In the Mumbwa district, the use of privately-owned tractors had become an important part of farming, and eleven tractors were owned by cultivators.[17] In contrast to this, there was only one privately-owned tractor near the Katete survey area and none was owned by a survey cultivator. There was a vague desire for tractor ownership amongst the Katete cultivators, but it was not popularly

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[17] This figure was for 1968/69. During the 1967/68 agricultural season there were 12 tractors. In each year, two tractors were jointly owned, each by three cultivators.

Table 9.12 Beliefs of Cultivators Regarding Indicators of Good Farming

	Mumbwa		Katete		Total	
	Villagers	Farmers	Villagers	Farmers	Villagers	Farmers
	Number of responses[1]					
Tractor	16	15	1	-	17	15
Equipment	18	24	3	4	21	28
Seeds	-	5	-	1	-	6
Fertiliser	2	3	-	-	2	3
Cash crops	-	2	5	-	5	2
Oxen	12	8	50	17	62	25
Land	4	7	-	-	4	7
Labour	36	28	16	9	52	37
Loans	3	4	3	-	6	4
Production	24	20	59	20	83	40
Income	6	5	18	8	24	13
Management	1	-	-	-	1	-
Total responses	122	121	155	59	277	180

[1] Cultivators could respond with more than one indicator.

believed that such ownership was practical at their present level of farming achievement. Consequently oxen were preferred. They were not only useful but also acceptable as a form of wealth in the community. Another point of interest in the table is that the use of biological inputs and the growing of cash crops were not often regarded as indicators of good farming. This implies that the cultivators did not consider intensification to be the best way of increasing their production. Further evidence of this was provided by the responses of the cultivators to the question : "How would you increase the yield per acre of your maize?". Many found this concept difficult to grasp and when first asked they replied that they would increase the acreage under cultivation.

In both Mumbwa and Katete the improved practices which were more often thought to be indicators of good farming were, in fact, the same as those most often used by the cultivators. For example, mechanisation, which was the resource most often mentioned, was one of those most often used (112 cultivators ploughed mechanically and 41 weeded mechanically), whereas biological inputs, which were mentioned least, were not often adopted (only 19 cultivators applied fertiliser and only 22 planted hybrid maize seed).[18] The Mumbwa cultivators with the highest production used both mechanisation and biological inputs.

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[18] These figures were higher than the number of cultivators who said that the use of fertiliser or hybrid maize seed were indicators of good farming. Table 9.12 shows that these figures were 5 and 6 respectively. The reason for these lower figures was that, in response to the question on the indicators of good farming, cultivators did not state all the indicators, but only what they considered to be the most important ones. In some cases this meant that total production was given as an indicator in preference to the use of fertiliser or hybrid maize seed.

Table 9.13 Cultivators' Stated Restrictions on the Improvement of Their Farming

	Mumbwa			Katete		
	Villagers	Farmers	Total	Villagers	Farmers	Total
	Number of responses[1]					
Lack of equipment	50	52	102	45	22	67
No tractor	16	23	39	2	2	4
No oxen	17	14	31	48	20	68
Lack of labour	1	3	4	14	4	18
Lack of good land	2	2	4	-	2	2
Lack of knowledge	2	4	6	-	1	1
No motivation[2]	6	8	14	6	-	6
Ill health/old age	7	5	12	26	1	27
Total responses	101	111	212	141	52	193
Total cultivators[3]	68	67	135	77	27	104

[1] Cultivators could respond with up to three restrictions.

[2] Responses classified as "no motivation" included laziness, lack of "African medicine" and excessive drinking.

[3] Three cultivators in Mumbwa and one cultivator in Katete did not respond.

Table 9.14 Cultivators' Stated Needs for Training and Advice for Farming

	Mumbwa			Katete		
	Villagers	Farmers	Total	Villagers	Farmers	Total
	Number of responses[1]					
Cereal crops	2	2	4	68	17	85
Legume crops	2	5	7	70	19	89
Vegetables/fruit	2	6	8	5	4	9
Cotton	8	13	21	9	3	12
Burley tobacco	2	-	2	3	7	10
Cultivation techniques[2]	58	76	134	-	3	3
Tractors/ equipment	6	9	15	-	-	-
Cattle	15	16	31	6	7	13
Fertiliser	20	28	48	1	1	2
Small stock[3]	4	4	8	38	18	56
Farm management	2	-	2	-	2	2
Total responses	121	159	280	200	81	281
Total cultivators[4]	68	67	135	77	27	104

[1] Cultivators could respond with more than one need.

[2] Cultivation techniques included crop rotation, plant spacing, weeding and use of tractors and equipment.

[3] Small stock included poultry, pigs and goats.

[4] Thirtytwo cultivators in Mumbwa and four cultivators in Katete did not respond. Twentysix thought that no advice was necessary.

tion (less than 25 per cent) of cultivators in each area wanted advice about cash crops. This confirms the point made in Chapter 2, that this type of improved practice was not very popular, even though the extension service, especially in the Katete district, concentrated on encouraging cultivators to grow these crops.

A more specific question was asked of the cultivators as to how they could increase the yield per acre of their maize. The responses (Table 9.15) indicate that most thought that the best way was by the use of fertilisers. The method after this mentioned most often, was better cultivation techniques (e.g. better weeding, early planting, correct spacing). The use of better seeds was mentioned once in Katete and by only five cultivators in Mumbwa. Villagers and farmers did not seem to differ in the methods which they considered to be best. The higher proportion mentioning fertilisers in this instance contrasts with the responses to the earlier questions, where its use was hardly mentioned.

Another interesting contrast between the two areas was in the knowledge of the best planting techniques. In Mumbwa, where the growing of maize was encouraged by the authorities, 66 cultivators knew the recommended planting method, whereas in Katete it was known by only 11. In contrast to this was the knowledge of the best groundnut planting technique. In Katete, where groundnut growing was encouraged, 57 cultivators knew the recommended planting method, whereas in Mumbwa it was not known by any. It appears, then, that the encouragement to grow a crop in a particular area does bring about a better knowledge

Table 9.15 Means by which Cultivators Believe that Yield per Acre of Maize can be Raised

	Mumbwa			Katete		
	Villagers	Farmers	Total	Villagers	Farmers	Total
	Number of responses[1]					
Use fertiliser	48	47	95	29	17	46
Use better seeds	-	5	5	1	-	1
Use manure	-	4	4	1	-	1
Plant early	11	8	19	1	2	3
Better weeding	40	29	69	38	12	50
Better plant spacing	3	14	17	2	4	6
Better ploughing	4	11	15	6	3	9
Rotation of crops	2	11	13	3	-	3
Total responses	108	129	237	81	38	119
Total cultivators[2]	68	67	135	77	27	104

[1] Cultivators could respond with more than one means.

[2] Eight cultivators responded "don't know" and one cultivator did not respond.

of the cultivation techniques, even though these techniques may not be used by all cultivators in that area.

9.4.2 Sources of farming knowledge

Regression analysis was carried out, using the Farming Knowledge Index as the dependent variable, in order to test the relationship between farming knowledge (at the level of awareness)[19] and the education variables and General Knowledge. The relevant correlation coefficients are presented in Table 9.16 and the results of the regressions in Tables 9.17 and 9.18. Separate regressions were calculated for villagers and farmers. In Mumbwa the variance of Farming Knowledge explained by the education variables and General Knowledge was higher for the villagers than it was for the farmers. Schooling alone was not significant in the former relation, but no independent variable was significant in the latter. Even though for Katete the explained variance was approximately the same for villagers and farmers, Schooling, and Training and Experience in Farming were significant for the villager regression, but no independent variable was for the farmer regression.

The farming knowledge (at the level of awareness) of farmers was higher than for villagers, and the analysis shows that, for the former, educational differences were not important in explaining the level of this knowledge. Therefore, it can be argued that farmers obtained their knowledge mainly from interpersonal-localite sources. If then cultivators could be motivated to improve their farming, they could obtain this basic farming knowledge from

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[19] As pointed out in Chapter 8.2, the Farming Knowledge Index measured awareness of basic farming facts and constraints, and did not measure detailed knowledge or understanding of improved practices.

Table 9.16 Zero-order Correlation Coefficients : Farming Knowledge with Education Variables and General Knowledge

	Zero-order correlation coefficients			
	Mumbwa		Katete	
	Villagers	Farmers	Villagers	Farmers
Cosmopolite experience	0.43*	0.21	0.28*	-0.12
Training and experience in farming	0.34*	0.32*	0.33*	0.39*
Schooling	0.19	0.06	0.34*	0.05
Present cosmopolite experience	0.32*	0.24	0.25*	0.33
General knowledge	0.48*	0.46*	0.43*	0.34

* Significant at P = 0.05.

Table 9.17 Multiple Regression : Farming Knowledge on Education Variables and General Knowledge : Mumbwa

Mumbwa Villagers				
Independent variables	Dependent variable : Farming knowledge			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	0.2803*	0.0883	0.2288*	0.0904
Training and experience in farming	0.2084*	0.1027	0.1623	0.1033
Schooling	-0.0296	0.1006	-0.0580	0.0995
Present cosmopolite experience	0.2053*	0.0902	0.1313	0.0905
General knowledge	-	-	0.2431	0.1247
Determination, R^2 (%)	30.48		34.50	
Standard error of estimate	18.11		19.36	

Mumbwa Farmers				
Independent variables	Dependent variable : Farming knowledge			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	0.0946	0.0786	0.0266	0.0748
Training and experience in farming	0.1792	0.0981	0.1169	0.0927
Schooling	-0.0321	0.0864	-0.1225	0.0843
Present cosmopolite experience	0.1141	0.0761	0.0942	0.0707
General knowledge	-	-	0.3450*	0.1022
Determination, R^2 (%)	14.62		28.05	
Standard error of estimate	17.86		16.40	

A : Regression on education variables.

B : Regression on education and General Knowledge variables.

* Significant at P = 0.05.

Table 9.18 Multiple Regression : Farming Knowledge on Education Variables and General Knowledge : Katete

Katete Villagers				
Independent variables	Dependent variable : Farming knowledge			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	0.1290	0.0910	0.0832	0.0931
Training and experience in farming	0.2030*	0.0933	0.1524	0.0960
Schooling	0.2224*	0.1070	0.1738	0.1087
Present cosmopolite experience	0.1757	0.1047	0.1321	0.1059
General knowledge	-	-	0.2105	0.1167
Determination, R^2 (%)	24.44		27.75	
Standard error of estimate	20.67		20.22	

Katete Farmers				
Independent variables	Dependent variable : Farming knowledge			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	-0.0234	0.1324	-0.0692	0.1349
Training and experience in farming	0.3117	0.1577	0.2875	0.1563
Schooling	-0.0061	0.1062	-0.0996	0.1729
Present cosmopolite experience	0.2381	0.1590	0.1468	0.1712
General knowledge	-	-	0.2386	0.1818
Determination, R^2 (%)	25.87		31.49	
Standard error of estimate	16.50		15.87	

A : Regression on education variables.

B : Regression on education and General Knowledge variables.

* Significant at P = 0.05.

localite sources rather than having to rely on the extension service.

But even for the villagers the proportion of the variance of Farming Knowledge explained by the education variables was low indicating that much of their basic farming knowledge also came from interpersonal-localite sources. As will be shown later, this farming knowledge, although in some ways important to motivation, does not necessarily lead to the adoption of improved practices. For this, farming knowledge at the levels of information and understanding is necessary.

The preceding discussion of the regression analysis has been in terms of the Farming Knowledge Index as a whole, and has therefore assumed that the sources of all types of farming knowledge were the same. There were, however, important differences in the sources of knowledge of the cultivation of various crops. As stated above, the majority of the cultivators obtained knowledge about the cultivation of crops from interpersonal-localite sources, mainly from the family or other cultivators. Table 9.19 shows that 88 per cent of all responses indicated that localite sources were important, but this general figure conceals important crop differences. For example, knowledge of the cultivation of cotton or tobacco, two of the newer cash crops in the areas, came almost entirely from the extension service. In Katete, where groundnuts was regarded as a cash crop, 20 per cent of cultivators said that the extension service was their main source of knowledge, whereas in Mumbwa, where the crop was not encouraged, only two per cent learned from the extension service. Knowledge of the cultivation of the crops which were grown by most cultivators came

Table 9.19 Cultivators' Sources of Knowledge about the Growing of Selected Crops

Source of knowledge, Number of cultivators							
Crop	Mumbwa						
	Extension service	Local farmers	Family	European farms	Literature	Radio	Total
Beans	2	2	3				7
Bulrush millet	2	1	5				8
Cotton	3		1				4
Cow peas							-
Finger millet		2	9				11
Groundnuts	2	6	87		1		96
Potatoes	2	1					3
Round beans							-
Sweet potatoes	1	1	16	2			20
Burley tobacco							-
Vegetables	1			1	1		3
Total	13	13	121	3	2	-	152
	Katete						
Beans			17				17
Bulrush millet							-
Cotton	4						4
Cow peas		1	35				36
Finger millet			1				1
Groundnuts	18	21	51				90
Potatoes							-
Round beans			8				8
Sweet potatoes			57				57
Burley tobacco	6			1			7
Vegetables		2	8				10
Total	28	24	177	1	-	-	230

either from their parents, or from other cultivators (i.e. from localite sources).

When asked how they could obtain training and advice, almost all cultivators considered that the extension service was the main source (Table 9.20). In Mumbwa, a significant proportion thought that the best way to obtain this training was at training courses, rather than by visits from extension staff, but this was not so in Katete.

Except for the cash crops of cotton and tobacco, a larger proportion of the cultivators in the present survey used localite sources for farming knowledge than did those in the studies by Kidd, Williams, Basu and Watts (see Chapter 4.4.2). One reason for this could have been that these latter studies differed from the present one in that they concentrated almost entirely on improved practices which were relatively new to an area. A comparison between studies is difficult since it is not known, in each situation, how much knowledge is available from localite sources.

The mass media were not important sources of knowledge about the cultivation of crops. For example, agricultural pamphlets were only a main source on two occasions and radio programmes were not mentioned at all. A number of cultivators said that they listened to agricultural programmes on the radio (30 per cent in Mumbwa and 28 per cent in Katete), but the knowledge gained from these programmes would have been general and not directly about the cultivation of crops. Radio farm forum was not mentioned as a source of farming knowledge, but these programmes had only been in operation for a relatively short time.

Ridging and other techniques were made compulsory and, as their use was enforced by the extension service which was almost entirely European, the cultivators came to regard this service in a similar manner to that in which they regarded the police. Many of these earlier techniques, however, have continued to be used by the cultivators since the "police-type" extension service changed to the advisory type of service, but others (e.g. crop rotation) have not.

In order to test the attitudes of the cultivators to the extension service, two questions were put to them : firstly, whether they thought that through the extension service they had gained farming knowledge and, secondly, whether they thought that this service had helped them to make more money. The cultivators' responses to these questions (Table 9.21) show that about a third of the Mumbwa cultivators regarded the extension service as being helpful for the acquisition of knowledge. A third also regarded it as being helpful for the earning of money. In Katete the corresponding proportions were one sixth and one tenth. Many cultivators who regarded the service as helpful for either the acquisition of knowledge or the earning of money did not regard it as helpful for both.

In both areas, a higher proportion of farmers than villagers thought that the extension service was helpful for the gaining of knowledge, but a higher proportion of villagers thought it helpful for the earning of money. It cannot be argued from this that villagers were more concerned with the earning of money than were farmers, since the latter are so concerned by definition. Rather it can be argued that farmers

Table 9.21 Cultivators' Attitudes to the Extension Service

			Do you know more about farming through the Extension Service?					
			Villagers			Farmers		
			Yes	No	Total	Yes	No	Total
Has the Extension Service helped you to make more money through farming?	Mumbwa	Yes	4	21	25	17	5	22
		No	3	40	43	23	22	45
		Total	7	61	68	40	27	67
	Katete	Yes	6	-	6	4	1	5
		No	2	69	71	5	17	22
		Total	8	69	77	9	18	27

regarded the extension service as the supplier of knowledge for the improvement of farming, and once this knowledge had been obtained they would be able to put it to use. On the other hand, the villagers thought that the extension service would help them to make money, not necessarily to improve their farming. They had a short-term attitude to farming and, with this attitude, they would need to rely annually on the extension service for assistance. It must be pointed out here that this argument applies to less than one third of the Mumbwa cultivators and to less than one fifth of those in Katete. Sixty per cent and 83 per cent respectively thought that the extension service had not helped them either with the acquisition of knowledge or with the earning of money, an attitude which is not surprising since only a small number of cultivators were visited by an extension officer during the survey (see Chapter 7.4.1), and presumably also during the years immediately preceding it.

From the discussion in the whole of this section, it can be said that, although cultivators regarded the extension service as their main source for knowledge of improved practices, they did not consider that they had received much help from it.

Although only a few cultivators had attended farm training courses, nearly half of them said that they would attend if they were given the opportunity (Table 9.22). If only males who were under 50 years of age were considered, then 74 per cent in Mumbwa and 61 per cent in Katete would have liked to have attended courses. Their positive attitude indicates that they regarded these courses as an important method of obtaining farming knowledge and skills. However, when asked the question, "How can

Table 9.22 Attitude of Cultivators to Farm Training Courses

	Would you like to attend a Farm Training Course?								
	Yes			No			Total		
	Age of cultivators								
	Under 50 years	50 years and above	Total	Under 50 years	50 years and above	Total	Under 50 years	50 years and above	Total
	Number of cultivators								
Mumbwa									
Male	39	34	73	14	24	38	53	58	111
Female	3	3	6	10	8	18	13	11	24
Total	42	37	79	24	32	56	66	69	135
Katete									
Male	22	13	35	14	29	43	36	42	78
Female	3	2	5	8	13	21	11	15	26
Total	25	15	40	22	42	64	47	57	104

you obtain training and advice?", their responses, for Katete in particular, indicated that farm training courses were not regarded as an important source of farming knowledge (see Table 9.20). The most probable reason for this is that they did not regard these courses as a realistic alternative to visits by extension officers. If, however, they were given the opportunity, many of them said that they would attend these courses.

Those cultivators who said that the extension service did not assist them were asked why; their responses are shown in Table 9.23. In Mumbwa the most important reason was that the advice was too difficult to follow. From the present author's knowledge of the situation this answer probably reflects the belief that the general practices encouraged by the extension service cannot normally be attained, rather than that the advice proffered to the individual was in any way unsound. The lack of belief in the possible attainment of the extension service targets, colours the entire attitude of cultivators to the service. In Katete the main reason given by the cultivators for not following the extension service advice was that they were not farmers and therefore the advice was not appropriate. They did not want to be involved in the extra work and cost of following the extension service advice.

9.5 The Adoption of Improved Practices

A cultivator in a developing society who wishes to improve his farming substantially must adopt improved practices.[21] This was true for the cultivators in the Mumbwa and Katete samples, as the correlation coefficients between production and the Improved Farm

[21] See Chapter 1.3.

Table 9.23 Reasons for Cultivators not Implementing Advice from Extension Service[1]

	Mumbwa			Katete		
	Villagers	Farmers	Total	Villagers	Farmers	Total
	Number of Responses					
The advice too difficult	24	11	35	1		1
The advice too expensive	8	2	10		2	2
Lack of labour		2	2	2		2
Lack of money	7	1	8	1		1
Advice no good without loans	1	1	2	2	1	3
Advice not good	1		1			-
I am too old/ sick	3		3			-
I am not a farmer	9	3	12	55	4	59
Not aware of any advice	4	3	7	5	4	9
Total responses	57	23	80	66	11	77

[1] The question was only asked of cultivators who said that the extension service did not assist them. There were 73 cultivators in Mumbwa and 74 in Katete.

Practices Index (0.60 in Mumbwa and 0.68 in Katete) were highly significant. This section will discuss the types of improved practices adopted by the cultivators, and the relationships between education, motivation and the adoption of improved practices.

9.5.1 The improved practices adopted by the cultivators

In the section on farming knowledge a few details were given on the improved practices adopted by the cultivators. The percentage of cultivators who had adopted the improved practices contained in the Improved Farm Practices Index are shown in Table 9.24.

The striking feature of this table is the difference between the percentage of cultivators who had adopted the different types of improved practices. As was suggested in Chapter 2, the practices most readily adopted were those involving improved cultivation techniques and mechanisation. The cultivation techniques were popular because they did not require radical changes to be made to existing farming practices, nor did they require additional capital; also the risk in using the techniques was minimal. Mechanisation was readily adopted, even though it required high capital investment, since it saved work, and since it gave status to its user. Another reason for its popularity was that mechanisation was used mainly for increasing acreage and, as pointed out, cultivators thought that production could best be increased by this means. Apart from the application of insecticides on maize, carried out for the protection of stored maize and not to increase production, neither the biological nor cash crop types of improved practices

Table 9.24 Improved Practices Adopted by Cultivators

(Percentages)

Type of improved practice[1]	Improved practice	Mumbwa		Katete	
		Villagers	Farmers	Villagers	Farmers
		Percentage			
Improved Techniques	Planting maize - time	40	61	66	56
	Planting maize - method	1	15	97	89
	Planting groundnuts - time	13	39	18	44
	Planting groundnuts - method			31	59
	Tobacco - seeding				22
	Maize - shelling	21	82	4	4
	Hired labour	3	22	4	37
	Maize - weeding	57	76	19	41
Mechanisation	Mechanised ploughing	40	90	17	44
	Mechanised weeding	1	52	1	15
Biological	Maize - fertiliser	3	19		15
	Maize - O.P. seed[2]	3	25		
	Maize - hybrid seed	1	28		7
	Cotton - spraying		3		15
	Maize - insecticide	29	82		
Cash crops	Cotton		6		15
	Tobacco				22
Number of cultivators		68	67	77	27

[1] The types of improved practices are those discussed in Chapter 2.2.

[2] Open-pollinated varieties of improved maize seed.

were used by more than 25 per cent of the cultivators in either area. In Mumbwa biological inputs were more popular than cash crops (e.g. cotton) but the reverse was true in Katete.

The question must be asked as to whether the improved practices most frequently adopted by the cultivators were those which had given the best economic returns to cultivators in the sample. In the third UNZALPI report (Elliott et al., 1970) an attempt was made to calculate economic returns on some of the improved practices. The findings of the report suggest that improved techniques made only a small contribution to increased production (ibid., pp.25, 33, 36) while mechanisation contributed to production because of the greater acreage which it allowed to be cultivated (ibid., p.47). Because the cultivators using hybrid maize seed, or fertiliser, or both, also used other improved practices (e.g. mechanisation), it was not possible to isolate the economic returns on these improved practices.[22] The growing of cotton or tobacco was the most profitable of the improved practices in Katete, where the nine growers of these crops were in the top 16 in terms of total production (as measured by maize equivalents).

These results indicate that, for the best economic returns, cultivators should have used hybrid maize seed with fertiliser and mechanisation for ploughing, planting, weeding, etc., or should have grown the cash crops of cotton or tobacco. But the

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[22] The use of hybrid maize seed and fertiliser was able to bring an increase in yield. For example, the eight demonstrations in the Katete district organised by the extension service, which used SR52 hybrid maize seed with fertiliser, obtained an average yield of 4374 pounds per acre with a maximum yield of 7000 pounds per acre (Department of Agriculture, 1969, p.4).

biological and cash crop types of improved practices were not often adopted by cultivators, even though they were being encouraged by the extension service.

9.5.2 Education, motivation and the adoption of improved practices

During the survey, farmers were using more improved practices than were the villagers, since the correlation coefficients between the Improved Farm Practices Index (a measure of the number of improved practices adopted by the cultivators, i.e. their adoption behaviour) and the villager/farmer variable were highly significant (the coefficients were 0.75 in Mumbwa and 0.55 in Katete, both of which were significant at P = 0.001). These coefficients were higher than those between the Improved Farm Practices Index and the education variables (Table 9.25), indicating that motivation was very important in explaining adoption behaviour. In the farming situation as found in Mumbwa and Katete, it cannot be argued that the cultivators' possession of cash or capital equipment motivated them to become farmers, since only a few Rhodesians inherited either equipment or large sums of money.[23] Another argument against this being the cause of motivation is that the correlation coefficients between Cosmopolite Experience and the Improved Farm Practices Index were only 0.20 and 0.18 in Mumbwa and Katete respectively, and, although the former coefficient was just significant (at P = 0.05), they were not very high.

The Improved Farm Practices Index was regressed on the education variables and General Knowledge (Table 9.26). The vari-

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[23] See Chapter 3.1.

Table 9.25 Zero-order Correlation Coefficients : Improved Farm Practices Index with Education Variables and General Knowledge

	Zero-order correlation coefficients	
	Mumbwa	Katete
Cosmopolite experience	0.20*	0.18
Training and experience in farming	0.64*	0.49*
Schooling	0.45*	0.05
Present cosmopolite experience	0.43*	0.11
General knowledge	0.49*	0.33*

* Significant at P = 0.05.

Table 9.26 Multiple Regression : Improved Farm Practices on the Education Variables, General Knowledge and Motivation

Mumbwa				
Independent variables	Dependent variable : Improved Farm Practices			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	-0.0511	0.0694	0.0228	0.0557
Training and experience in farming	0.5045*	0.0785	0.3160*	0.0659
Schooling	0.1676*	0.0746	0.0160	0.0617
Present cosmopolite experience	0.2046*	0.0684	0.1403*	0.0548
General knowledge	0.1936*	0.0945	0.1411.	0.0753
Villager/farmer	-	-	33.2504*	3.7936
Determination, R^2 (%)	52.35		70.22	
Standard error of estimate	22.47		17.46	

Katete				
Independent variables	Dependent variable : Improved Farm Practices			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	-0.0011	0.0730	-0.0068	0.0680
Training and experience in farming	0.3030*	0.0688	0.1800*	0.0712
Schooling	-0.0848	0.0874	-0.0754	0.0815
Present cosmopolite experience	0.0271	0.0865	0.0022	0.0800
General knowledge	0.1480	0.0928	0.1025	0.0872
Villager/farmer	-	-	19.4433*	4.8742
Determination, R^2 (%)	26.92		37.22	
Standard error of estimate	19.25		17.59	

A : Villager/farmer dummy not included.

B : All independent variables included.

* Significant at P = 0.05.

ables with significant coefficients in these regressions were, in Mumbwa, Training and Experience in Farming, Schooling, Present Cosmopolite Experience and General Knowledge, and, in Katete, Training and Experience in Farming. The proportions of the variance explained were 52 per cent in Mumbwa and 27 per cent in Katete. All the variables which were significant in these regressions were also significantly correlated with motivation as measured by the villager/farmer dummy (see Section 3.1). Does this mean, then, that all these variables were only significantly associated with adoption behaviour because of their association with motivation, or did they also contribute directly to the adoption of improved practices? In an attempt to answer this question the Improved Farm Practices Index was again regressed on the education variables and General Knowledge, but this time the villager/farmer dummy was included as an additional independent variable. The results of these regressions are presented in Table 9.26. The proportion of the variance explained increased markedly (from 52 to 70 per cent in the Mumbwa regression, and from 27 to 37 per cent in the Katete regression), and, in both areas, the villager/farmer dummy was highly significant (at $P = 0.001$). Motivation, then, was important to the cultivators' adoption of improved practices.

In the Mumbwa regression, with the villager/farmer dummy included, Schooling and General Knowledge were not significant, whereas they were for the regression which did not include the villager/farmer dummy. Consequently it can be argued that Schooling and General Knowledge did not contribute to adoption behaviour directly, but through their effects on motivation. In other words, they contributed to the motivation of the

cultivators, but did not have a further effect on adoption behaviour, other than through motivation. On the other hand, although their regression coefficients were lower in the regression which included the villager/farmer dummy, Training and Experience in Farming, and Present Cosmopolite Experience were still significant, indicating that an important contribution was being made directly to the adoption of improved practices. In the Katete regression, with the villager/farmer dummy included, Training and Experience in Farming was still significant indicating that in Katete it also contributed directly to adoption behaviour.

Even though the main contribution of schooling in Mumbwa was by motivating the cultivators to improve their farming, it cannot be argued that all children who attended school become better farmers, because, as explained in Chapter 7.1.2, most school-leavers obtained urban employment in order to fulfil their aspirations. The minority who did commence farming were motivated to farm for money and not just for subsistence. In Katete, Schooling was not significant in the regressions, either with the villager/farmer indicator, or without it. Schooling, therefore, did not contribute to the adoption of improved practices either directly or through motivation. The reader must be reminded again that only 15 Katete cultivators had attended school, and that there were no significant differences in Schooling between villagers and farmers.

Cosmopolite Experience (i.e. experience in urban and rural employment) did not contribute, in either area, directly to the adoption behaviour of the cultivators nor through motivation.

If the cultivator's purpose in obtaining this employment was to earn money to buy equipment or other inputs to improve his farming, then a significant relationship would have been expected. But, as there was no such relationship, it may be concluded that this was probably not their purpose of obtaining employment.

The Present Cosmopolite Experience Index, which represented experiences during the survey which could have contributed to the outward orientation of the cultivator, was significant in the Mumbwa regressions both with the education variables and General Knowledge only and also with the villager/farmer indicator included. As there was a significant difference between villagers and farmers in this experience, its contribution could have been both through motivation, and directly on adoption behaviour. No such relationship was found in Katete.

In Mumbwa the General Knowledge Index was significant in the regression of the Improved Farm Practices Index on education variables and General Knowledge. When the villager/farmer variable was included in the regression, General Knowledge was no longer significant. General Knowledge was related to the motivation of the cultivator (Section 3.1), and these regression results suggest that its contribution to adoption behaviour was mainly through this motivation. Even though in Katete General Knowledge was significantly correlated with motivation, it was not significant in explaining the adoption of improved practices. This could have been due to the fact that the villager/farmer dummy was not as highly correlated with adoption behaviour in Katete as it was in Mumbwa (the coefficients were 0.55 in Katete and 0.71 in Mumbwa).

Training and Experience in Farming was significant in all the regressions in which the Improved Farm Practices Index was the dependent variable. Since these regressions included the villager/farmer dummy as an independent variable, which was also significant, it can be argued that Training and Experience in Farming was of importance at the adoption stage, in spite of the significant correlation between the two independent variables. The significant correlation coefficient between the villager/farmer variable and Training and Experience in Farming was mainly due to the fact that the extension service visits were most commonly made to those who had adopted improved practices. For both areas, however, the first-order correlation coefficients between Training and Experience in Farming and Improved Farm Practices with the villager/farmer variable held constant were lower than the zero-order coefficients (in Mumbwa the coefficient was reduced from 0.65 to 0.46 and in Katete from 0.49 to 0.39) indicating that contact with the extension service contributed, to some extent, to the motivation of the cultivators. Since the main purpose of the extension service is to assist those who have adopted, or desire to adopt, improved practices it is a technical service and not a community development one. It should not therefore be expected to try to motivate the cultivators to improve their farming, but to help, technically, those who desire to do so.

For each area the Improved Farm Practices Index was regressed on the education variables and General Knowledge for villagers and farmers separately. The results of these regressions (Tables 9.27 and 9.28) show that, for both Mumbwa and Katete, more of the variance of Improved Farm Practices was explained for the farmers

Table 9.27 Multiple Regression : Improved Farm Practices on Education Variables and General Knowledge : Mumbwa

Mumbwa villagers				
Independent variables	Dependent variable : Improved farm practices			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	0.1727*	0.0797	0.1561	0.0837
Training and experience in farming	0.3044*	0.0927	0.2895*	0.0956
Schooling	-0.0007	0.0908	-0.0099	0.0921
Present cosmopolite experience	0.1531	0.0813	0.1292	0.0889
General knowledge	-	-	0.0785	0.1154
Determination, R^2 (%)	30.94		31.45	
Standard error of estimate	18.01		17.92	

Mumbwa farmers				
Independent variables	Dependent variable : Improved farm practices			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	-0.0673	0.0735	-0.1084	0.0743
Training and experience in farming	0.4003*	0.0918	0.3627*	0.0912
Schooling	0.0669	0.0808	0.0125	0.0830
Present cosmopolite experience	0.1519*	0.0712	0.1399*	0.0696
General knowledge	-	-	0.2084*	0.1006
Determination, R^2 (%)	35.39		39.64	
Standard error of estimate	16.73		16.16	

A : Regression on education variables.

B : Regression on education and General Knowledge variables.

* Significant at P = 0.05.

Table 9.28 Multiple Regression : Improved Farm Practices on Education Variables and General Knowledge : Katete

Katete villagers				
Independent variables	Dependent variable : Improved farm practices			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	0.0871	0.0711	0.0614	0.0736
Training and experience in farming	0.0235	0.0729	-0.0049	0.0759
Schooling	0.0535	0.0836	0.0262	0.0859
Present cosmopolite experience	-0.0362	0.0819	-0.0607	0.0837
General knowledge	-	-	0.1185	0.0922
Determination, R^2 (%)	3.88		6.07	
Standard error of estimate	16.16		15.97	

Katete farmers				
Independent variables	Dependent variable : Improved farm practices			
	A		B	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Cosmopolite experience	-0.0391	0.1164	-0.0759	0.1194
Training and experience in farming	0.7367*	0.1387	0.7173*	0.1383
Schooling	-0.1238	0.1408	-0.1989	0.1531
Present cosmopolite experience	0.1317	0.1398	0.0584	0.1516
General knowledge	-	-	0.1917	0.1609
Determination, R^2 (%)	61.83		64.25	
Standard error of estimate	14.51		14.04	

A : Regression on education variables.

B : Regression on education and General Knowledge variables.

* Significant at $P = 0.05$.

than for the villagers by these independent variables. In Mumbwa only Training and Experience in Farming was significant for the villagers, whereas for the farmers Present Cosmopolite Experience and General Knowledge were significant in addition to Training and Experience in Farming. In Katete no variable was significant for villagers, but Training and Experience in Farming was for farmers.

The education variables, therefore, contributed more to the adoption behaviour once the cultivators were motivated. The large differences in the explained variance between the villager and farmer regressions may be accounted for, at least in part, by the nature of the improved practices adopted by the two groups. The villagers had adopted mainly improved techniques which were previously encouraged by the extension service (see Table 9.24). The farmers had, in addition, adopted the mechanisation, biological and cash crop types of improved practices. Since during the survey the extension service was encouraging, in particular, the latter two types, a close association for farmers between contact with the extension service and Improved Farm Practices would be expected.

Other research projects, which have associated schooling with the adoption behaviour of cultivators, have shown that, in Africa, schooling was generally not significant, whereas in India, where the level of schooling was usually higher in the rural areas, it was. It has been shown in this present study that, in Mumbwa, where the level of schooling was higher, it was significantly associated with adoption behaviour, but this was not the case in Katete, where the level of schooling was lower. It was also found in this study that contact with the extension service was

significantly associated with adoption behaviour. However, a comparison between the results of this present study and those of studies done in other areas is of doubtful value because the studies were carried out in different social and cultural environments.

9.5.3 Farming knowledge and the adoption of improved practices

Since farming knowledge was only measured at the very general level of awareness, and not at the levels of "information" or "understanding", no attempt will be made to show a causal link between the Farming Knowledge Index and the adoption of improved practices. Rather, it will be shown that cultivators appeared to be aware of improved practices, but often did not have detailed knowledge of them nor an understanding of how they could be used profitably on their own farms. The two improved practices which will be discussed in this way are the use of fertiliser on maize, and the rotation of crops.

(i) Fertiliser : When the cultivators were asked to name the best methods by which they could increase their yield of maize, the most common reply was "by use of fertilisers" (this reply was given by 41 per cent in Mumbwa and by 54 per cent in Katete). During the same year, only 14 in Mumbwa and six in Katete used any fertiliser, and that was on less than 40 per cent of their maize. The overwhelming reason given by cultivators for not using fertiliser was that they had no money (63 per cent in Mumbwa and 41 per cent in Katete gave this reason). In many cases there was money available (the average

savings of farmers in Mumbwa was 148 Kwacha and, in Katete, 40 Kwacha), but the cultivators preferred not to spend this money on these inputs. A number of them, 26 in Mumbwa and 13 in Katete, when asked in the second year of the survey, said that they would use fertiliser the following year, but only 12 and six, respectively, did so.

(ii) Rotation of crops : the rotation of crops is a simple technique which does not require any special capital investment nor a marked change in farming practice, and little increase in labour. It was recognised by 63 per cent of Mumbwa, and by 96 per cent of Katete, cultivators as a good practice, but only 18 per cent of the maize planted during the 1968/69 agricultural season was on different soil from that planted during 1967/68. Even allowing for the fact that many Mumbwa cultivators planted much of their land in maize in both years and did not therefore have spare land for rotation, the percentage of maize planted in rotation was very low.

The difference between the number who knew about the advantages of using fertiliser and the rotation of crops, and the number actually using them highlights one of the problems connected with the cultivators' adoption of improved practices. In terms of the levels of knowledge discussed in Chapter 2.3.2, it can be said that the majority were aware of the improved practices which they could adopt, that a lesser number of them had obtained more detailed information about them, and that only a few understood how they

could be used to give profitable returns. This lack of understanding of how improved practices could be used profitably on their own farms is partly due to the fact that returns have, in many cases, been low and some cultivators had built up a "learned resistance" to them. In addition, some cultivators, although they were aware of the value of improved practices, did not seek further information or understanding of them simply because they did not desire to improve their farming.

9.6 The Effective Use of Improved Practices

Since the Improved Farm Practices Index was highly correlated with production (measured in terms of maize equivalent) it can be said that the adoption of improved practices had led to increases in production. From this association, though, it is not possible to draw any conclusions as to how effectively these improved practices were used. Conclusions of this type can only be drawn from a detailed study of how each improved practice was used on a particular farm. An analysis of this nature is beyond the scope of the present study. It is strongly believed by the author, from his observations during the survey, that there is much room for improvement in the way in which the improved practices are used, since only those with the highest production were able to earn an income equivalent to that of even an unskilled urban employee. The more effective use of improved practices needs not only better teaching of farming skills, but also a higher level of teaching in farm management. Whether this latter is possible with the present cultivators, very few of whom have been to school, is another question.

9.7 Summary

The main findings of this chapter can be summarised as follows :

(i) The important education variables contributing to higher production in the Mumbwa and Katete samples were, Training and Experience in Farming (mainly contact with the extension service) and Present Cosmopolite Experience (attendance at church and community development meetings, and visits away from the village during the period of the survey). In addition Schooling was important in Mumbwa and General Knowledge in Katete;

(ii) The motivation to improve farming (as measured by the villager/farmer dummy) was important to the adoption of improved practices and hence to increases in production;

(iii) The important contributing variables to this motivation were Schooling, Present Cosmopolite Experience and General Knowledge in Mumbwa, and Cosmopolite Experience (mainly urban and rural employment) and General Knowledge in Katete. Training and Experience in Farming was significantly correlated with motivation in both areas because the farmers had adopted the improved practices which the extension service was encouraging and because of this they had more contact with this service than did the villagers. This contact was more a result of motivation than a cause of it;

(iv) The community constraint to improved farming appeared to be greater in Mumbwa than in Katete and this could have been one reason why Schooling was not significantly correlated with motivation in Katete;

(v) The resources most often mentioned as being indicators of good farming were those more often used by the cultivators, but, except for mechanisation, they were not the ones which gave the higher economic returns, nor were they those which were encouraged by the extension service during the survey;

(vi) Other cultivators and the family were the main sources of knowledge of established techniques, whereas knowledge of the newer improved practices and crops came mostly from the extension service;

(vii) The extension service was regarded as the main source of knowledge of improved practices, but few cultivators were visited by extension officers during the survey, and most said that they had not acquired much knowledge, nor received much assistance, from them;

(viii) In Mumbwa, of the education variables and General Knowledge, only Cosmopolite Experience did not contribute significantly to the adoption of improved practices. The main contribution of Schooling and General Knowledge appeared to be through motivation. In Katete only Training and Experience in Farming contributed significantly to the adoption of improved practices;

(ix) More of the variance of the Improved Farm Practices Index was explained by the education variables and General Knowledge for the farmers than for the villagers indicating that education contributed more to adoption behaviour once a cultivator was motivated. Without this motivation, therefore, much education would be irrelevant;

(x) A cultivator's lack of understanding of the use of fertilisers and the rotation of crops was a constraint to his adoption of these improved practices, even though he was aware of their value;

(xi) Despite the significance of the relationship between education and the improvement of farming, the impact of education on farming was not as great as might be expected from theoretical studies.

Chapter 10

EDUCATION AND THE DEVELOPMENT OF FARMING IN MUMBWA AND KATETE : DISCUSSION OF RESULTS

10.1 Introduction

The majority of studies carried out on education and agricultural development in developing countries have been theoretical. They have been concerned with the manner in which education should contribute to this development. By contrast, the present study has attempted to measure, quantitatively, aspects of education and, using these measures, to examine statistically how, in the specific situations of Mumbwa and Katete, education has contributed to the development of farming. In addition, it has attempted to explain why the contribution of education has not been as great as that predicted by educationists. While it must be acknowledged that the measures employed in the analysis were not perfect, since they did not take into account the quality of educational experiences, it is believed that this does not invalidate the results.

Although education had contributed to the improvement of farming in the UNZALPI sample, its contribution had been meagre, since most of the sample had a level of living much lower than that of the urban population. While a great deal of the blame for this can be placed on the national pricing policy, and on poor supporting facilities in agriculture, it must be admitted that education has not brought great changes to the rural areas. Some people attribute this to the small investment in schooling, community development and farm training facilities, while others

attribute it to the low quality of the education which has been given.

An attempt will be made in this chapter to explain some of the reasons why education has not contributed more to the improvement of farming in the survey areas; and from this discussion, suggestions will be made for some priorities in educational policy. It is outside the line of argument to follow through the practical implications of the results of the analysis, although from time to time some will be briefly discussed.

The organisation of farming in Zambia, envisaged by Kaunda, is mainly that of family farms, and, although it is idealistic since it ignores differences in individual ability, the emphasis in the discussion which follows will be on family farms. No attempt will therefore be made to discuss, except if it is directly relevant to the argument, state farms or large-scale settlement schemes and co-operatives,[1] although the present author believes that these will play an important role in rural development in Zambia.

10.2 The Adoption Process

Throughout this study, motivation, farming knowledge, and the adoption of improved practices have been kept as separate and distinct stages in the adoption process. These stages are, however, interdependent. For example, if a cultivator who is motivated to improve his farming is not able to acquire the

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[1] These schemes offer hope for fundamental rural change, but their introduction on any large scale is impossible because of the cost involved (King, 1967, p.14).

necessary knowledge of how this can be done, or, once having acquired the knowledge, is not able to adopt the improved practices, then he will probably lose his desire, since it would no longer seem to be attainable. Because of the inter-dependence of the stages, any rural development programme must be carefully integrated. The education aimed at producing the motivation must be accompanied by opportunities for acquiring the necessary farming knowledge, and the improved practices must be available for those wishing to adopt them.

The following discussion will concentrate on two main problem areas. Firstly, it will discuss how education can more effectively produce motivation in the cultivators, and secondly, it will discuss the role of the extension service in assisting cultivators to fulfil the aspiration to earn money by improved farming.

10.3 Education and Motivation

Once an individual has been motivated to improve his farming, he appears to be able to take the necessary steps to fulfil this aspiration.[2] Motivation is, therefore, essential if an individual is to improve his production substantially. Without it, the teaching of new techniques, or the provision of improved practices, will probably not lead to sustained increases in production, although there may be some short-term increases.

Essential to the fulfilment of the aspiration acquired through motivation is the existence of economic opportunities.

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[2] The zero-order correlation coefficient between production and the villager/farmer indicator was 0.54 in Mumbwa and 0.74 in Katete.

In the UNZALPI sample opportunities did exist, but only the best farmers were able to earn an income which was equivalent to that of an unskilled urban employee (Elliott et al., 1970). If the economic opportunities had been so great that even cultivators working only for a few hours every day, and using only traditional methods, would have been able to make a good living, then it is not disputed that more of them would have desired to do so. But, as the opportunities were not so great, only the cultivators who had become motivated to improve their farming (i.e. those who had become farmers), saw the economic opportunities as being sufficient for them to strive after actively.

In a study of small communities similar to the two in the UNZALPI sample, economic opportunities are similar for all individuals, with the exception of those who lack the basic resources of land and labour. The constraints, which apply differentially to individuals, are personal ones, i.e. differences in motivation, in knowledge, in personality and in ability. It has been shown that lack of motivation is an important constraint, and it has been argued that changes in the values and attitudes of villagers are essential if they are to become farmers. Kaunda's philosophy of Humanism is an attempt to preserve those traditional values and attitudes which do not constrain modernisation, and, at the same time, to change those which do. It is a base on which changes in the society and in individuals can be made. Whether the implementation of this philosophy is possible and, if it is, whether it will have the desired effect, remains to be seen.

Education, as discussed in Chapter 3, should assist in motivating the cultivators to improve their farming, since the educated person has been taught to accept modern values rather than the restrictive traditional ones. Hunter (1969b, pp.163-164) says that "although there is evidence of a strong correlation between progressive farmers and education (schooling), this is probably taken too simply. Progressive farmers and innovators in the village are indeed most frequently men who had been into the outside world". The results of this present study do not support this. Although those in Mumbwa who had been to school were more often motivated to improve their farming, this was not true in Katete, nor for those who had had direct contact with the modern society, through urban or rural employment.

Schooling did contribute to motivation towards improved farming in Mumbwa, where a considerable proportion of the cultivators had already been motivated in this way, and, consequently, where the abilities and aspirations acquired at school were not so constrained by traditional attitudes. In Katete, where attitudes in the villages were less modern, and where the level of farming was lower so that the economic opportunities did not appear to be so good, schooling was not a significant contributor to the motivation. It can therefore be argued that the schooling produces the changes in values and attitudes within the individuals, but unless the resulting aspirations are able to be fulfilled, the individuals relapse into their traditional habits of mind.

From the results of the analysis, it is not possible to say whether the situation would have been different in Katete if more cultivators had been to school, or, for that matter, if, in both

areas, the cultivators had been to secondary school instead of only attending for an average of four years. Maybe the values acquired after ten years at school would be less easily lost than those acquired after only four years.[3] The point to be made here, though, is that schooling at the lower primary level will not contribute to the improvement of farming through motivation unless the attitudes of those in the villages are directed towards development. Because of the strong authority which elders still exert in the villages, especially over land and social behaviour, it is valid to argue that the same would be true even for those who had completed a full primary education, since the school-leavers would have lived at home during their schooling, and would be less than 17 years old when they left school. If a society is orientated towards development, the values acquired from a theoretical study at school of modern society would be similar to those adopted, or aspired to, by the majority in the villages, and conflict would not arise to the same extent as if only a minority held these values. This finding supports that made by Anderson (1965, p.13), when he says that "it would seem to be the conclusion of many investigations that education seldom takes root until the transition to a market orientation had already begun". This can be put in another way : schooling reinforces other factors and is not, in itself, the initiator of modernisation.

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[3] Another important unknown factor was the quality of schooling. It is a common belief that the quality of primary schooling in Zambia, in the past, was low, especially that in the rural areas. However, because schooling was directed towards preparation for "white-collar" employment, it cannot be argued that improvements in the quality of this type of schooling would have led to the production of better farmers. The problem was not so much the quality of schooling, as the reluctance of the rural society to accept individuals with the modern values and attitudes.

Direct contact, through urban and rural employment, with a society in which modern values predominate was not an important contributor to the motivation of the cultivator towards farming. Hunter rightly pointed out that this direct contact should contribute to motivation; why, then, did it not? As explained in Chapter 7, many cultivators who returned to their villages after living in an urban area did so either because they had lost their jobs, and therefore could no longer support their families, or because they had only gone for a set period of time in the first instance. To both groups, the urban and village societies were as different as two worlds, and the values appropriate to the former were not to the latter. The opportunity to earn money in urban employment was welcomed, but when it came to an end they could always return to their villages and to farming. But they believed that the values acquired in a town could not be brought back to the village. A similar attitude existed also for those who had the opportunity of rural employment.

Because of the changing nature of urban employment, as discussed in Chapter 7.2.1, it will not be of value in the future, since those becoming employed will not return to their villages. Urban and rural employment will only contribute to the improvement of farming if the cultivator seeks this employment in order to obtain money for the purchase of farming equipment. In this case the experience will be a result of motivation and not the cause of it.

The time spent by cultivators in cosmopolite experiences during the survey (and most probably in the years immediately prior to it) - for example, attendance at church, community development meetings, and visits to friends and relatives -

was associated with motivation only in Mumbwa. It can be argued that, because they had had these experiences after they had become motivated, any associations found cannot be regarded as causal. The experiences were also associated with adoption behaviour, but, because many improved practices were adopted prior to the survey, neither can these associations be regarded as causal. These experiences were, however, important for the general modernisation of the society and should, therefore, be encouraged. During the survey, community development meetings, being mainly political in nature, were regarded by the cultivators as intrusions into their society, since the meetings were closely associated with party political indoctrination. Priority must be given by the organisers to winning the confidence of the cultivators before attempting to use these meetings as a modernising medium. If this is done, then "political activities" may help to broaden their outlook.

The significance of the General Knowledge Index indicated that the socialising and other informal experiences, which a cultivator obtains from his elders, peer groups and groups outside his village, are also important. Consequently any means of making cultivators more aware of modern society will contribute to motivation, and so to development.

Much of the research in developing countries on the improvement of farming has failed to consider motivation. The assumption has usually been made that, if cultivators can be shown the economic advantages of adopting improved practices, they will take the necessary steps to adopt them. But, as pointed out, this will happen only in the very rare event of economic opportunities being overwhelming. Many of the factors discussed in this

study as being important to motivation have been associated, in other research, with adoption behaviour. Once the importance of motivation is demonstrated, as it has been in this study, it is logical to argue that these characteristics contribute to adoption behaviour through motivation, and not directly to adoption behaviour as many studies have assumed. In fact, if these studies had measured motivation they might have found that education was associated with it, even though the education was not associated with adoption behaviour. Examples of characteristics which other studies have associated with adoption behaviour are socio-economic status, "progressiveness" and "innovativeness". Claims that these factors, rather than education, are the important contributors to motivation fail to take into account the fact that the education occurred prior to farming. In the situation in Mumbwa and Katete, it would not be valid to argue that these attributes were the cause of education, but rather as Anderson (1965, p.22) argues :

education contributes to motivation and, therefore, to adoption of improved practices through changes in these personal characteristics.

Before discussing the type of education which is necessary to help cultivators to improve their farming, the need for this improvement, in order to assist school-leavers to be assimilated into village society, will be briefly discussed.

Most cultivators in the survey commenced farming because they had no alternative means of livelihood. Their peers, who were fortunate to have had the opportunity of attending school,

had the alternative of non-farm employment open to them, and most of them took it. In the near future, in Zambia, many school-leavers who have had a full primary school education will not be able to obtain non-farm employment (see Chapter 6). Consequently, they will have to return to their villages, not by choice, but because there is no alternative. The standard of living to which they aspire will be at least as high as that of the best in the rural areas. If they are to accept, voluntarily, farming as a way of life, they must see that these aspirations are capable of fulfilment in the villages, otherwise they will remain for only a short period of time before leaving for the urban areas in order to look for paid employment, in spite of the limited opportunities available there. Many of them would prefer to wander the streets unemployed, rather than to return to their villages. Even though the level of living in the rural areas has recently improved, the gap between this level and that of those in employment in the urban areas has widened.[4] The aspiration of the school-leaver is, therefore, higher than it was at the granting of independence. The argument that, as the rural areas develop, the school-leavers will be more prepared to return to the villages, is true only if the gap between the level of living in urban and rural areas is narrowed.

In the past, the school-leavers have been motivated to obtain non-farm employment because the rewards and status have been vastly superior to those which could be acquired by farming. This attitude existed, not only in the aspirations

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[4] See Chapter 1.2.

of the school-leavers themselves, but also in those of their parents and the government, which needed skilled manpower for administration. This pressure from the government is now being redirected in order to persuade school-leavers to become farmers, but no such change has taken place in parental aspirations. These latter were shown, in this present study, not to be realistic. But nevertheless they must change if the school-leavers, who return to their villages, are not to be regarded by their parents as failures. The parents must see that their children can obtain a reasonable level of living from farming, but, in order to do this, they must also see farming as a way of life and not just as a means to subsist.

How does a 14 to 17 year-old primary school-leaver, who has not been able to go to secondary school or to find employment, feel on returning to his village? He is there confronted with a society which, although it has modernised to some extent, still retains its basic traditional values and structures. According to custom, he is not able to marry and obtain his own land for a few years. In the meantime, he is expected to work for his parents, frequently tilling the land in the traditional manner, when he knows that this is not the best way. Under this system, he is not likely to be able to persuade his parents to invest in the inputs necessary for the use of improved farm practices, nor are there any opportunities for him to build up capital to purchase these for himself. He is regarded by the family as a failure, because he was unable to obtain a "white-collar" job, and so he feels rejected by them. What alternatives are open to him? In a few cases, he may be able to have some form of farm training (e.g. Young Farmers' Clubs), or he may be able to find employment near his village and live at

home. But, usually, he has no option but to relapse into the traditional way of life and will therefore be unable to make a contribution to its development.

It is not argued here that the specific aims of education must change to those which encourage children to remain traditional, but rather should aim to change the society into which the school-leavers will have to live, in order that no conflict arises between their aspirations and those of the adult members of the community. For this to occur, higher priority must be given to adult education, in order to motivate the adults to desire the higher level of living associated with the modern way of life, so that they will encourage the school-leavers to make a living from farming, and if these adults are not too old, to increase also their own production, both to raise their level of living and to be an example to the young people.

Despite the emphasis on Humanism in Zambia, a comment often heard, even among government officials, is that the country should concentrate on the young people since all the adults are too old to change their way of life, and, anyway, they will die off in the near future. Such a negative approach would certainly not solve the rural problems since it fails to grasp one of the basic facts of rural society - the importance of continuity. Financially, and in terms of available skilled manpower, it is not possible to resettle all school-leavers away from their villages. Therefore, the majority of them will have to be settled in their own villages and to develop in co-operation with the adults and not in spite of them.

Although the need for adult education has long been recognised by the government, it has been seen only in terms of individual social welfare. This study has demonstrated that adult education is also necessary for increases in economic welfare; not only for individuals, but also for the rural population as a whole. The government has excused the low priority given to adult education on the grounds that the need to train individuals to administer the government and to expand the industrial economy was more important (see Chapters 1 and 3). To it, the returns on this type of investment seemed to be higher than those on rural adult education. Another reason for the low priority given to adult education was that the little which was being done did not appear to have achieved very much. While it is acknowledged that the education of adults is more difficult than that of young people who are at a much more impressionable age, a lot of the failure of adult education can be attributed to its inappropriateness and not to the intrinsic reluctance of adults to change their set patterns of thinking and of behaving.

What type of education then is appropriate? It is believed by the present author that the most important type should be "motivational education", i.e. the general aim of the education should be to motivate adults to aspire to a higher level of living, and must seek to change their values and attitudes accordingly. A lot of research is necessary to translate this general aim into specific aims, and from these to construct a suitable curriculum.[5] This is not the place to detail the

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[5] For a detailed discussion of the process of curriculum construction, see Wheeler (1967).

curriculum, but only to say that it must be broader than mere instruction in reading, in writing, or in cooking, and that this motivational education must precede detailed teaching of farming techniques, because, as was shown in the last chapter, the teaching of farming and other related skills is not relevant if the cultivators are not first motivated to raise their level of living. A high priority must be given to this type of adult education, otherwise the schooling of young people will be wasted if they have to return to an environment in which the values and attitudes, which they acquired at school, are rejected by the community as a whole.

Because of the pressure from parents for more schooling for their children, it would be political suicide for the government to restrict the numbers of children entering primary or secondary school, in order to provide more education for adults. Instead, if the resources are insufficient, the hours of schooling could be restricted so that adults could receive teaching in place of the second session for children, as is common in many places.

As far as is possible, adult educational programmes should be carried out village by village, instead of by selecting only a few adults from each village. While it is acknowledged that motivation and knowledge diffuse from the innovators to others in a community, this will only occur if the values and attitudes of a considerable proportion of adults in the village are favourable to these changes. As was shown in Chapter 9, schooling only contributed to motivation, and thus to the improvement of farming, when a considerable proportion of cultivators had modern attitudes. Therefore, for an educational programme to have an

impact, a considerable number of adults in the village must receive this education directly.

In addition to a programme of adult education, there must also be opportunities for school-leavers to continue their education. This education must have two main purposes. Firstly, it must continue the process of general education in such a way that the individual does not lose his aspirations before he is able to fulfil them by farming commercially on his own. Secondly, it should teach him the necessary knowledge and skills to farm commercially, and encourage him to use them either on his parents' farm, or, if he has one, on his own. Many conferences have been held on the best ways to provide this education, and many suggestions have been made;[6] it is not necessary to discuss them here. Rather, it must be emphasised again that, unless the conditions are favourable, the aspirations gained at school will be lost before the school-leaver has an opportunity to fulfil them through farming. Even where the conditions were favourable, many cultivators, who had been to school, had lost their motivation, and those who had retained it were not able to raise their level of living to a level as high as that of the unskilled urban workers. The next section, then, will discuss how best cultivators can be trained to fulfil their aspirations.

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[6] For example, the Commonwealth Africa Regional Youth Seminar, held in Kenya, in 1969 (Commonwealth Secretariat, 1969), and the Commonwealth Conference on Education in Rural Areas, held in Ghana, in 1970. Suggestions on after-school youth education have included a national Youth Service, apprenticeship schemes, village polytechnics, and settlement schemes (Carr, 1969).

10.4 The Role of the Extension Service

Although the farmers more than the villagers had adopted the improved practices necessary to make a success of their farming, there was a wide range in the number and type of practices adopted. Much of this variation can be attributed to lack of resources, e.g. money to buy seed or fertiliser, equipment to plant a greater acreage. Additionally, there was a restriction placed on the cultivator by his own lack of managerial ability. It is believed that the most important of these constraints was his lack of ability; unless the cultivator knows how to go about improving his farming and is sure that he can handle the higher level of management involved, he will remain at a fairly low level of farming, even though he may have a strong desire to increase production.

Even though, in Mumbwa, schooling contributed to the acquisition of motivation, it did not contribute to the cultivator's adoption of improved practices. It would be expected that attendance at school would have made the cultivator more prepared to accept the risks involved in adopting these practices, and more able to use them profitably. Since this did not occur in the survey areas, it can be argued that farming was not sufficiently complex for the general abilities acquired at school to be of importance.

In the analysis, the extension service has been shown to be the most important source of knowledge of improved practices, especially of the ones newly introduced into a community, and to be strongly associated with the adoption behaviour of cultivators. The extension service has, therefore, an important role to play in the improvement of

farming. Despite this, the service had a poor reputation amongst cultivators.

What is the role of the extension service? Its role is not to persuade cultivators to improve their level of living, nor even to persuade them to improve their farming. Extension officers are not trained for this. Rather, their task is to provide the necessary assistance to those who already wish to improve their farming.

Although the extension service has been closely associated with the adoption of improved practices, and, therefore, with increased production, the level of production in most areas is still pitifully low. Some of the blame for this must lie with the extension staff. They have concentrated on teaching the same simple skills to the same cultivators year after year, and, as a result, have not been able either to teach these skills to others, or to teach farm management, i.e. to show cultivators how to organise their farming to make the best use of the resources at their disposal. As a consequence of the latter, cultivators know how to use improved practices, but not how to make the best use of them. There are two main reasons why the teaching of farm management has not received higher priority. Firstly, it is commonly believed that most cultivators, since they are uneducated, do not have the ability to improve substantially their level of management, and secondly, the extension staff have been inadequately trained to teach it. But the teaching of farm management is essential if cultivators are to make a success of the higher level of farming which can be reached by using improved practices.

From observation of the situation in Mumbwa and Katete, the present author believes that there are two main problems facing the extension service as it is at present constituted in Zambia : overcoming the lack of confidence in it by the cultivators, and restoring the low morale of the extension staff. These problems are of course related. If an extension officer's advice does not lead to increases in production, then the cultivator loses confidence in the officer, and the latter feels that he is achieving nothing. If the extension service is to be effective, then the cultivators' confidence in it must be restored and the extension officers' morale must be raised.

By far the best way, and probably the only way, to restore confidence in the extension service is to ensure that, generally, the advice from extension staff leads to increases in production. This may sound too obvious even to mention, but it is not taken seriously enough by extension staff. In order for this to be achieved, the extension officer must be convinced that, unless he believes that the advice will lead to increased production, it should not be given. It is better not to give any advice than to give advice which results in failure. It is true that this argument cannot be pushed to the extreme, otherwise no advice would be given since there is always the risk of failure. Further, he must realise that it is better to give adequate help to a few than a little help to many. The latter is tempting because of the large number in his area who need assistance. But this temptation must be resisted.

Another essential is that the right advice be given to each individual, rather than "group advice". This is not the place to say what kind of advice is necessary for the

cultivators in the Mumbwa and Katete areas. However, the need for a package approach was stressed in the third UNZALPI report (Elliott et al., 1970, p.65) as one or two improved practices used in isolation did not often bring profitable returns.

While it is evident that the extension service would be much more effective if there were more staff, with more general education and better training, this needs to be stressed here as the extension service is regarded as very important by the cultivators. Upgrading of the extension service must receive priority. However, it is recognised that, for at least the next decade, the extension service will be working under-strength with inadequately trained staff, and so the principles outlined later will have to take this fact into account.

Too often the extension staff have been used as scape-goats for the lack of development of farming in a given area. Functioning as they do in a role midway between Agricultural Officers on the one hand and cultivators on the other, they are susceptible to receive blame from both groups: from the former when cultivators do not adopt improved practices, and from the latter for the lack of loans, seeds, fertilisers and spare parts for machinery. Rarely do they receive rewards or praise for their achievements from either group.

The difficulty of the task facing them is not fully appreciated. Often an extension officer, with only seven years or less of schooling and only six months of extension and agricultural training (although many of the younger ones have completed the two-year course at Monze Agricultural College), is placed in an agricultural camp in a village and told to

improve the farming of 2000 families in the surrounding area. Can he be blamed for not succeeding? Many of them, faced with this almost impossible task, try to help as many people as possible and, as a result, work extremely hard, but achieve little. Others, having been overcome by the immensity of the task, give up, and spend a lot of their time mixing socially and drinking with village people. The extension officer must be able to identify himself with the people in order to gain their confidence, but, at the same time, he must keep apart from their internal conflicts. This middle way is notoriously difficult to achieve and calls for a diplomatic approach which most of the officers do not possess.

What can be done, then, to increase the confidence of the cultivators in the extension service and to increase the morale of extension staff? The following are some principles on which to base policy decisions and are not intended to be a list of practical suggestions. These principles come both from the present author's observation, and from the results of the analysis of data.

(i) One of the most pressing needs is for the better supervision of commodity demonstrators and agricultural assistants. They need to organise their time on a weekly basis so that they know what they can hope to achieve realistically. Help for this should be given from District Agricultural staff and from time to time the programmes of work checked. Naturally this must be carried out in such a way that the extension staff do not feel that they are not

trusted; rather, they should feel that the district staff are interested in them and want to help in every way possible. Daily meetings between the staff of an agricultural camp would be a good way of starting the day as problems common to all could be thrashed out in discussion. It must be appreciated by them that an hour spent in organisation is worth more than half a day "running around in circles". Better organisation and supervision are essential to the working of the extension service.

(ii) The principle must be adopted of helping only a few and doing it well. The teaching must be thorough so that the cultivator will not forget the advice and have to be retaught every year, as has so often happened in the survey villages.[7]

(iii) As far as possible extension staff should plan the whole farming operation with the cultivator. Too often cultivators plan improvements which are not possible with the resources at their disposal and, if the extension officer assists in this, he will be blamed for the failures. The teaching of farm management must be given priority in extension work.

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[7] Extension staff had been helping the same cultivators to prepare tobacco seed beds and to transplant the seedlings every year for nearly a decade. The same applied to some cotton growing techniques.

(iv) Because of the shortage of extension staff, the better farmers could act as advisers. Extension staff should introduce new knowledge and techniques into a community which the innovators could then diffuse to the rest of the community. But the use of the better farmers as advisers is fraught with danger, since many of them have reached their higher level of production in competition with those who need their advice.

(v) If cultivators desire to adopt improved practices, they must be able to obtain the necessary advice and assistance from the extension service without difficulty, otherwise they may decide against the adoption. In the survey areas, agricultural camps were never more than five miles away and access to them was easy. Since there is a shortage of extension staff, their time would be saved if cultivators came to them for advice instead of much of their time being spent in travelling by bicycle from village to village. For this to be successful, a rota system would have to operate, so that one extension officer was always at the agricultural camp to receive those who came for assistance. It may be argued that the cultivators would not come to the camps. But, in reply, it must be said that, apart from this system saving time, it would be a means of sorting out those who were

motivated to improve their farming from the rest. Cultivators, who are sufficiently interested in obtaining advice to travel to the camps in order to obtain it, are those who should be given priority. If this is done, then the return on the extension advice would be much greater. This is not to say, however, that the extension officer should never go to farms; he must in some cases in order to advise individual farmers.

(vi) Incentives for extension staff are essential. Normally, these would be promotional and linked to increases in salary. Otherwise the job would be regarded as "dead end" and the work would suffer accordingly.[8]

(vii) There are many tasks performed by the extension staff which should be done by others, e.g. distribution of seeds and fertilisers, and the collection of loan repayments. While it is acknowledged that they may be the best people to do it, this work takes them away from their main task of teaching cultivators.

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[8] The 1968/69 annual report of the Eastern Province Department of Agriculture made the following comment : "It must be mentioned that there were a number of extension staff at all grades with extremely good conduct which resulted in recommendations for promotion, most of which did not materialise ....." (Department of Agriculture, 1969, p.3).

10.5 Conclusion

In the development of farming in the rural areas of Zambia, there are two groups of people who must be considered. Firstly, there are the cultivators, mostly with little, if any, schooling, and secondly, the school-leavers who are not able to find the non-farm urban employment which they desire and, consequently, have to return to their villages. It has been argued, in this thesis, that higher priority in education must be given to these two groups. Firstly, priority must be given to the present cultivators, not only so that their own level of living may be improved, but also so that the school-leavers may be more prepared to return to their villages and commence farming. If this is not done, then much of the value of the schooling of the next generation as a modernising influence will be lost, as it was for the cultivators in the UNZALPI sample.

It has further been argued that higher priority in adult education must be given to "motivational education". Only after the cultivators have been motivated to improve their farming will they learn about, and adopt, improved practices, and use these practices to give sustained increases in production. This motivational education must be followed by effective farm training, if the aspirations are to be fulfilled. If the farmers are to reach an income equivalent to that of urban employees, the training they receive must be both in acquiring the skills necessary to use improved practices, which are relatively easily learned, and in farm management. The extension service would be much more effective if it concentrated on these motivated cultivators. The main problems facing the extension service are the cultivators' lack of

confidence in the staff, and the staff's low morale. Better supervision and organisation are required to overcome these problems. More liaison is also required between educational agencies in rural areas, at the grass-root level, if there is to be motivational education followed by farm training.

There is a need, too, to continue the education of the school-leavers in the village so that they can make the transition from school to commercial farming more successfully than has been done in the past.

A politically acceptable way must be found of allocating to adult education a higher proportion of the total resources available for education.

This thesis has assumed that the motivated cultivator, using the full potential of the improved practices, will be able to attain an annual income equivalent to that of an urban employee, and that all the improved practices he needs will be readily available. Finally, it assumes that social welfare will increase with economic welfare, so that the rural areas will become better places in which to live. If any of these assumptions is unrealistic (and it requires analyses outside the scope of this thesis to repudiate them), then the necessary conditions must be created so that these assumptions can become reality. Failure to do so will also mean failure in rural development, and without rural development, national development is impossible.

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APPENDIX I

Questions and Points Awarded in the Construction of Indexes

The indexes used in this study were constructed using data available from the UNZALPI survey. Details of the derivation of the indexes can be found in Appendix II, but it is desirable to state here that the method of construction of the indexes is such as to overcome the arbitrary nature of the scores indicated below on which the indexes are based. This present appendix details the experiences and questions used in the construction of the indexes to represent the education, knowledge and other measures.

Measures of Education

(i) Cosmopolite experience index

This index is based on three types of cosmopolite experience (urban employment, urban unemployment and rural employment) and is weighted according to the type of experience and on how recently it was obtained. The types of experiences and their weights are :

(a) Urban employment ... ... years x 3

(b) Urban unemployment ... ... years x 1

(c) Rural employment ... ... years x 1

The weights used according to how recently the experience was obtained are :

(a) 1965 or later... ... ... years x 4

(b) 1960-1964. ... ... years x 3

(c) 1950-1959. ... ... years x 2

(d) Before 1950 ... ... years x 1

Example

A cultivator employed in an urban area from 1955 to 1961 would have the following score :

From 1955-1959	...	5 years x 3 x 2	= 30
1960-1961	...	2 years x 3 x 3	= 18
		Total score	48

(ii) Training and experience in farming

Question	Answer or form of answer	Points awarded
1. Were you employed on a European farm?	>4 years 1-4 years	4 2
2. Are you a member of a farming organisation?	Yes	2
3. Have you attended demonstration plots?	Yes	1
4. Were you a member of the Improved Farmer Scheme or the Peasant Farmer Scheme?	Yes	2
5. How many times did the Extension Officer visit you during 1967/68?	>4 1-4	2 1
6. How many times did the Extension Officer visit you during 1968/69?	>4 1-4	2 1
7. How many Farmer Training Courses have you attended before 1968/69?	>4 3 or 4 1 or 2	3 2 1
8. How many Farmer Training Courses have you attended during 1968/69?	>0	2
9. Have you attended Farmers' meetings during 1967/68 and 1968/69?	In both years In one year	2 1
10. Do you discuss farming matters with the other cultivators?	Often Occasionally	2 1
11. Do you know more about farming because of the Extension Service?	Yes	1
12. Would you have made as much money this year if there had been no Extension Service?	No	1
Maximum possible score		24

(iii) Schooling index

Standards of education associated with points	Points
Cultivator and family, uneducated	0
Cultivator uneducated, educated sons at school	1
Cultivator uneducated, educated sons left school	2
Cultivator uneducated, wife educated	3
Cultivator educated, Grade 1	4
Cultivator educated, Grade 2	5
Cultivator educated, Grade 3	6
Cultivator educated, Grade 4	7
Cultivator educated, Grade 5	8
Cultivator educated, Grade 6	9
Cultivator educated, Grade 7	10
Cultivator educated, Grade 8 and Form 1	11

(iv) Present cosmopolite experience index

The index is based on four cosmopolite experiences during the period of the investigation :

1. Visits away from the village with at least one night away;
2. Attendance at church meetings or services;
3. Attendance at community development meetings;
4. Attendance at adult education or literacy classes.

For each activity the cultivators were ranked from the highest to the lowest on the number of hours spent on that activity. The highest quarter were given a score of 4 down to the lowest quarter a score of 1. Those not having had the experience scored zero. The sum of hours for the second and third years of the survey was used in each case. The maximum possible score was 16.

Measures of Knowledge

(i) General knowledge index

Question	Points awarded
1. Where is the nearest secondary school to your village?	One point awarded for each correct answer, all three countries having to be named in Question 6 to obtain 1 point.
2. How do the people at the boma get their water?	
3. How does the rural council get its money?	
4. Why do overseas visitors go to Livingstone?	
5. Into what river does the Kafue/ Luangwa river flow?	
6. Name three of the countries which border on Zambia?	
7. How many shillings are there in one Kwacha?	
8. In which year did Zambia become independent?	
9. What is Zambia's chief export?	
10. What is the new way of petrol entering Zambia?	
Maximum possible score	10

(ii) Farming knowledge index

Question	Answer or form of answer	Points awarded
1. What is the recommended method to plant maize?	Correct answer	2
2. How can maize yields be increased?	For each correct answer (max. 3)	1
3. What is the best way to plant groundnuts?	Correct answer	2
4. What is the current commercial price of maize?	Correct answer	1
5. What is the current commercial price of groundnuts?	Correct answer	1
6. What is the weight of a standard bag of maize?	Correct answer	1
7. What farming inputs or results show that a man is a "good farmer"?	Uses improved inputs Uses more basic inputs	2 1
8. Why does he farm in this way?	Able to use improved inputs Able to use more basic inputs	2 1
9. Do you know where training and advice can be obtained?	For each correct answer (max. 3)	1
Maximum possible score		17

(iii) Literacy index

Each cultivator was asked if he was functionally literate, semi-literate or non-literate in English and in the vernacular language. Points were given as follows :

Functionally literate	...	2 points
semi-literate.		1 point

giving a maximum of 4 and a minimum of zero points.

As this index is based on only 5 categories it is limited in its ability to discriminate between cultivators. For this reason only the minimum use has been made of this index.

Other Measures

(i) Aspiration index

Question	Answer or form of answer	Points awarded
1. Is your farm a business?	Yes	2
2. If No to Question 1, can your farm be a business?	Yes	1
3. Would you like paid employment? If Yes, if you had to make a choice between employment and farming, which would you choose?	Farming	1
4. Why did you commence farming?	For profit	1
5. If you became rich through farming, what would your plans be?	Improve farming	1
6. If you received a gift of 200 Kwacha what would you do with it?	Improve farming	1
7. If you received a gift of 4 Kwacha per week, what would you do with it?	Improve farming	1
8. What percentage of time do you spend on farm work?	35% and over 20% - 34%	2 1
9. Would you like to be a commercial farmer? If Yes, why?	Yes For profit	1 1
10. If you became rich, what would you do with your riches?	Improve farming	1
11. Do you like farming? If Yes, why?	For profit	1
12. Why do you not grow cotton or tobacco?	I do. All answers <u>except</u> those showing <u>lack</u> of motivation	2 1
13. Do you think that you could farm as well as the best farmer?	Yes	1
Maximum possible score		16

(ii) Improved farm practices index

Question	Answer form of answer	Points awarded
1. Are you growing cotton now?	Yes	1
2. Do you grow Burley tobacco?	Yes	1
3. How much fertiliser did you use on maize?	≥100 lb.	1
4. Do you use insecticides on maize?	Yes	1
5. How many acres did you plant with improved open-pollinated maize seed?	>0	1
6. How many acres did you plant with hybrid maize seed?	>0	2
7. When did you plant your maize?	If within 2 weeks after start of rains	1
8. By what method was your maize planted?[1]	By planter Rows with spacing By rows	3 2 1
9. When did you plant your groundnuts?	If within 2 weeks after start of rains	1
10. By what method were your groundnuts planted?	On ridges	1
11. How many times did you spray your cotton this season?	>3	1
12. How many times did you seed your Burley tobacco?	>2	1
13. How do you shell your maize?	By hand Any other method	0 1
14. What percentage of total farm labour was hired?	10% or above of total labour	1
15. Did you use mechanised ploughing?	Yes	1
16. Did you use mechanised weeding?	Yes	1
17. Did you weed your maize more than once?	Yes	1
Maximum possible score		20

[1] If a cultivator used more than one method of planting the number of points corresponding to the best method was allocated to him.

(iii) Level of living index

Question	Answer or form of answer	Points awarded
1. Do you possess :		
(a) a motorcycle or car	Yes	2
(b) a bicycle	Yes	1
(c) an improved cooking stove	Yes	2
(d) a radio	Yes	2
(e) a watch or clock	Yes	2
2. What is the present value, per member of family, of your bought furniture?	4 Kwacha and over Less than 4 Kwacha	2 1
3. What is the present value, per member, of the family's clothing?	5 Kwacha and over Less than 5 Kwacha	2 1
4. Do you own a burnt brick or kimberley brick house?	Yes	2
- Maximum possible score		17

APPENDIX II

Derivation of Indexes[1]

The derivation of the indexes was based on the method used by Bessell in his work on the measurement of managerial efficiency in agriculture,[2] and is similar to the method used in the analysis of the UNZALPI data.

In general, the points given to particular answers, or sets of answers, are arbitrary and as such they have no usefulness as measurements of variables to be included in regression models to represent the attributes with which they are associated, although they have limited usefulness in ranking respondents in relation to the particular attributes concerned. It is possible to imagine a continous spectrum for a concept (e.g. for "Farming Knowledge") within which all cultivators fall, and in this situation the answers to questions asked of cultivators about their farming knowledge serve as an indicator of their position within the spectrum. The accuracy (or fineness) of placing an individual cultivator within the spectrum depends essentially on the number of questions which it is possible to ask him. The larger the amount of evidence upon which he is assessed, the more accurate will be his placing within the spectrum. The larger the sample

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[1] Adapted from Elliott et al., (1970, pp.154-155).

[2] Bessell, J.E., (1969), The measurement of managerial efficiency in agriculture, unpublished Ph.D. thesis, Sutton Bonington, School of Agriculture, University of Nottingham. The author wishes to acknowledge the assistance of Dr. Bessell in the construction of the indexes used in this thesis.

of cultivators from which information can be gathered, the more accurate will be the definition of the spectrum.

The range of values in the spectrum within which individual observations can fall must be controlled and, ideally, the range of a series of indexes to be used as variables in a regression analysis should be identical. Since it is not possible from a sample of cultivators to know the extent of the variation in the population, the scale delineating the spectrum must be asymptotic to the range values. Bearing the foregoing in mind, let Z be the "Farming Knowledge Index", a the number of points scored by an individual cultivator for answers to the questions asked, s_a the standard deviation of a, $\phi(t)$ the frequency function of the normal law then,

$$Z = 50 \pm 100\int_0^t \phi(t)dt$$

$$\text{where } t = (a-\bar{a})s_a$$

yields an index with the asymptotic values 0 and 100, and a theoretical frequency distribution which is rectangular with a mean of 50. The distribution of a was found to be markedly skewed in each of the indexes, but a close proximity to normality was obtained by using the square root transformation. All indexes were based on the whole sample of cultivators in Mumbwa and Katete, i.e. $N = 239$.

Although this process allows qualitative variables not only to be quantified, but to be standardised so that they can be

legitimately included in multiple regression analyses, a restriction is imposed on the interpretation of correlation coefficients and standard errors of estimates. Since the scatter of observations over the correlation surface is not normally distributed, the standard errors of estimate will be inflated and the usual interpretation invalidated. Further, although the correlation coefficients may be interpreted in the same way as those for normally distributed variables, it is not possible to use standard tests of significance for differences between two or more correlation coefficients.

APPENDIX III

Maize Equivalent Values for Crops

Maize was chosen as the base for the comparison of crops because it was the main subsistence crop in both areas, and was grown by all cultivators except one. For the calculation of maize equivalents the prices pertaining to village transactions were used, since all crops were sold at the village level, whereas only a limited number of them were sold at markets operated by the statutory marketing boards. Maize rather than money was used because the values of crops differed between the areas. Maize equivalent values of crops are presented in Table A/1.

Table A/1 Maize Equivalent Values of Crops in Mumbwa and Katete 1967-1969

Crop	Mumbwa	Katete
	lb of crop, equivalent in value to one lb of maize	
Maize	1.0	1.0
Beans, round	4.3	1.0
Beans, other	3.4	3.7
Bulrush millet	4.0	n.a.
Cotton	4.0	4.4
Cow peas	3.4	1.0
Finger millet	2.7	n.a.
Fruit	6.7	2.2
Groundnuts	4.3	4.7
Rice	n.a.	14.8
Sorghum	2.0	n.a.
Sweet potatoes	1.3	1.8
Sunhemp	1.6	n.a.
Tobacco, Burley	26.7	14.8
Vegetables	6.7	3.7

Notes : 1. n.a. : not applicable; the crop was not grown in the area.
2. Where applicable, the weight of shelled/threshed crop was used to calculate the maize equivalents.
3. The valuations are based on the prices which prevailed when supplies were adequate. The maize equivalents differed very little between the 1967/68 and 1968/69 agricultural seasons.