

THE TRANSFORMATION OF TRADITIONAL AGRICULTURE:
A SURVEY OF WEBUYE DIVISION, BUNGOMA DISTRICT, KENYA

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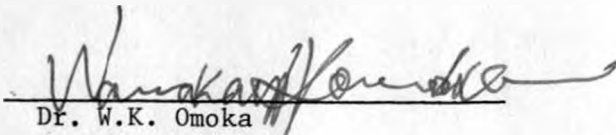
DECLARATION

This thesis is my original work and has not been presented for the award of a degree in any other University.



Mathews G. Muyekho

This thesis has been submitted for examination with my approval as the University Supervisor



Dr. W.K. Omoka

TO MY FATHER, THE LATE
FESTUS MUYEKHO MUFUTU

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ABSTRACT

This study is the investigator's attempt to examine certain principal aspects of agricultural transformation in the Webuye Division of Bungoma District, a division that is dominated by smallholder subsistence cultivators. The major objective is to ascertain the extent to which novel agricultural practices have been adopted by farmers and how the adoption of such innovations is affected by changes in social organization. It was hypothesized that farmers' socio-economic needs, their social and demographic characteristics, and changes in their extended family relations, are likely major determinants of agricultural transformation (that is, a shift from the traditional to modern systems of agricultural production). Furthermore, it was posited that farmers' conservative behaviour or non-innovation is a function of limitations imposed by production factors.

As a theoretical framework for understanding this change in agricultural practices, the theory of diffusion was applied to explain farmers' behaviour in relation to their response to novel ideas. In other words, it was conceived that this change in agricultural practices is a consequence of external influence from neighbouring communities and change agents, but not merely a result of internal dynamics in the community. By means of a review of the existing literature, random sample survey, and observation, both qualitative and quantitative data were collected and subjected to both descriptive and statistical analyses. The major quantitative analytical techniques included the use of simple frequencies, cross-tabulation, linear correlation, multiple linear regression and R-type factor analysis.

The work is presented in eight chapters. In the first chapter, the major problem, objectives and the rationale underlying the study are highlighted. In the second chapter, the existing literature on the subject matter is reviewed, the major theoretical issues and assumptions of the study are discussed and research hypotheses formulated. In the third chapter, the methodological procedures for the study are presented. These include site description, sampling and data collection. The next four chapters are devoted to hypothesis testing - that is data presentation, analysis and interpretation. Finally conclusions derived from the study are presented in the last chapter.

The results of data analysis and hypothesis testing generally show that the transformation of traditional agriculture in Webuye Division is contingent upon farmers' socio-economic needs; that farmers' social and demographic characteristics are not important forces of agricultural transformation; that changes in extended family relations do not markedly effect agricultural production (both traditional and modern), and that non-innovation cannot wholly be accounted for by limited factors of production. It is deduced that agricultural change is a complex phenomenon which cannot be explained in terms of one specific dimension of causative variables, but a multiplicity of factors. Both traditional and modern social and economic institutions are seen as complementarily contributing to agricultural production. In this vein, tradition and modernity are conceived as mutually interdependent rather than being viewed as conflicting or opposed dimensions.

CHAPTER 1

BACKGROUND INFORMATION

1.1 Introduction

Most Kenyans are rural dwellers who depend mostly on their farms for their livelihood. In this perspective, farming is their principal source of income which is derived from both subsistence and cash-crop production. Given the everincreasing population, production should be high enough to keep pace with the changing demographic structure. Since the country's greatest source of foreign exchange is the export of agricultural produce, there is need for increased cash-crop production. This is contingent upon farmers' adoption and efficient use of modern techniques.

In this study, the investigator attempts to find out how small-scale producers have tended to transform their production strategies in response to the changing circumstances. Although agricultural transformation entails the adoption and subsequent incorporation of novel agricultural practices and technologies into the existing modes of production, it also involves a total change or modification of the productive forces, popular attitudes, ideology and social organization on the part of the actors, the producers (Dalton,1971; Eisenstadt, 1966, 1970;

Hoselitz, 1960; Long, 1977; Moore, 1963; Redfield, 1956; Smelser, 1963). Accordingly, we are dealing with aspects of socio-cultural change as a tool for understanding changes in economic systems (Oloko, 1981:11-3). These are important aspects of development generally, but they are avenues for rural development in particular. Webuye Division in Bungoma District displays the typical characteristics of a modernizing community in terms of agricultural innovativeness but it is still dominated by small-holder producers.

1.2 Problem Statement

The study of agricultural transformation Worldwide is an interdisciplinary one with each discipline having specific objectives which are geared towards creating change and development. Recommendations accruing from their research findings have been adopted to attain the desired goals. However, despite these recommendations, many rural communities are still blanketed by traditionalism save those whose members have had opportunities to gain "outside" experiences. Thus some communities exhibit economic systems characteristic of those described by some anthropologists like Durrenberger (1984), Forde (1963) and Sahlins (1974), that is, economic systems that are based on reciprocity and where the principle of embeddedness is operative. However, the current trend is that of a continuous process of rapid transformation in most traditional societies (Kituyi, 1990; Meyerhoff, 1991; Rigby, 1985).

In Kenya, many studies and evaluation programmes on small-holder agriculture, and their resultant suggestions at both regional and national levels have been realized (Ascroft, et al, 1975; Bhandari, 1973; Brown, 1963; Greene, 1975a, 1975b; Heyer, 1973; Leonard, 1972a, 1972b, 1973; Leonard et al, 1971; Mbithi, 1972; Mbugua et al, 1975a, 1975b, 1975c; Von Pischke, 1974). However, tendencies of "conservatism" by small-holder cultivators still persist despite government encouragement. At another level, most studies on agricultural change and development in Kenya or East Africa have been centred on the introduction of new farming practices especially cash-crop production (Allan, 1965; de wilde, 1967; Heyer et al, 1976; International Labour Organization, 1970; Knight, 1975; Vincent, 1971) but in most cases reference has been on Large-scale production systems or even state enterprises.

In Small-scale production systems, uneven change could be attributed to various circumstances, both known and unknown. In Kenya, the issue is not a recent one but dates back to the colonial period and the period immediately after independence when the government tried various sorts of reforms to see Small-holder farmers adhere to modern standards of agriculture (Kenya Colony and Protectorate, 1945; Mitchel, 1946; Swynerton, 1954). According to Migot-Adhola (1984), attention was initially confined to areas of

high potential land on the fringes of the former White Highlands. The rest of the country, inhabited by the majority of the African population formed marginal land where no profitable export crops were adopted. Agriculture in these areas continued to stagnate.

In Bungoma District, government development plans look quite impressive. For instance, the Bungoma District Development Plans for the periods 1979/83, 1984/88 and 1989/93 emphasize the major development potential as existing in the small-holder production, mainly in small-scale mixed farming (Government of Kenya, 1980, 1983, 1988). Although government reports indicate drastic improvements following each plan period, intensive assessment gives negative results. For instance, following the 1979/83 Development Plan, Kituyi (1991) noted that government targets were never met. A wide gap existed between government projections and the actual "peasant" performance.

As far as Webuye Division is concerned, no systematic study has been done pertaining to socio-cultural change within the frame work of agricultural transformation except from general perspectives such as religious innovation and social change (de Wolf, 1977), agricultural innovation (Misiko, 1976) and Peasant security relative to economic production (Kituyi, 1991). The same applies to most of the studies covering most parts of Western Kenya (Allan,

1971; Garst, 1972; Hanraham, 1973; Hay and Heyer, 1972; Leonard, 1972a, 1972b; Leonard, et al, 1971; Mbulika, 1971, Moock, 1971; Ogutu, 1985; Thurman, 1968; Uchendu and Anthony, 1975; Weisel, 1974). In the present study, the investigator aimed at looking at agricultural change from a socio-cultural perspective through indepth understanding of the major internal dynamics operative in the community in question relative to external influences. This was based on the application of a definite anthropological theory. Accordingly, the central research problem was to study the major aspects of social and technological change in a community of subsistence farmers. Emphasis was placed upon farmers' adoption of agricultural innovations by means of identifying the forces that lead Small-scale farmers to shift from the traditional to the modern techniques of crop husbandry. Some of the questions posed by Todaro (1982:221) were adopted as investigative guidelines for the study: How are traditional low productivity subsistence farms transformed into high productivity commercial enterprises?, Do traditional small-scale farmers stubbornly resist change or they act rationally within the context of their particular environment? Are there economic and social incentives which are sufficient to elicit output increases among small-holder cultivators? An attempt to answer these questions was conceived as a predictive solution to the research problem.

1.3 Objectives of the Study

In order to meet the demands of the formulated problem, the investigator had the following objectives in mind:

1. To search for an explanation of rural socio-economic change in terms of the values and attitudes held by the farming population.
2. To identify and document major aspects of agricultural transformation in relation to technology and social organization.
3. To trace the motives for and the deterrents against, agricultural transformation in rural areas in general and in Webuye Division in particular.
4. Finally, by way of inference, to determine the extent to which the old and the new, tradition and modernity, merge or co-exist in present-day agricultural production practices.

1.4 Rationale for the Study

The study was conceived as basic social science research concerned with advancing the state of knowledge within the field of Applied Anthropology and related social science disciplines. In this perspective, the study is justified on the following grounds:

1. It is hoped, the study will provide systematic data and information on the emergence and subsequent fluorescence of new economic and social institutions.
2. The study will contribute to available information and knowledge of rural Kenya in the domain of agricultural development.
3. The findings of the study may be used as a predictor of the probable results of various courses of action aimed at raising the living standards of rural communities.
4. Agricultural development is a systems process which requires a variety of talents. It is anticipated that the study will contribute to the general interdisciplinary studies to an understanding of the dynamics of cultural change.
5. The study may assist in evaluating the effectiveness of attempts to modernize traditional communities.

In general terms the study was geared to the needs of policy makers who may want to know about development trends, the nature of particular social and economic problems, and the effectiveness of government programmes. It may also benefit development planners, change agents, non-governmental organizations, international donors, and other groups who are concerned with the interests of the community in question in case they seek to affect or reach it. Finally, the study may have instructional benefits to researchers and students in the investigator's own or related fields.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL ORIENTATIONS

Traditional agriculture differs from modern agriculture in terms of both the types of crops grown and the methods of production, although in certain cases they tend to overlap. In this respect, literature was reviewed under three broad subheadings. First, there was need to look briefly at the nature of traditional agriculture as it exists or existed in different societies (technology and general production practices). Second, transformation is discussed as an aspect of modernization of agriculture which involves socio-cultural or structural change, with examples drawn from various societies. Finally, there are certain prerequisites to agrarian change which include extension services and other supportive institutions.

2.1 The Nature of Traditional Agriculture

Most authors tend to agree on the nature and organization of traditional agriculture worldwide (Boserup, 1965; Forde, 1963; Johnston and Kilby,

1975; Malassis, 1975; Sahlins, 1974).

According to Todaro (1982) agriculture in a traditional society is taken as a way of life and not an occupation or a source of income. Farmers are much more attached to their land and much of their time is devoted to its cultivation. Such farmers are concerned most with survival so that subsistence is more cherished. The family is the basic unit of production. Family needs are minimal and are made by tilling a small piece of land. The selling of labour to commercial agricultural enterprises is prevalent. In such societies, profits are not preconceived goals and the farming techniques are scaled to one's level of disposable capital, human and animal power rather than mechanized equipment. For the traditional farmer, excrement and traditional crops and seeds are employed rather than chemical fertilizers or experimental cultivations. Fragmentation and subdivision of land so that many people are overcrowded on very little land is another common feature. In short, therefore, the characteristics of most non-western agricultural systems include laying importance on subsistence farming, as the base for the

village economy; and the rights of each family (both nuclear and extended) in a village to have access to land. Accordingly, the basic variable input in African agriculture is farm family and village labour (Todaro, 1982: 226-31).

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Traditional economies have been described as village communities. Their typical characteristics are such that:

...not only is there a large share of self-produced consumption goods, but the tools of production and intermediate inputs such as feed, seed, and fertilizer also originate on the farmstead or in the village. The knowledge applied in farming and crafts is largely the result of local experience accumulated over generations. And the social institutions which define the scope of cooperative efforts in production and extent of economic horizons center around local kinship networks (Johnston and Kilby, 1975:3).

According to Johnston and Kilby (1975) three characteristics are common to all traditional economies. In the first place the proportion of the population devoted to farming and the rural economy is high. Secondly, the productivity of rural labourforce is low. Finally,

diets are heavily weighed towards less-preferred starchy staples. In addition to these characteristics, kinship reciprocity is a central organizing principle in the social structure of small-scale village communities. The virtues of the kinship network in providing security to even the poorest members of the village are closely linked to its disposition to inhibit change, whether such change is beneficial or not.

Malassis (1975:50) observes that primary traditional agricultural societies display some variety, but their key feature is obviously that they are agricultural. Their main economic activity is being concerned with satisfying food requirements. These societies are relatively closed and are therefore characterized by processes that are directed towards supplying their own wants, building their own amenities and consuming what they themselves produce. In effect, these societies ensure that the production process is continued by setting aside seeds and seedlings from harvests and by providing their means of production from their

own resources. The basic social unit is responsible for all production activities. Trade is slight or non-existent and agriculture is essentially of the subsistence type.

Traditional agriculture is based on biological energy (human or animal). Because production largely depends on the number of workers, the extension of agriculture depends on population growth. It has also been found that traditional economies are capable of change but the process is slow - young people owe most of their knowledge and skills to their elders.

Traditional agriculture has also been studied from the perspective of the dynamics of land utilization and with respect to the degree of intensity. For instance, Boserup (1965) made a classification of five land use types. These are identified as forest-fallow cultivation; bush-fallow cultivation; short-fallow cultivation; annual-cropping and multi-cropping.

The complexity of the characteristics of

traditional agriculture is further explored by Klaus (1976) in his study of a Malinese society. These characteristics include: a pre-capitalist type of exploitation and dependency along social and economic relations; common ownership of land and the means of production; the existence of a higher level of productive forces; a greater division of labour; surplus production and exploitation of foreign labour. However, there is not enough surplus for a nuclear family to become self-sufficient. This makes economic independence impossible. The economic and social basis for the society arising out of the existing productive forces is the village community. And, the economic basis for the system of social relations is "a short-handed hoe used for extensive slash-and-burn agriculture". When productive forces are low, collective subsistence is guaranteed by the community. The purpose of the labour is to ensure the subsistence of the community and its members, that is, to create products for use and not for exchange. The traditional community is a closed system of relations which lacks the driving power for the development of the production forces and changes in its social and economic conditions

because of lack of contact to a larger local market. Thus, the traditional agricultural community is dominated by the extended family which communally owns all the tools necessary for the subsistence of the community and its members, as well as the products so created. Therefore, the traditional agricultural community is a system of social relations of cooperation and solidarity based on communal ownership of the land with specific organization of the division of labour. The village head plays a decisive role to keep this system functioning (Klaus, 1976:54-7). Fallers (1961), Mbithi (1974) and Redfield (1956) adequately discuss the observations made in the preceding literature. According to Fallers, the peasant householder has a multiplicity of roles: as enterprise manager; as kinsman in a blood tie network; and as neighbour. Neighbourhoods influence greatly a householder's social life, such as through communal labour, reciprocal group work and feasts. Finally, a householder is part and parcel of a cultural system which requires him to meet certain obligations. As for Redfield, traditionalists control and cultivate their land for subsistence as part

of their way of life.

Mbithi (1974), in describing the social structure of agriculture in Kenya, notes that farming is a way of life, a cultural activity, as well as an economic activity. The community relates to the household and to the individual in multidimensional ways. The householder lives in a community with complex group systems such as lineage groups, age-set groups, and religious and ritual groups. The community is a means of denoting legitimacy in associations (Mbithi, 1974:11). For a peasant the basic production and consumption unit is the family. Production activities are integrated into the cultural values, beliefs and sanction Mechanisms of the society. And, although farming is on a smaller scale, surplus production is encouraged for purposes of exchange. Labour is determined by family size; it is allocated on the criterion of age and sex, and is open to exappropriation by the community. Labour is demanded in the form of peaks and troughs according to the agricultural calendar. At peak periods labour demand exceeds family labour supply. Finally,

activities are endless, monotonous, unspecialized, and there exist low returns to labour for unit time (Mbiti, 1974:73).

Several ethnographic examples may be cited in relation to traditional agricultural systems albeit quite marginal when compared to the case examples enumerated above. Hata (1973) discusses a typical traditional type of agricultural production in Cameroon, in the Dourou area. The cultivated fields are categorized as bushfield, yamfield and tobacco field. There is cultivation of seventeen different rotate crops and running two kinds of swidden fields with different combinations of the crops and planting pattern of different nature each year. Dourou agriculture is described as transitional.

Among the Tongwe of Tanzania, different crops are grown in small quantities. The main feature of agriculture is shifting cultivation with maize and cassava as primary crops (Kakeya, 1976). Crops are grown for traditional liking, for social, and for ritual factors. Forde

(1963) has documented major cultivated plants and the development of agriculture in the tropical forest regions. These include: root crops (yams, sweet potato, manioc and taro); tropical fruits (Coconut, breadfruit, and banana); and the cereals (wheat and barley, rye and oats, millets and maize). In addition, cultivation tools are identified as comprising mainly the digging stick, the hoe and the plough (Forde, 1963:411-40). As case examples, Forde describes the application of these systems among the Boro of the Western Amazon forest, the Yomba and Boloki hoe cultivators of the African forests, the Hopi and Yuma flood farmers in the North American desert, the Oceanians and the Coshin of the Malabar coast.

The works of Schneider (1966) among the Turu of Tanzania, Netting (1965) on the Kofyar of Northern Nigeria, Palmeri (1979) in a Niger village, and Slattery (1979) in Mysore State, India, equally give us a clear picture of the nature of traditional agriculture. The same has also been observed by Dove (1984), Huang (1984) and McGough (1984).

It is common understanding that traditional agricultural organization exists in different forms in different traditional societies. Malassis (1975) has identified four major forms of socio-economic organization of agriculture: customary; feudal or semi-feudal; peasant; and capitalistic or semi-capitalistic (Malassis, 1975:64-5).

Forms of customary organizations are initiated and perpetuated by tradition. A set of rules and patterns of behaviour govern the life of the group, land tenure, cultivation and labour conditions. Feudal or semi-feudal agriculture is characterized by the dominance which the owner of the means of production exercises over the slaves so that their activities and their subsistence depends principally on the owner. In peasant agriculture, the initiative for production is left to the individual but where dominance exists, it is not exercised by direct subordination of the worker but by the market situation in regard to land, production factors and agricultural products. Capitalistic or semi-capitalistic agriculture is

characterized by specific production relations between the owners of the means of production and the wage-earners, who sell their labour on a market.

Of the four forms of agricultural organization, customary organization is prevalent in most East African Societies. The existence of capitalistic forms is a product of Western influence in these societies. Webuye Division, like other parts of Bungoma District exhibits these traditional tendencies. As far back as the nineteenth century, Hobley (1897:178) noted that the people of Bungoma District were agriculturalists. Nasimiyu (1985a: 51 - 64) notes that at the end of the nineteenth Century, Bungoma people were able to grow a variety of food crops due to the high fertility of soil, reliable rainfall and abundant land. Agriculture and animal husbandry were the main economic activities. Land was mainly used for growing subsistence crops. The main crops were eleusine, sorghum, green-grams, simsim, banana, groundnuts, peanuts, sweet potatoes, tobacco and vegetables. Due to the availability of

large tracts of land both shifting cultivation and crop rotation were practised (Nasimiyu, 1985a:56-7). Labour was mainly available from children and family members, especially the women. The high labour demands accounted for polygamous marriages in the community. Both Nasimiyu (1985a) and Wagner (1939) show that the division of labour was based on sex and age. Women and men had each, specific tasks to carry out, but women did most of the farm work. While men did the clearing of virgin land, women did the digging, planting, harvesting and storing (Wagner 1939:38-9). Division of labour was an outcome of traditional norms in both domestic and public production. Labour was also communal; the neighbourhood worked together on individual plots in turns. This was more active during peak periods, hence households did not exist in isolation.

The tools, mainly for digging and weeding, included wooden hoes and animal bones. Iron hoes were only used at a later period and these

brought important changes in traditional agriculture, that is, production became more advanced.

Exchange was mainly by barter. The produce was directly exchanged with other commodities from neighbouring groups. The produce, especially grain, was stored and measured in granaries or baskets (Nasimiyu, 1985a:63).

In the twentieth century, traditional agriculture in Bungoma District seems to have retained the same characteristics but with some modifications (Nasimiyu, 1985b:56-73). For instance, in the realm of exchange, Wagner (1956:161-2) noted:

Intensive informal hospitality exists among neighbours. Exchanges of balanced sort are principally in durables, with craftsmen, but the rates most favour neighbour-clasmen; are higher for the clansman who is not a neighbour but most dear for strangers.

At present the traditional crops in Webuye Division, and in Bungoma District in general, remain finger-millet, sorghum, cassava, sweet potatoes, bananas and other indigenous

crops. These are the main staple food crops in addition to maize which was introduced in 1910 by the colonialists (Wandera, 1990). A number of cash crops, mainly coffee, sugar cane, and sunflower are also grown. In addition, horticultural crops are also to be found. Land is a central resource for people's livelihood. Each family provides its own agricultural labour-planting, weeding and harvesting. Cooperative labour is mainly for heavy work and is provided by friends and relatives in turns. Storage means for harvests include granaries and baskets. Sale of produce is mainly by means of exchange with other communities. Western scholars studying non-western agricultural economies have emphasized underproduction as being rooted in production organization based on domestic groups and kinship relations. Among the "dimensions" cited for this state of affairs are, underuse of resources, underuse of labour power, and household failure, that is, domestic groups persistently fail to produce their own livelihood, although organized to do so (Sahlins, 1974:41-74). Whether this is true at present

or not, is a matter of investigation. For now, it only suffices to conclude this discussion with a brief examination of the social organization of the people of Webuye Division.

Two aspects of social organization exist; the traditional or (informal) and the new form of social organization (formal) which is a result of contact with foreigners, mainly the non-Africans. Both forms of social organization, however, overlap (Omoka, 1990). Three components of social organization are common - a system of norms regulating the behaviour of the members, a system of sanction that maintains social control, and a system of hierarchy which defines members' roles. This classification is, however, not exhaustive.

In Webuye, there exist both the nuclear and the extended forms of the family. Exogamy is characteristic of the nuclear family while the institutionalized rule of residence is patrilocal. Most domestic groups are polygamous but this is seen as merely a means of exerting social dominance (Omoka, 1990:171). The large

extended family is aimed at sharing the various economic and social responsibilities, that is, maintenance of the extended family household. It is meant to socialize the young, allocate and distribute goods, and to organize work. It is more important than the nuclear family units. The ext-ended family also operates by means of kinship link in the female line but the patrilocal extended family is the most common form of the extended family in Bungoma District as a whole.

2.2 Agrarian Transformation and Socio-Cultural Change

This entails transition from "traditionalism" to "modernity". When modernization of agriculture takes place, old practices are abandoned in favour of the new and more viable practices. Thus, changes in agriculture create economic development. In fact agriculture and economic development are inseparable. These changes bring with them changes in social structure and organization. Development, therefore, has to start in rural areas if it has to take place, particularly in the agricultural sector. According to Todaro (1982), "the core problems of widespread poverty, growing inequality, rapid population growth and the rising unemployment, all find their origins in the stagnation and often retrogression of economic life in rural areas.

Changes in traditional agriculture have come about either directly or indirectly, as a result of European influence. Several processes have been the main agents of change but the major ones have been the introduction of new forms of socio-economic organization, mostly based on private ownership, and the development of commercial agriculture. Another variable has been an inclination towards specialization (Johnston and Kilby, 1975:34; Malassis, 1975:64).

The main aspects of agricultural change and development have been technological and socio-economic. The pillars of technological change, the Green Revolution, have been plant selection and the creation of new high-yield varieties, fertilizer technology, pest control and storage and preservation. Socio-economic changes include land reforms, adapting the structure of production units, training and information of farmers, the organization of markets and the intervention of government institutions and services in development (Malassis, 1975;197 - 8, 201 - 19).

It follows that economic growth begins only in agricultural societies, the transition being a gradual one. This is a school of thought which emerged in the 1960s through the 1970s after realizing that problems facing smallholder farmers led to agricultural stagnation.

This led to a new model of development that attracted the attention of planners and project designers who abandoned the "industry-led, capital resource strategy" which dominated development theory in the 1940s and 1950s. The new model emerged from studies by political economists such as Hunter (1967), Johnston and Kilby (1975), Johnston and Mellor (1961), Mellor (1966), Myrdal (1966) and Owens and Shaw (1972). Thus, in the 1960s it was clear that industrial development would not lead most rural-based developing countries toward rapid economic growth. This was due to competition of industries in international trade, limited domestic markets due to overall poverty, lack of expansion of industries, few urban jobs, lack of economic opportunity, population growth and land pressure. By early 1970s more emphasis was being placed on rural development efforts and the possibilities of providing additional food and improving the income levels of rural inhabitants consequently helping to generate increased demand for industrial products.

The new theoretical focus on increasing agricultural output and improving income distribution in the rural sector may be the only effective way to get their economies moving. Productivity can be improved by use of

high yielding varieties of seed, application of fertilizer and good farming practices, and the development of intermediate or appropriate technologies to complement labour. However, a number of critical factors constrain production by smallscale farmers. These include hostile climates, poor soils, rapid population growth, limited market opportunities, and lack of commitment to rural development by national governments. Implementation of smallfarm programmes requires land reform in order to reach growth and equity goals.

The economic state of a society is closely related to its political as well as its social state. Forces that bring change in one also bring some change in the others. Therefore to explain change we must take into account economic as well as non-economic aspects of behaviour. For example, a society whose technology is unchanging, is unchanging in other elements of its culture as well. Hagen (1964:20-35) observed that lack of consistent progress in techniques is a characteristic of all traditional societies. To him creativity or innovation is a requisite for change. Thus

innovation is the essence of technological progress without which progress would stop. But understanding change is also a very complex phenomenon. Kroeber (1969) notes that although culture can be understood primarily in terms of cultural factors, no culture is wholly intelligible without **reference** to the non-cultural or environmental factors with which it is in relation. As an example, he uses six American states forming a belt from Ohio to Nebraska. These states produce almost half the world's maize crop. Initially the Indians in this region farmed maize but with less intensity compared to other regions. Their population also remained very low. Kroeber notes that:

The difference is not in the plant, nor fundamentally in methods of farming it. It is factors extrinsic to the cultivation itself which have changed an area of below-average maize-growing into one of most successful specialization. These factors are cultural: domesticated animals, economic demand and distribution facilities, methods of transportation, improved machinery. The natural environment remained the same (Kroeber, 1969:350).

It follows that maize farming, like other subsistence and economic activities, and cultural activities, is conditioned by natural factors such as climate, soil and drainage. In this situation, the interactions of culture and environment become exceedingly complex such that generalization becomes unprofitable. In each situation or area, different natural factors are likely to be impinging on culture with different intensity.

Certainly development as a product of transformation or change is related to modernization. According to Chi-yuen wu (1977:2), "Development is a process of societal transformation from a traditional society to a modern society. Transformation is also known as modernization". Long (1977:13) makes a discussion, in broad terms, on modernization and social transformation occurring in rural populations in the Third World. The initial impetus to modernization is the result of the impact of external forces such as colonial expansion and the spread of technical innovations or cultural movements.

As for Moore (1963:89) modernization is total transformation of a traditional society into an advanced or modern, typical of the Western World. Eisenstadt (1966, 1970) sees modernization process as taking off from different types of society but varies in the extent to which they have the resources and abilities necessary for modernization (Eisenstadt 1970:25). He defines modernization as:

the process of change towards those types of social, economic, and political systems that have developed in western Europe and North America from the seventeenth century to the nineteenth and have then spread to other European countries and in the nineteenth and twentieth centuries to the South American, Asian and African countries (Eisenstadt, 1966:1).

Weiner (1966) equates modernization to economic growth or westernization, while Rogers (1969:14) conceptualizes the term as "... the process by which individuals change from a traditional way of life to a more complex, technologically advanced and rapidly changing style of life".

Apart from the above definitions some

scholars have only tried to distinguish between a "modern" and a "traditional" society by way of description. Smelser (1963) observed that a developed society is a highly differentiated one and an underdeveloped society is lacking in differentiation. The same views are expressed by Hoselitz (1960) who says that change from a traditional society entails the modification or elimination of traditional "pattern variables". Accordingly, modernization is the structural shift from functionally diffuse economic roles to functionally specific roles. Eisenstadt (1966:49) shows that modernization can only be ascertained if the society develops a certain degree of structural flexibility whereby it becomes capable of dealing with new changing problems and of absorbing within its central institutional sphere, new social groups and strata with their problems and demands. According to Dalton (1971:29) the structure of a traditional village society is undermined by replacement of its traditional functions by superior economic and technological alternatives. For Johnston and Kilby (1975:52) social change leads to greater differentiation of social roles and institutions

and the emergence of new mechanisms of social integration. Redfield (1956) noted that rural systems are "part societies" which increasingly become dependent upon the wider system as modernization is stepped up.

On the Kenyan scene, Nyangira notes that:

... modernization is the process whereby institutions are adapted for the purpose of creating modernity. The adaptation is characterized by growth, differentiation, integration, specialization and complexity in the structures of the social system. Modernity, on the other hand, may be measured by indices on urbanization, per capita income, education, communication, transportation, etc. Levels of the modernization process and modernity co-vary. In other words where there is high level of modernity, there is high level of modernization (Nyangira, 1975:1-2).

The same views have been expressed by Long (1977:13). Nyangira further shows that economic growth is a major prerequisite to modernization and the relationship between modernization and social organization is change in the role structure.

From the examples given here and many others not cited, it is evident that the concept of modernization is multidimensional in nature. Most researchers often point out certain

core features such as industrialization, commercialization, and urbanization as taking relatively similar forms, in different parts of the world. Modernization is also perceived as an external and largely uncontrollable force. A weakness in most of the studies is in using evolutionary models in drafting modernisation theories. Rogers (1969) has vividly pointed out several misconceptions about modernization:

1. Modernization is not necessarily synonymous with "Europeanization" or "Westernization". It is a synthesis of old and new ways and varies in different environments.
2. Modernization is not necessarily good. It brings a mix of constructive and destructive effects depending on the situation and on the perspective of the observer.
3. The process is not unidimensional and therefore cannot be measured by a single criterion or index (Rogers, 1969:14-5).

Leslie (1974) has also pointed out that many modernization theorists tend to look at "modern" and "tradition" as opposed variables, a conception he strongly disagrees with. For instance, he says:

... modernity has developed its own traditions. Artists and scientists build upon the modernity of their forebears, and generations of men and women have transmitted more or less modern cultures to their children. Rather than assuming that tradition and modernity are categorical opposites, as those who study modernization processes sometimes do, we should try to understand the traditional dimensions of modernization (Leslie, 1974:70).

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Further, he stresses that modernity is not traditionless and that although it favours social and cultural change, it is selectively and not categorically opposed to institutions and modes of thought handed down from the past. The same sentiments are expressed by Ogionwo (1969).

How do traditional farmers change their agricultural practices and make improvements? Todaro (1982) outlines three major stages in the "evolution" of agricultural production.

First, is the pure, low-productivity subsistence farming. Secondly there is transition to mixed and diversified farming. Finally, comes specialization (modern commercial farming) which is an advanced stage of individual holding in a mixed market economy. He observes that, "... under proper conditions small farmers are responsive to incentives and opportunities and will make radical changes in what and how they produce" (Todaro 1982:237). Lack of innovation in agriculture is not due to poor motivation or fear of change but a result of inadequate or unprofitable opportunities. And, according to Klaus (1976), effective utilization of African agricultural resources for economic and social development, and political mobilisation is hindered by a number of obstacles, chiefly technical and economic. The level of productive forces is very low and the producers concentrate too much on subsistence production. The solution is to develop productive forces, increase labour productivity, overcome the subsistence economy and diversify the structure of production (Klaus, 1976:17-8).

Lippitt (1958) identifies three kinds of forces in human behavioural change. Firstly, there is motivation force which creates dissatisfaction with the status quo. Secondly, resistance forces motivate people not to change. Finally, interference forces obstruct change without being directly related to it. Leagans (1963) observed that changes that are important to people are those which help them meet their needs for biological, economic, social, aesthetic or moral well being. Misiko (1976) suggests that many theories can be used to explain the behavioural change in farmers. For him, farmers will not resist innovations if the incentives perceived by them were strengthened while the perceived disincentives were weakened or removed. He concludes that farmers are aware of the need for innovations but do not change due to immediate physical, economic and biological environmental constraints. The socio-economic status of farmers is considered to be of crucial importance. This point has also been observed by Hunt (1975) in relation to the adoption of cash crops. The socio-economic aspects here

include education, occupation and landholding. A man, for example, who has had access to formal education is more likely to be in salaried employment which enables him to acquire adequate land, either by clan distribution or by personal purchase. With his regular income, he will be in a strong position to selectively exploit cash crops to his advantage. Therefore only the relatively wealthy farmers have the resources to accept innovations. In her correlation of wealth with the adoption of innovations, Hunt concludes that innovators are overwhelmingly the wealthy farmers. The main source of wealth is salary. Most poor farmers are unwilling and unable to risk. The best farmers include a high proportion of school teachers, agricultural assistants, chiefs and assistant chiefs and others who receive a regular salary. The salary enables the recipient to farm on a large scale, to hire labourers and to afford the necessary inputs and tools. Similarly, Brokensha and Riley (1980) note that cash crops cannot be separated from such factors as education, occupation and land ownership, all of which lead to a dramatically increasing social

stratification. Individual land ownership is likely to lead to more careful use of land as well as to more intensive use (Brokensha and Riley, 1980:268).

In studying the process of agricultural change in Kisii District, Kenya, Uchendu and Anthony (1975) noticed that progressive farmers were characterized by management ability, access to resources of land, labour and capital, formal education, and experiences gained from outside contact. To them the characteristics of the innovation matter a lot. For instance, the lower the risk, the more the innovation is acceptable. Other factors to be considered are economic opportunities, access roads and the ecology. Studying in the same area, Garst (1972) maintained that the profitability of innovations attracts the farmers, while price decline or uncertainty of market is a deterrent. Another incentive is larger nectareage of land. The compatibility or adaptability of the innovation also ensures faster adoption. Finally, in the same line, Vail (1972) noted that stimulus forces external to a culture can

encourage smallholder agricultural transformation if there is proper planning and policy-making.

It seems that technology alone cannot solve social problems but instead, tends to increase them. According to Mbithi (1974) the rejection of an important technical package is a rejection of its social implications. For example, the introduction of the tractor introduces unusual labour problems and may lead to shifts in the traditional sexual division of labour. The new technology is seen as a constraint to the normal healthy social relations. Ember and Ember (1973:518) emphasize that in determining the overall benefits of planned change, it is important to understand some of the basic aspects of a society's culture which are likely to be influenced by such programmes. In other words, the richness of local perceptions (indigenous knowledge) need to be taken into account in any development planning since development is culture specific. A number of examples on this issue are worth noting.

Norman (1977) finds that an understanding of present processes and decision behaviour in traditional agriculture is crucial in determining the relevant practicality and potential success of proposed changes and innovations in agriculture. Barker, Oguntoyinbo and Richards (1977) show that farmers are able to provide lucid and concise information on environmental difficulties. This information is a rational assessment of real difficulties. According to the National Academy of Sciences (1977) the perceptions of people who affect farming systems are important factors to consider. Traditional farmers have developed great skills in agriculture and animal husbandry over the centuries within the bounds of the technologies available to them. Therefore the approach to increasing their production must begin with understanding what traditional farmers do, why they do it and the results that they provide. As for Silberfein (1977) the combination of information and techniques is expected to maximize production and minimize risk at predetermined work levels. But improved practices cannot be superimposed from the top-

down nor should they be based primarily on capital intensive methods. The improvement of crop yields should be structured within the context of the existing agricultural patterns, building upon the farmers' accumulated knowledge and perception of the factor of risk.

Why do many officials ignore local perceptions and knowledge? The answer is provided by Brokensha and Riley (1980) that:

This applies to most agents of change-colonial and post colonial, Kenyans and foreigners. One basic reason is that all are trained in western scientific institutions, which either ignore traditional ideas as irrelevant or treat them as obstacles to be overcome.... In some cases the problem is compounded by a personal racial (or antipeasant?) bias; but the main cause is the emphasis on scientific solutions when tradition is often wrongly perceived as antithetical to true science (Brokensha and Riley, 1980:265)

A good local example is in Nyanza province, Kenya. Anyang'-Nyong'o (1981:108-20) noted that the result of land consolidation and the development of the sugar industry has affected food crop production. In the first place, sugarcane is being grown in farm plots where food crops were previously grown outside the

sugar belt. Secondly the long "gestation" period for sugar cane affected the possibilities of shifting cultivation within the cultivated land - the only way to maintain land productivity at a given level. This way, the trend in agricultural production is biased in favour of cash crops. An important consequence was the severe shortage of maize, wheat and milk during 1980 and 1981.

Views emphasizing the relationship between development and culture have also been expressed by Arensberg and Niehoff (1964), Foster (1962, 1969), Kituyi (1991), Niehoff (1966) and Paul (1955). General aspects of cultural transformation are also to be found in the works of Steward (1972) and Mead (1975).

Apart from distant influences, change in a community may also result from new elements brought in by the surrounding or neighbouring communities. Fukui (1969), working among the agrico-pastoral Iraqw of Tanzania, found that the spread of cash crops

resulted from British rule, the need for money, and government advice, but the Bantu settlement in the area had the greatest effect, although financial rationalization was overcoming traditional customs which had been surpassing it.

In evaluating crop development in Migori/Kihancha, Mbugua, et al (1975a) found that labour is the main constrain on crop production. They found that labour could be made more productive by using ox-drawn equipment or tractors but the former was emphasized because the latter tend to be too expensive for many smallscale farmers. In line with this, Skinner (1960) looked at labour migration as an outstanding feature in most contemporary African societies for it is the cause as well as the **result of important social** and cultural changes. But excessive migration curtails production. This is more so where the farming population migrates to urban areas.

On general agricultural change, Apthorpe (1979), Belshaw (1968), Camino (1979), Hellbom

(1979), Mafeje (1979), Mkrtumian (1979), Palmer (1979), Preston (1968), Sarkany (1979), Schultz (1964), Skalnik (1979), Slattery (1979), Stahl (1979) and Tadros (1979), have used different orientations but the characteristics of change tend to be similar.

In Webuye Division, the transition of agriculture from traditional forms to modern forms can also be viewed as having gone through gradual phases but with no clear dividing points. In the division as elsewhere in the district, new crops were introduced in the colonial period. In 1910 maize, beans, groundnuts, sim sim and cotton were introduced into Bungoma District. Rice, green grams, onions, cabbage, tomatoes and carrots were introduced before 1920. The farmers, however, relied mostly on traditional methods of farming, using traditional hoes. Ox-drawn ploughs were introduced between 1910 and 1912, but by the end of the First World War, they were being used by few people, mostly the chiefs. The increased use of the ox-drawn plough, maize growing and the use of livestock manure are

developments that took place in the 1930s through the 1940s. Modern agriculture gained root in the 1950s characterized by proper land preparation, weed control, crop diversification, early planting, coffee husbandry, and the planting of napier and other kinds of animal fodder (Wandera, 1990). At present various food crops, horticultural crops and cash crops are grown in different combinations by farmers in Webuye Division.

2.3 Supportive Institutions in Agrarian Change

Transformation of traditional agriculture cannot take place in a vacuum, that is, within the communities in question by their own initiative alone. Some influence from above must be exerted upon the traditional farmer to make him realize the need for change. Change itself is not easy especially in the extreme traditional societies. The traditional farmer has to be moulded to develop that inner drive for change. In other words, striving for a better life, the will to get out must be born. Brokensha and Riley (1980:259-62) have made an exploration of the major constraints on

increasing agricultural production. These are summarized as follows:

1. Environmental:
 - (a) uncertain rainfall and poor soils
 - (b) pests

2. Farmers' organization of agriculture:
 - (a) inadequate labour.
 - (b) lack of land.
 - (c) lack of capital.

3. Government/managerial:
 - (a) ineffectiveness of extension services.
 - (b) disorganization of agricultural departments
 - (c) frequent transfer of officers
 - (d) too much emphasis on inappropriate crops
 - (e) lack of study of optimal planting time and methods

4. Technical:

unavailability of inputs (seeds, fertilizer, insecticide, equipment,

etc) at the right place and time.

5. Infrastructure: poor communications and markets.

Although all these constraints may not be overcome at a **given** time, appropriate strategies and approaches may be executed so that they are at least minimized. The major opportunities for increasing agricultural production include the expansion of farm land and increasing crop yields through intensification. On the other hand, development-oriented agricultural productivity includes specialization and diversification, adoption of new enterprises and multiple cropping. These opportunities cannot be exploited without resort to certain strategies to get farmers moving. This involves the removal of impediments to production increase mainly natural disasters, unsatisfactory land-tenure systems, poor government administration, and customs and institutions prejudicial to development. This, therefore, calls for the need to create incentives or motivation on the part of the producers in order to develop their

desired will. Most authors in one way or the other emphasize one or more of the following mechanisms: extension services, cooperatives, field demonstrations, regular meetings by farmers, market and price incentives, transportation networks, credit and farmer training. Related to these, Yang (1969:29-59) identifies several approaches to speeding up agricultural development:

1. Research and experimentation.
2. Education and training.
3. Influencing costs and income (reduction of farm costs, price and income supports, and evaluation of cost controlling and price subsidization policies).
4. Credit, capital and savings.
5. Structural and intersectoral development (rural employment and productivity, and farm mechanization and organization and planning).

Such mechanisms tend to create some awareness or at least to change their attitudes in one way or the other. Other authors mention government policy. In general terms the major

supportive institutions for agricultural change are: land tenure institutions (Dorner, 1971); market institutions, both factor, and product markets (Witt, 1971); planning institutions (Martin, 1971); research institutions (Ruttan, 1971); extension institutions (McDermmot, 1971); agricultural credit institutions (Jones, 1971), and rural governing institutions (Luykx, 1971). With experience of a Malinese Society, Klaus (1976: 76) noticed that "modernizing agriculture meant equipping the peasants with ploughs, ox-carts, simple sowing and spraying instruments, selected seed and fertilizer..." but, at the same time, he found that it is impossible to change traditional agriculture through material support, training and education alone, without changing socio-economic relations and taking into account a number of secondary factors. This, then, indicates that change in itself is a very complex phenomenon. Certain socio-economic relations tend to inhibit social progress and preserve the traditional community which passively resists any economic innovations.

Socially conditioned attitudes sometimes contradict the interests of the producer. For those who conform to the system, any extension of production is useless. The social system of which an individual is a part may lack an inner driving force to develop the productive forces. The individual's consciousness is adapted to this so that any changes appear strange. Thus the economic and social system may cause a lack of initiative and become a decisive obstacle for the development of production and the productive forces. Klaus, further, observes that an individual deeply integrated into the extended family has no subjective interest in extended production or the application of modern methods of production. The "elders" are seen as the major obstacles to change because they are the least accessible to innovations. For them, innovations are factors which disturb the whole system. However, it is also noted that these obstacles are not limited to the lack of initiative by the producers only but there is also the "balance of poverty" which compounds the situation. certain "seeds" may develop which can make the producer become conscious of

his objective interests and act accordingly. The spread of commodity-money relations, contact with the city, and the influence of the radio and the press, cause new types of needs to arise among the peasants, particularly among the youth and can lead to new attitudes towards increased production and developed productive forces. Therefore, it is possible to change the attitudes of the young producers to economic and social progress and introduce them to more effective modern production, through consciously created change. Pilotti (1979) refers to this as rural capacitation.

Accordingly, rural capacitation means "replacing the rudimentary and inefficient techniques with modern agricultural methods". This is technical education which includes mechanization, use of fertilizers, book-keeping and management. In short, it includes the elements and knowledge indispensable for the modernization of the agricultural sector. Technical capacitation is necessary in bringing about rational and efficient exploitation of the land, transforming agriculture into a dynamic sector whereby the per capita productivity can be augmented significantly and the producer will improve

his living conditions.

Todaro (1982:249) gives a summary of sources of small-scale agricultural progress as technical change and innovation, appropriate government economic policies, and social institutions. He further outlines conditions of general rural advancement as, modernising farm structures to meet rising food demands; creating an effective supporting system; and changing the rural environment to improve levels of living. New agricultural technologies and innovations in farm practices are prerequisites for improved output and productivity. These include the use of biological (hybrid seeds) and chemical (fertilizer, pesticides, and insecticides) methods. These are suitable for the small farmer in that they improve the quality of existing land and raise yields per unit of land. As to why smallholder producers remain backward, Todaro observes that the institutions and government policies that accompany new technical innovations too frequently serve the needs and vested interests of the wealthy landowner. This view is also expressed by Bhandari

(1973), Leonard (1972a, 1972b, 1973, Havelock (1971), Mbithi (1972) and Moris (1987) among others. This is mainly a problem of extension by government agricultural extension services. Bhandari points out the problems to be low numbers, poor education and insufficient trained extension workers. Leonard notes the poor training of extension workers, poor relationship between extension workers and their "bosses", poor organizational structure in the Ministry of Agriculture, and poor incentives to extension workers. Again, Leonard notes that the concentration on progressive farmers is achieved at the expense of the non-innovative ones. Mbithi and Moris converge in their observations that bureaucratic arrangements in government ministries, with steep vertical hierarchies, create a poor relationship between junior extension staff and the top officers. Thus the problems of extension range from poor training of extension workers, through the poor relationship between these change agents and their superiors, to poor contacts with farmers.

A close examination of a number of evaluative studies of some development programmes

in Kenya shows a variety of problems faced by the small rural producers. Mbugua, et al (1975a) in evaluating crop development in Migori, showed that farmers lacked motivation in the form of training, they were constrained by large increases in seed and fertilizer prices, and, generally, suffered from the inefficiency of government extension workers in teaching them the techniques for enriching the soil with locally available materials. In another study in Kapenguria, the same team (1975b) emphasized the provision of credit, extension service and farm demonstrations. Thus, in most evaluation programmes it appears that efforts at developing rural areas are welcomed but are channelled in the wrong direction (Alibaruho and Mbugua, 1975; Greene, 1975a, 1975b; Mbugua et al, 1975c; Von Pischke, 1974; and Wyeth et al, 1975). Therefore, extension agents have an influence depending on their degree and intensity of interaction with farmers (Misiko, 1976) as well as the medium of communication (Yadava, 1979).

Crop development, it seems, will be achieved successfully if certain services are made available to the small farmer. These include formation of cooperative societies, credit schemes, marketing arrangements, road networks and farm demonstrations, among others. Another factor is price incentives (de Wilde, 1980). But Heyer (1975) found that the switch to the better priced maize in some areas of Kenya led to the abandonment of the more nutritious and drought resistant sorghums and millets. This can be viewed as a disadvantage of the innovation. On any move to provide credit facilities to smallholders, Migot-Adholla (1984:214) shows that no impressive results in terms of improvement in the levels of agricultural output and productivity have been achieved. This is due to a number of reasons. Smallholders have not been fully exposed to extension workers and farm inputs appropriate to their level of husbandary and resource endowment. Most smallholder farmers largely depend on natural conditions for the growth and yields of their crops. Marketing co-operatives and boards are structures of colonial administration designed to promote large-farmer agriculture at the expense of smallholder agriculture. Finally, the small-holder is sub-ordinated to the vagaries

international commodity quotas and prices over which he has no control.

Jhingan (1975:35-6) also emphasizes a radical transformation of existing institutions, social attitudes and motivations. According to him, to increase agricultural output, radical changes have to be made in the form of land reforms, improved agricultural techniques and inputs, better marketing organization and new credit institutions. Therefore, integrated development objectives namely, improved levels of living, decreasing inequality in the distribution of rural incomes and the capacity of the rural sector to sustain and accelerate the pace of these improvements are a must. According to Chi-yuen Wu (1977), institutions and non-material culture (values, beliefs, customs and norms) should accompany the progress of material culture (technology) and social development should be taken as an integral part of modern development. These changes lead to the decay of traditional structures without being necessarily prejudicious. What causes the decay of traditional structures? The

following have been suggested:

1. The penetration of commodity-money relations into the village community whereby productive forces develop and market relations spread.
2. Growth of individualism because a producer can use the products of his field at will without coming into conflict with the norms of the extended family.
3. Cash crops are grown because they are sold in the market most easily for the highest profit.
4. The economic and non-economic factors undermine the social system of the extended family and finally destroy it through the immediate emancipation of the nuclear family

What suffices to say here, simply, is that change comes when an individual producer creates the new objective prerequisites and a driving force for the development of the productive forces and of production. He has a new relationship to his work and his product. The propensity with which this drive is developed is partly

developed by the producer's own initiative and partly by change agents by means of supportive institutions.

2.4 Hypotheses

As a result of the literature reviewed above, the following hypotheses were generated:

1. It is most likely that agricultural transformation is a consequence of modern socio-economic needs.
2. Agricultural transformation is most likely related to the farmers' social and demographic characteristics.
3. Conservatism on the part of individuals is an effect of limited factors of production.
4. The transformation of traditional agriculture tends to be influenced by changes in extended family relations.

2.4.1 Operational definitions of Variables

All the hypothesized variables were defined either as independent or dependent. For each hypothesis, it was assumed that a functional relationship exists between the

independent variable and the dependent variable. According to Suits (1963:80) "a variable Y is said to depend on or be a function of a variable X, whenever knowledge of the value of X enables us to predict the value of Y". It was also assumed that multivariate functional relationships also existed among the variables such that any dependent variable was subject to the influence of several independent variables.

2.4.1.1 Independent Variables

Socio-economic needs, the farmers' characteristics, factors of production and changes in extended family relations were operationalized as independent variables. Their indicators were defined as follows:

(a) Indicators of Socio-economic Needs

These were conceptualized as constraints or imbalances that impinge on individuals, a solution against which transformation becomes viable. They were identified as:

- (i) payment of school fees for children (education).

- (ii) the need to accumulate wealth,
- (iii) the need for surplus production,
- (iv) the need to minimize, or guard against starvation,
- (v) the need to purchase modern household items,
- (vi) the need to possess valuable tangible assets, e.g. motor vehicles;
- (vii) the need to diversify income,
- (viii) the need to gain access to modern market facilities,
- (ix) the need to elevate one's social status,
- (x) the need for the general well-being of the family.

(b) Farmer Characteristics

This variable was operationalized in terms of social and demographic attributes such as age, education and occupation. Ostensibly, young farmers were:

- (i) those below thirty-five years of age,

(ii) those who pay more attention to salaried employment or off-farm activities,

(iii) those who have few or no dependants,

Middle-aged farmers were conceptualized as:

(i) those between thirty-five and fifty years of age,

(ii) very enterprising (productive),

(iii) those who combine farm and non farm activities,

Old farmers were conceptualized as:

(i) those over fifty-five years of age,

(ii) dependent on their children,

(iii) those whose ability to enterprise is very low.

(c) Factors of Production

These were defined as the avenues

to successful fulfilment of the desired needs. They included:

- (i) adequate and potential land for farming,
- (ii) capital (finance) investment,
- (iii) labour availabilities,
- (iv) market availabilities,
- (v) machinery/tools;
- (vi) communication networks;
- (vii) extension services,
- (viii) co-operative effort,
- (ix) management and planning,

- (x) compatibility or adaptability of the innovations.

(d) Change in Extended Family Relations

The indicators included:

- (i) land demarcation within the extended family,

- (ii) independent nuclear families and households,
- (iii) co-operation by friendship and not through kinship ties,
- (iv) absence of reciprocal labour (workgroups),
- (v) infrequent contacts among relatives,
- (vi) individual decision-making,
- (vii) individual problem-solving,
- (viii) individual management and planning of farm activities,
- (ix) individual ownership of property.

2.4.1.2 Dependent Variables

Transformation or innovation and conservatism or non-innovation were conceptualized as dependent variables. Operationally, they are defined as follows:

(a) Transformation

The abandonment, by farmers, of the traditional methods of production and the subsequent adoption of novel techniques and practices. The following were conceptualized as indicators of innovativeness:

- (i) use of the ox-drawn plough or tractor,
- (ii) application of chemical fertilizers,
- (iii) use of hybrid seeds,
- (iv) Market-oriented production in addition to subsistence production,
- (v) accessibility to sources of credit or financial institutions,
- (vi) book-keeping,
- (vii) membership of co-operative societies,
- (viii) use of extension services,
- (ix) use of modern methods of storage and preservation of produce,

- (x) accessibility to farmer-education institutions,
- (xi) accessibility to modern marketing facilities,
- (xii) surplus production.

(c) Conservatism

Non-adoption of agricultural innovations or resistance to change, was conceptualized as conservatism. Resistance to incorporate new techniques and technology implies persistence of traditionalism. The following are the "fetters of tradition":

- (i) continuous use of the hoe and human power in land preparation,
- (ii) absolute reliance on animal/composite manure in production,
- (iii) use of non-hybrid seeds (local varieties),
- (iv) concentration on subsistence production,

- (v) absence of operational capital,
- (vi) lack of farm records,
- (vii) non-membership of co-operative societies,
- (viii) lack of knowledge of extension services,
- (x) non-attendance of farmer-education meetings/training,
- (xi) disposal of produce within the village,
- (xii) absence of surplus production.

2.5 Theoretical Orientations

Anthropologists have traditionally propounded different theories in attempts to account for culture change but the most notable have been functionalism, structural-functionalism, diffusionism and evolutionism. Conflict theories have also been used in anthropological studies. Each of these theories has its own merits and weaknesses depending on the particular levels and situations in the analysis of culture change. In this study, the theory of diffusion or

diffusionism, was adopted as a theoretical framework for an understanding of the society in question. The basic guidelines to this study are discussed under three sub-headings: a characterization of culture change and related issues; the theory of diffusion; and the general assumptions underlying the study.

2.5.1 Characterization of Culture Change

Culture change has been used to refer to modifications in the elements and patterns of a cultural system (Clifton, 1976). It involves alterations in ideas and beliefs, values and norms about phenomena. In most instances cultural change is closely related to social change which involves changes in the structure of social relationships. These include changes in social roles as well as the relations between them, subsequently leading to changes in the relations between groups and institutions. This may be successful, but sometimes external influence can be resisted. Significant cultural changes can originate from within the society itself, in which case they are called innovations, discoveries or inventions. Another kind of cultural-change results from processes and

events which come from the merging of two or more formerly separate and independent cultures. This is also characterized as culture contact, transculturation or acculturation. In the words of Adams (1974: 44).

Culture change refers to a number of things. Since no two specific acts of culture can ever be quite the same, culture is always changing in a very real sense. On the other hand, since culture is usually seen to reside also in the continuity of some form-meaning-relational set, change can also refer to a change in the relative continuity among the components of the set.

It is conceivable that culture is not something static but is constantly changing.

It is held that the basis for all changes in socio-cultural systems is the variability in ideas, values and beliefs held by individuals; hence the life experiences of each individual are unique. Accordingly all processes of change, whether external or internal in origin, deliberate or otherwise, are similar. Differences between individuals and a capacity to conceive new ideas create a long, enduring society; hence uniformity or

homogeneity in this respect impairs progress. The basic fact of cultural systems is dynamic change or adaptation to altered circumstances of life. Individuals differ according to their "cognitive maps" of the social and physical world they live in as well as in the manner they adjust to their world. Essentially, all human individuals are potential sources of new ideas about social relationships and cultural things and ways. However, many of these new ideas may not spread any far and some may have adverse consequences for the group. Certain permutations and combinations of older cultural ways into new configurations have to be made. These then become innovations.

The psychological and social processes of creating new ideas and things are fundamental to cultural change. A number of views on these processes of innovation have been posited. A common view focuses on only those innovations that become public and have a major impact on human life. In another view, innovation is treated as desirable changes in belief and practice and questions why some communities

reject them (Rogers and Shoemaker, 1971). Barnett (1963) views innovation as any idea, overt behaviour, or concrete thing or practice which individuals perceive as novel.

At inception, an innovation is a complex, private, and mental event which involves an analysis of existing ideas, a recombination of their elements and the creation of novel notions. This is considered to be a universal characteristic of all individuals. The process may be so latent that an individual is quite unaware of it, it may be deliberate and conscious effort. Cultural and social change occurs when an individual, conscious of a new idea, communicates it to others. The creative, innovative processes which transform the original novel idea include communication, sharing, acceptance, or rejection, modification and institutionalization.

Examples may be cited of studies undertaken on the basis of the model described above. Geertz (1963) focusses on economic transition as an index of social change, while Hunter (1961) views culture change in terms of extending systems

of relationships. Linton (1963) describes culture change by means of acculturation processes; Little (1965) observes that changes appear in times of transition and upheaval of traditional social networks, binding together heterogeneous groups; and Spicer (1961) looks at change as a result of the intrusion of foreign communities into a group.

The conception of the transformation of Africa, when the above model is applied, is too simple. According to Malinowski (1948), the transformation produces "hybrids" only on the surface. In reality these are new forms, taken neither from the European nor the African tradition. The African is only seduced by the enticements of western civilization and accepts new forms of life. When the ideas, interests and blessing of a co-operative are denied them, Africans naturally fall back on their own systems of belief, value and feeling. The more independent, far-sighted and sensitive the African, the stronger will be his reaction.

This way, elements of an old culture are revived but with a new appeal. Such complex nationalism draws all its strength from the enormous residue of old tradition. Only what seems valuable from the past can be integrated into modern life. A tradition seen rationally, whose values are made explicit and renewed, must assimilate those foreign elements which modern times demand and in this process the foreign elements are so transformed and adapted that a modern, viable African culture arises out of the whole.

2.5.2 Diffusion

Diffusion has been defined as "the process by which cultural elements are borrowed from another society and incorporated into the culture of the recipient group". (Ember and Ember, 1973:492). Sometimes borrowing enables a society to bypass stages or mistakes in the development of a process or institution. For example Germany borrowed industrialization from England and Belgium. Japan did the same. Both Germany and Japan are today among the highly industrialized nations in the world. Diffusion is held to be common

and a majority of the traits of most cultures can be attributed to outside societies.

The theory of diffusion has been existing in anthropological traditions since the time of its founders in Britain (W.J. Perry and G.E. Smith); Germany (F. Ratzel, W. Schmidt, and F. Graebner) and the United States (A.L. Kroeber, R.H. Lowie and C. Wissler). However, it is exposed to much criticism for being historical and incapable of scientific control (Firth, 1964; Malinowski, 1948, White, 1959).

The process of diffusion is simple. Three patterns of diffusion are common. Firstly, there is direct contact in which case elements of a culture may be first taken up by neighbouring societies and then gradually, spread further and further. Secondly, there is intermediate contact whereby a new idea is brought about through the agency of third parties, e.g., the traders who may carry a trait from the society originating it, to another receiving it. Lastly, there is stimulus

diffusion, implying that knowledge of a trait belonging to another culture stimulates the invention or development of a local equivalent.

It should be pointed out that diffusion of ideas into a culture is a subjective process. Not all traits are readily incorporated; some or all may be rejected. Selection occurs because cultural traits differ in the extent to which they can be communicated. Sometimes the overt form, rather than the function or meaning of a particular trait seems frequently to determine how it will be received.

Diffusionism has been criticized for certain of its shortcomings:

1. It emphasizes the material aspects of culture and not social or political aspects.
2. In most cases, it is descriptive, hence it does not analyze or explain how the traits spread and why changes occur. In other words, it lacks explanatory power.

3. It does not identify the creativity of human nature, thus denying independent invention.
4. It assumes that individuals are passive recipients of outside ideas and do not react to such outside influences.
5. It is also historical; thus it fails to explain events as they occur at present.

Despite these criticisms, the diffusionist approach has to be adopted in order to explain certain phenomena. For example, a society accepting a foreign cultural trait is likely to adapt it in a way that effectively harmonizes the new trait with its own cultural traditions. Additionally social changes can be viewed as changes in value systems. At this level it is difficult to account for such changes only in terms of structural changes (structural-functional theory) or the clash of institutions (conflict theory). Here the diffusionist theory of change may be of great use. Therefore, the validity of a method or approach will depend

on what level and types of change in a culture are being analyzed (Onwuejeogwu, 1975:10-12).

How is the theory of diffusion applicable to the current study? The answer is simple. It is assumed that the farming population in the area of study acquired new techniques, new cultivars, new inputs and anything else under the term "agricultural innovations" through outside influence mainly the change agents, or internally as a result of dissatisfaction with existing practices resulting from internal constraints. This way the population gets transformed by means of a modification of the existing practices.

2.5.3 General Assumptions

Every empirical study is based on some assumption, as a base on which findings may be generated and validated. In this study, a number of assumptions were made regarding the farmers' behaviour in adopting new practices.

1. Change is an ultimate goal or end.

Farmers turn to new ways of production as a function of attaining security by

means of diversification of income-generating activities on the farms.

2. Farmers are willing to change if the necessary incentives are offered and if they overtly find that change is beneficial.
3. Change is normative behaviour. Farmers' interactions within the social system provides them with a sense of identity and influence their behavior. Those who are more receptive to change on interacting with the less receptive are likely to influence them. This way the "conservatists" are likely to go by the norms associated with change and thus sharing similar and positive attitudes.
4. Change is high if the interaction effect is high.
5. Change requires trial. Individuals must seek information about the new idea and try it out before adopting it.
6. Socio-economically better off farmers are likely to change faster than their socio-economically handicapped counterparts.

CHAPTER 3

METHODOLOGY

The initial stage of the actual fieldwork began with the mapping of the research site, that is, it became viable to locate the major features of the physical and social landscape. This was particularly useful in determining, inter alia, the specific methods of defining the population, sampling, data collection and data analysis (Pelto and Pelto, 1973).

3.1 Geographical setting and the general ethnography of the Research Site

Webuye Division is situated on the eastern part of Bungoma District in the Western Province of Kenya (see Figure 1). Bungoma District, which covers a land area of 3,074 square kilometres, lies on the southern slopes of Mount Elgon and is part of the Lake Victoria Basin with an altitude ranging from 1,200 metres in the west and southwest, to over 4,000 metres to the north (Government of Kenya, 1988:1-4; Wagner, 1970:4). The district shares common borders with Uganda (northwest), Trans-Nzoia District (north), Busia District (West and Southwest),

FIG. 1 Location Of District



Source: Bungoma District Development Plan: 1989-93. Ministry of Planning and National Development, Republic of Kenya (1988) p. vii.

and Kakamega District (East, South and Southeast).

Webuye Division is among the larger administrative units that constitute Bungoma District. To facilitate administration, the division is divided into several administrative units (see Figure 2 on page 82). The division borders Tongaren and Kimilili to the north and northwest respectively, and Kanduyi on the west and southwest. To the northeast, east and southeast of the division is Kakamega District with River Nzoia forming a common border. The total land area covered by the division is 261 square kilometres while the average height of land is 1600 metres.

The relief and landforms in the surrounding areas affect the climate and the general development potential of the region. The undulating terrains, favourable rainfall and good soils, provide an ample environment suitable for arable farming. The position of the division in relation to Mount Elgon influences both rainfall and temperature. The region experiences moderate temperatures, the mean annual temperatures ranging from 21°C to 22°C.

Source:

FIG. 2 BUNGOMA DISTRICT ADMINISTRATIVE BOUNDARIES



The region receives both convectional and relief rainfall. Annual rainfall follows a seasonal pattern ranging from 1250 millimetres to 1800 millimetres. Generally, there are two rain seasons. Long rains fall between March and July while the short rains fall between August and October. The heaviest rain is experienced in April and May. Most farming activities take place during this period. The fairly heavy rainfall provides the area with a high density of drainage. The major river is the Nzoia backed by its tributaries Kibisi, Kuywa and many numerous permanent streams.

Soils in Webuye, as in the rest of the district, vary. The wide range of soil types is a result of variations in the geological structure of the area. The soil pattern and depth are determined by the geology and topography of the region but generally fertile red soil is widely distributed (Wagner, 1970:4). According to Ominde (1963:77-8), the topography of the area gives rise to two distinctive soil types. At the higher altitude, the alpine meadow soil originating from Mount Elgon and the shallow stony soils on the ridges alternate with each other. At the lower

extreme altitude, the brown loam soils alternate with alluvium in the valleys. Finally, de Wolf (1977:19-20) noted soil types as dark-red friable clays with a deep humic top soil derived from volcanic and basement complex rocks.

On the basis of land elevation soils in Webuye Division can be categorized into four major types. Firstly, the soils on bottom lands which are developed from infill, mainly from undifferentiated basement system rocks include complex, poorly drained, very deep and dark-grey to brown clay soils. These soils are mostly found in Webuye location. Secondly, in the lower middle-level uplands are well-drained, deep to very deep and varying from dark-red to red nitosols and ferralsols; and brown to dark-brown acrisols. These soils are found in parts of Bokoli, Misikhu and Ndivisi locations. They are developed on basic igneous rocks and granites. Thirdly, the soils on the uplands, next to the mountain slopes are well drained, moderately deep, to very deep reddish brown to yellowish brown or dark-brown clay ferralsols and acrisols. These soils are also found in Bokoli, Ndivisi and Misikhu locations.

Finally, the area lying below 1500 metres forms a basin which is prone to swamps, waterlogging and flooding along river valleys. Clay soils are prevalent and during the wet seasons, they render roads impassable. But during the dry season, they crack, making ploughing and early planting difficult.

The vegetation in the area consists of bushland, woodland and grassland. Grass and scattered trees or groups of trees form a common scenery. Most of the natural vegetation has been cleared down to give way to cultivation.

These climatic, ecological and edaphic conditions make Webuye one of the high potential arable areas in Bungoma District (see Figure 3). Being the main economic activity, farming is practised to a reasonably high degree. A majority of the inhabitants are engaged in small-scale mixed farming, growing both food and cash-crops, as well as keeping livestock. The main food-crops include maize, beans, finger millet, sorghum, cassava, banana, sweet potatoes, yams, groundnuts, simsim and vegetables.

FIG 3: Bungoma District
Simplified Agro-Ecological Zones



Source: From Farm Management Handbook Of Kenya 1982

The major cash-crops include coffee, sunflower, sugarcane and maize (Kituyi, 1991; Opanga, 1989; and Wandera, 1990). Most of these crops, except sugarcane, are marketed in the local market centres and in Webuye Town where storage facilities for grains and the urban consumer population are available. The livestock reared include cattle, goats, sheep and poultry.

Demographic figures show that Webuye Division is one of the highly densely populated parts of Bungoma and exhibits a high rate of population growth. For example, in 1976, Ndivisi location had a total population of 38,157 persons with a growth rate of 1.46 percent per annum. With a total land area of 205 square kilometres, its population density was 144 persons per square kilometre compared to 141 persons per square kilometre in 1969. In 1979, Ndivisi Location had a total population of 41,741 persons with a density of 203 persons per square kilometre (Government of Kenya, 1980:10). Between 1979 and 1987 Ndivisi Location registered a population growth rate of 3.98 percent per annum (Government of Kenya, 1981:122-3).

Webuye Division as a whole had 229 persons per square kilometre. The largest division in the district, Kanduyi, with a land area of 825 square kilometres had a density of 203 persons per square kilometre. The trend in population growth for Webuye Division is similar to that of Bungoma District in general. In 1962 the district had a population density of 112 persons per square kilometre. Its density in 1979 was 164 persons per square kilometre, with a population growth rate of 3.85 percent per annum. Its total population was 503,935 persons. Out of this number, Webuye Division had a share of 12.03 percent with a total population of 60,631 persons. According to the 1983 divisional boundaries, the population projections for Webuye Division for the years 1988, 1990 and 1993 were 87,550, 94,130, and 104,721 persons respectively (Government of Kenya, 1988:17).

This fairly dense population has certain implications as far as land-and-settlement is concerned. Most of the plots in the area are small-holdings of less than 10 hectares each.

The presence of numerous small plots arises from the traditional systems of land tenure whereby land is subdivided for the sons of the owners.

Land is privately owned, although corporate ownership also exists. However, most of the land belongs to individuals who own title deeds. The advantage of having title deeds is that farmers are motivated to develop their plots more effectively through acquiring loans against title deeds. But this has the disadvantage of subjecting land, previously under corporate ownership to further subdivision into smaller units which eventually tend to be uneconomical.

The dominant ethnic group is Abaluyia (specifically Babukusu and Abatachoni), There are also pockets of Kalenjin (Sabaot), Iteso and Luo. The main urban centre, Webuye Town, is multi-ethnic. In Webuye, there exist two forms of social organization, typical of the social structure of Bungoma in general. These aspects are the indigenous (informal) organization and the new form of organization which is more formal, resulting from contact with "extra-continental

"intruders". Both forms of Social Organization overlap. As far as indigenous social organization is concerned, three systems of controlling members' behaviour are operative. In the first place is a system of norms that define appropriate behaviour for the members; secondly is a system of sanction that maintains social control; and finally, a ranking system which defines members' roles (Omoka, 1990:166-74). This is a patrilineal society with both nuclear and extended forms of family organization. It is also exogamous. Both monogamous and polygamous forms of marriage exist.

In Webuye Division, there is only one major urban centre, Webuye Town, situated along River Nzoia. It is a fast-growing town which has gained prominence due to the Pan-African Paper Mills, established in the 1970s. It is the second largest town in the district after Bungoma. It has a municipal council which serves the surrounding areas, including parts of Kakamega District. Its population estimate stands at 30,825 persons with about 6,165 households. It is a focal point for tarmac roads to Kakamega, Eldoret, Bungoma and Kitale.

It is also served by the Nairobi-Malaba line of Kenya Railways.

In the rural areas, the road network is either gravel (murrum) or earth. The use of earth road is quite limited during the wet season. Poor or inadequate road coverage affects agricultural production and other social services.

3.2 Research Population

The population of study was defined as all farmers who own plots and are residing within the boundaries of Webuye Division. Since any research work is influenced by the environment in which it is done, it became viable to make a general excursion of the area to gain knowledge about the local situation before venturing into the field. As noted by Peil(1983:71):

the possibility of doing research and the success of the techniques used are often strongly affected by local or national structural and cultural variables. These vary between countries, between rural and urban areas, and between regions with differing historical or political backgrounds.

It therefore became necessary to understand the geography, history, politics and culture of the community and the historical development of the institution on which the research was to focus.

Although the investigator hails from the community in question, it was risky to assume knowledge of the local population which would lead to adverse consequences. Peil (1983) observes further that:

Most social science research projects are carried out in the home area of the researchers, who therefore assume that they have all the background information needed. Expectations and behaviour can vary considerably and generalization from one's experience to the whole of society can be dangerous. Research is a process of acquiring knowledge and assuming understanding at the beginning can seriously handicap the project (Peil, 1983:71).

With this caution, therefore, the researcher assumed the role of an entrant in a new community, hence the experiences encountered arose purely from the research point of view. But, on the whole, access to the population posed no problems as permission had been granted by the government, while members of the population accorded full co-operation to the researcher, probably being a "native" of the area.

3.3 Sampling

Having defined the population, it became imperative that only some elements in the entire population be used to provide useful information on the whole population. This called for sampling, a vital tool in social research. Therefore in order to save on economic costs, to achieve quality work and to provide quicker results, sampling became inevitable (Bulmer, 1983b; Emory, 1985; Onyango and Plews, 1987; Peil, 1983; Prewitt, 1975;

Suits, 1963). A number of considerations were made in the process of drawing the sample. These include representativeness, adequacy of the sampling frame, method and type of sample to be drawn and the sample size. A detailed discussion of these factors is essentially worthwhile.

It is common knowledge that any sample we draw may be representative of the population from which it is drawn or it may not. When the sample is not representative of the population, any value we calculate from the sample would be incorrect as an estimate of the population value. When the sample is drawn properly some sample items will underestimate the population values while others will overestimate them.

Variations in these item values tend to counteract each other such that a sample value that is generally close to the population value is obtained. To achieve this representativeness, the investigator took precautions to ensure that there are enough members in the sample; the members are drawn in a way to favour neither the overestimating nor the underestimating tendencies; a wide range of types or population parameters are included; the sample is drawn by the researcher himself; and finally, that the sample is free from systematic bias. It was hoped that a sample with these attributes would constitute a good sample. And truly, a good sample must be valid. This validity depends on the accuracy (the degree to which bias is absent from the sample) and the precision of estimate, as measured by the standard error of estimate (Bulmer and Warwick, 1983:91; Emory 1985:276-8; Prewitt, 1975:15-8; Suits, 1963:55).

A suitable sampling frame for this study posed a serious problem since the statistical data available for the community were rudimentary and sometimes out-of-date for some parts, or completely unavailable. Reliance on such data was found to be subject to considerable degrees of error.

As indicated by Bulmer (1983:93) "inaccurate or incomplete information (such as a sampling frame that does not cover the population it purports to cover) is as misleading as no information at all". For instance administrative boundaries for Webuye Division and those within it, have been changing from time to time. Again, records of the population resulting from census by means of enumeration do not show the individual elements that could be used as units of study. The only reliable sampling frame for the entire population was a record of title deeds kept by the regional lands registration office. But owing to the frequent shifting of local boundaries and the creation of new administrative units, these records could not be used to obtain up-to-date information. For example some plots in Webuye Location are registered with titles under the formerly larger Ndivisi Location. Similarly plots in the newly created Misikhu Location are registered under Bokoli Location. In actual sense, therefore, no real sampling frame was available. This is a problem that is common for, as Bulmer (1983:93) points out, "population and land records potentially offer a means of sampling but such records, even where

apparently complete, may be unsatisfactory due to inertia or deliberate distortion on the part of those maintaining them". And Peil (1983:80) notes that "...formal sampling in rural areas is complicated when farm ownership is widely dispersed in irregular and unsurveyed packages which are subject to conflicts over tenure". Caught in this situation where no appropriate list existed, some convenient means of identifying the items to constitute the sampling frame had to be devised (Onyango and Plews, 1987:15). Such a frame was conceived to be adequate and up-to-date for the purpose of the study. Bulmer (1983:95) and Peil (1983:80) have suggested alternatives to pre-existing but incomplete frames. For instance, in rural surveys, the alternative is to establish the geographical boundaries of units, such as villages, sub-locations, and locations, and a list of residents compiled to include all parts of a settlement. Alternatively, village-level listings kept by village headmen are useful. This is the approach that was adopted in obtaining a sampling frame for the present study.

Another crucial factor in sample selection was the method and type of sample to be drawn. The method that was used in this study was one of probability and stratification based on randomness. Random samples are designed to avoid sources of bias since in such samples, the inclusion of an item is a matter of chance independent of the will and judgement of the researcher, or the nature of the item. However, like any other sample design, probability sampling also involves some element of error, but it is the only method of sampling that can be used to minimize the amount of error in a sample. For instance, Moser and Kalton (1971:61-78) and Warwick and Lininger (1975:82-94) show that where probability sampling methods are used, sampling errors can be calculated statistically to provide estimates of population values from sample values. Hursh-cesar and Roy (1976:57) outline the necessity for probability sampling in development research as arising from "indefinite populations, unavailable sampling frames, small budgets, lack of time, inexperienced personnel, pressure for results and the like".

To ensure that the whole population is evenly covered and to enhance the success of randomization, stratified sampling was also used whereby the population was segregated into a number of mutually exclusive sub-populations or strata. This was followed by taking simple random samples within each stratum. This, then, was a stratified random sample defined as "a set of simple random subsamples, each drawn from a designated sub-population or stratum, the sizes of the several subsamples being chosen to give maximum reliability to the final result" (Suits, 1963:57). According to Kish (1965:76-7) the main reasons for stratification are to increase a sample's statistical efficiency, to provide adequate data for analysing the various subpopulations, and to enable different research methods and procedures to be used in different strata. For the present study, stratification was done along the locational boundaries so that Webuye, Ndivisi, and Bokoli (including Misikhu) each formed a single stratum.

Stratification was conceived useful in three ways. Firstly, it was conceived that each stratum would be homogeneous internally but heterogeneous with other strata of the population.

This way it would be more efficient statistically. Secondly stratification would be useful where the researcher wanted to study the characteristics of certain population subgroups. Finally, it was useful for the application of different methods of data collection when called for in different parts of the population.

The principle of proportionate sampling was also adopted, that is, the sample drawn from each stratum was in proportion to the stratum's share of the total population. This provided for a self-weighting sample whereby the population parameters can be estimated by calculating the sample statistics.

The size of the sample is the last factor that was given due attention in the process of sampling. This was important especially in making statistical inference, that is, estimating the properties of a population from evidence furnished in a random sample. This way, the data in a random sample can be processed to produce the best single estimate of the required population characteristic (a point estimate). For instance point estimates of the population mean, variance or standard deviation can be worked out from the sample.

As it has been observed elsewhere, "the most important factor in determining the size of sample needed for estimating a parameter of a population is the size of the population variance. The greater the dispersion or variance in the population, the larger the sample must be to provide a given estimation precision" (Emory, 1985:287). Since the investigator was also interested in making estimates concerning various subgroups of the population, it was necessary for the sample to be large enough for each of these subgroups to meet the desired quality level. This was achieved by making the total sample large enough to assure that each critical subgroup meets the minimum size criterion.

With all these factors in mind, a random sample of 210 individuals was drawn from the three strata, as defined previously. From each stratum, a random subsample of 70 individuals was drawn.

3.4 Data Collection

Data for this study were both secondary and primary. But before the actual process of collecting data commenced, a number of considerations were made. These include the methods to be used, the relevance of personal characteristics, the variability of language use, the type of data to be collected and the fieldwork team.

Any method used for data collection varies with the topic and inclination of the researcher, as well as the situation in which the research takes place. Similarly, every method of data collection is only an approximation to knowledge. Each provides a different and valid glimpse of reality and is limited when used alone. The question which arises, therefore, is not which method is the best but which is most appropriate and feasible for the problem at hand. Generally, different methods are complementary to one another rather than in competition. Most authors tend to agree on the criteria for choosing the appropriate methods. The criteria are: appropriateness to the research objectives; reliability; validity;

representativeness or generalizability; explanatory power; administrative convenience (e.g. cost, speed and organizational complexity); and avoidance of ethical or political difficulties in the research process (Bulmer, 1983:10-11; and Warwick, 1973:189-203). In addition, a method's accuracy of measurement is a function of its qualitative depth and control over observer effects.

The personal characteristics of the researcher such as social position, marital status, sex and age were considered important in the research site since these were likely to affect the kind of information to be collected. Therefore, the researcher's efforts were tailored at adjusting to the lifestyle, perceptions and symbols of the community. Closely related to this is language. Language is a problem when working outside one's community, hence a thorough understanding of the local language is useful for understanding the connotations of the words. For the present study, this was not a problem for the researcher, since he was competent in the major dialects used in the community.

The third consideration was the kind of data to be collected. In research, data collected are either quantitative or qualitative and each requires a specific method. Further, such data could be economic, political or sociological. Economic and political data tend to be easy to get but sociological data have to be collected by the researcher himself by means of primary sources.

Finally, there was the question of the fieldwork team. It is obvious that a properly executed fieldwork is an exhausting and time-demanding activity. There is very little time for the individual researcher to carry out the whole research. Therefore, there was need to have some assistants in the field. The field assistants were mainly the educated members of the local research area. In all, three field assistants were involved, each from one location of the research site. Such were persons who had clear perceptions and knowledge about their own local cultural and social systems. They were important for their special social ties as for their research abilities. This field crew, consisting of four members was considered adequate because

specialists tend to criticize the presence of many researchers as one that poses problems of rapport maintenance in the villages, although such a large field team facilitates proper division of labour (Pelto and Pelto, 1973:278).

In view of these considerations, a number of methods were used to generate data, both secondary and primary.

3.4.1 Secondary Data

Secondary data were initially used. These were mainly derived from documentary information and archival records. The major sources of information were public libraries in Nairobi, the University of Nairobi Libraries and the District Development office in Bungoma.

Secondary data proved quite useful in that they provided specific details that corroborated information gathered from primary sources. They were useful in making specific references on some point. Both quantitative and qualitative data were produced from secondary sources, hence they formed an object of extensive retrieval and analysis.

Finally, it was possible to make inferences from data obtained by means of secondary sources. In this regard, secondary data formed an integral part of the study.

3.4.2 Primary Data

Secondary data formed a useful basis for research on past events. They were also found cheaply and quickly, thus saving time and being less costly. However, certain shortcomings necessitated the use of other sources. In the first place, some information derived from secondary data did not meet certain needs of the present study. Secondly, even where the necessary information was available, it was difficult to measure the accuracy of such information. Finally some information derived from secondary sources was found to be outdated. To offset these negative tendencies, primary methods of data collection were employed. This way, secondary and primary data were complementary to each other. It became necessary to employ multiple research techniques in order to maximize the advantages of hard (quantitative) and soft (qualitative) data gathering.

This is basic to scientific research. The methods used were basically sample survey and observation. As observed by Pelto and Pelto (1973:269):

.. recent literature on fieldwork indicates a growing tendency toward quantified, "operationalized" observations: use of surveys, questionnaires, psychological tests, or other quantified data-collection methods.

4.2.1 Sample Survey

This was the most dominant and overt method of collecting primary data. The survey began with the researcher and his team of three assistants introducing themselves and their research intentions to the local population. The sample survey was designed to meet two broad goals. In the first place it was designed to portray, although not accurately, the characteristics of particular individuals, situations or groups in terms of behaviour attitudes and dispositions to act. Secondly, it aimed at determining the frequency with which such behavior or attitudes occur in the sample. This was an explanatory survey designed to test hypotheses about the relationships between variables in order to understand the forces of agricultural change in Webuye Division.

The survey was conducted by means of a survey instrument. The unit of response (the respondent) was a farmer. The survey instrument was in the form of a standard questionnaire which was structured and contained both closed- and open-ended questions. The questionnaire was either self-administered or it was administered by way of direct interview. Self-administered questionnaires were only applicable to the literate respondents. Direct interviewing formed the core of the survey as most of the respondents were either illiterate, semi-literate, or in the case of the literate ones, could not understand fully or interpret the questions. It was a face-to-face, two-way conversation initiated by the interviewer to obtain information from a respondent. In general terms, the survey instrument was designed to elicit information about the hypothesized relationships involving independent and dependent variables.

Although both the self-administered questionnaires and the interviews were successfully applied, certain problems were apparent. The self-administered questionnaire covered only the literate

population. At the same time even the literate respondents experienced problems of misinterpretation of some questions, an effect that called for the presence of the interviewer for further clarification. In the same vein, there was a tendency for the researcher to lose control of the research setting, that is, the respondents on many occasions ventured too much into aspects quite unrelated to the scope of the discussions until pardoned by the interviewer. On the other hand, the interview proved quite expensive in terms of time and money. An interviewer could hardly complete more than three interviews a day. Since the respondents were geographically scattered, a substantial amount of time was taken up with travel tasks. Another problem was related to non-response. Sometimes, the interviewers could not get the respondents who were scheduled for the interview. The only solution was either to make callbacks or where possible to make substitutions, although such action was prone to bias.

Inspite of these shortcomings, the survey instrument proved quite advantageous. As for the self-administered questionnaire, it was easy to gather information from a number of respondents within a short period. Again, anonymity was assured. As for the interviews, it was possible for the interviewer to secure "deep" and detailed information by way of probing with additional questions and gather supplemental information through observation. It was also possible to improve the quality of the information received. Finally, it was possible for the interviewers to control the interview setting and make adjustments to the language of the interview.

Generally speaking, the survey was conducted under very conducive conditions whereby most respondents gave full cooperation and showed open-willingness to provide any necessary information. Given that the principal researcher and other interviewers hailed from the research site, almost all members were willing to air their views although in some cases "don't know" or "no opinion" responses were prevalent.

2.2. Participant Observation

This method was used to gather data that, under all circumstances, would not be gathered by the sample survey. It was used in order for the researcher to achieve three basic goals: to examine complex social relationships or intricate patterns of interaction such as kinship obligations or commercial exchanges in the villages; to get first-hand behavioral information on certain social processes such as interest in new farm packages; and to infer latent value patterns from overt behavior such as attitude toward leadership in the local area.

With these goals in mind, the researcher was not only a mere passive observer but took a variety of roles - participating in the events being studied. It was a matter of making casual social interactions with the population in undertaking specific functional activities - interaction at market centres, in sporting activities, church services, as well as local public meetings. This kind of fieldwork has been described in the simplest terms as "fieldwork that involves living in close contact with a

research population in order to observe their daily routines, ritual, and social acts, economic activities, and other aspects of cultural behavior... "(Pelto and Pelto, 1973:243). In the process of observing by participation, the observer's presence in the social situation was maintained for the purpose of scientific investigation. According to Schwartz and Schwartz (1955:344), the observer is part of the context being observed. There was, therefore, a need to establish a role within the group being studied, that is, maximum rapport with the subjects was maintained.

During observation, the researcher carefully noted and recorded the details of the activities and behaviour in order to understand their consequences for his research objectives and hypotheses. But great care was taken so as not to "over-participate", for, as Cicourel (1964: 45) points out:

the more intensive the participation, the richer the data but the greater the danger of going native as a consequence of taking over the group's way of perceiving and interpreting the environment hence becoming blinded to many points of scientific importance.

The researcher's role remained within his limits as an investigator. In the words of Pelto and Pelto (1973:248):

...the fieldworker does not assume a role that is fully "native" in all respects. Nor do the "natives" come to think of the anthropologist as a completely assimilated member of the local social order. The fieldworker is always a marginal person, an outsider who, if he is successful is permitted relatively free access to the backstage area of the local social scene.

Use of the local language was of positive social value and brought putative solidarity between the researcher and the population under study. This was another important step toward the building of rapport. Great care was also taken to avoid authoritarian and judgemental behaviour on the part of the researcher. This was achieved by means of the researcher being flexible, constantly adjusting his behaviour to suit the styles and modes of conduct of the local community. The importance of this should not be overemphasized, for:

The essence of successful ethnography is a form of behavior that makes the fieldworker a "friend" of the community he studies and a special friend of a number of persons within it. Further --- the behaviour involved in

successful fieldwork presents a model for a panhumanly applicable style of friendship (Pelto and Pelto, 1973:257).

The method of participant observation was employed due to its feasible advantages. Firstly, the investigator gets access to events or groups that are otherwise inaccessible to scientific investigation, for instance belief systems. Secondly, the investigator perceives reality from the viewpoint of someone "inside" the study rather than external to it. This perspective is invaluable in producing an "accurate" portrayal of the phenomenon being studied. In other words, participant observation provides a more intimate view of the social process. Finally, through participant observation, the investigator can use his ability to manipulate events or situations (Yin, 1989:93).

2.2.3 Direct (Non-participant) Observation

In addition to participant-observation, direct observation, that is, observing without participating, was used to gather primary data. This method was used side by side with the survey method.

Although very useful, observational research methods are subject to certain shortcomings. The methods are costly especially where the researcher wants to conduct all the observations himself. It is also difficult to standardize observations. Covert behaviour cannot easily be ascertained from observations, for instance attitudes and opinions. Finally, observational data are subject to many errors of misperception.

3.5 Problems encountered in the Field

Although the process of data collection in the field was successfully conducted, certain emergent problems were apparent. These problems range from sampling to the actual process of data collection. The initial problem was lack of a clearly defined sampling frame. As already noted, population records for the community do not show individual households. Again, owing to the frequent shifting of boundaries and the creation of new administrative units, official records are not up-dated immediately. A record

of land title deeds for the region was not sufficient because of such changes. To solve this problem, the investigator and his assistants had to establish the geographical boundaries of the locations from which a list of residents (farmers) was compiled and a random sample of respondents drawn.

A second problem was sample size and the survey instrument. The sample, consisting of 210 respondents, proved to be too large in relation to the period for which data were to be collected, and the number of researchers. At the same time, the survey instrument, the questionnaire was found to be too long such that a single interview could take over two to three hours to complete. As a result of this, data were not collected and completed within the scheduled time or period.

Initially data collection was scheduled to last for one month, but it was not until after about three months that the exercise was completed. For the illiterate respondents, it was impossible to use self-administered questionnaires; for the literate members, there were frequent problems of misinterpretation of questions which called for elaboration and clarification by the interviewers from time to time. Another related problem concerned respondents' failure to give answers to some questions. Often times the respondents could give "don't know" or "no opinion" responses for which the interviewers had no alternative solutions. However, in research work, such responses were viewed as an integral part of the research.

A common problem was non-response, that is, the respondents could not be found or were too busy and unprepared for the interviews. The solution here, was to make callbacks or substitutions. All this meant spending more time and resources.

Generally, the exercise was expensive in terms of both time and money. Since the respondents

were geographically scattered, there emerged problems of travel tasks. For longer distances, the researchers relied on public transportation which proved to be costly for the whole period of the research. For short distances, bicycles were found to be more convenient.

Finally, observation posed problems for it was employed to gather data for the whole region without singling out specific respondents. Some activities that were observed were not directly related to the objective of the study. Such activities included sports, worship and funeral ceremonies. It was also found difficult to ascertain respondents' attitudes and opinions by means of passive observation.

3.6 Data Analysis

The methods that were used for analyzing the data were both qualitative and quantitative. Qualitative analysis involved a description of farmers' behavior in relation to the hypothesized variables. Quantitative analysis included contingency (Chi-square), correlation, regression and factor analyses.

CHAPTER 4

DATA ANALYSIS-CONTINGENCY I

The primary data collected in the field were used as evidence of the phenomena under discussion. However, owing to the raw nature of the data, it became necessary to break and simplify them so that meaningful patterns could apparently emerge. The process involved running the frequencies and cross-tabulations. Significance tests were employed to evaluate the evidence. In all cases the .05 significance level was used in testing the hypotheses. A calculated value that equals, or is less than the critical value fails to attain significance in which case the null hypothesis is upheld while the alternative hypothesis is rejected. A calculated value exceeding the critical value attains significance with the resultant acceptance of the alternative hypothesis and rejection of the null hypothesis.

The four hypotheses formulated in chapter two are tested by this criterion. The testing

of the first two hypotheses is the province of this chapter, while the next two hypotheses are discussed in the next chapter.

4.1 Patterns of Agricultural Transformation Relative to Famers' Socio-economic Needs

The first hypothesis states that agricultural transformation is likely a consequence of socio-economic needs. In testing this hypothesis a number of variables, both independent and dependent, were involved. Variable socio-economic needs, the influencing variable, was measured by the following:

- (i) payment of shool fees;
- (ii) accumulation of wealth;
- (iii) surplus production;
- (iv) insurance against starvation;
- (v) purchase of valuable assets;
- (vi) diversification of sources of income;
- (vii) elevation of social status: and
- (viii) general family well-being.

Variable agricultural transformation, the dependent variable, was measured by:

- (i) Cultivation of coffee ;

- (ii) cultivation of sugar cane;
- (iii) cultivation of sunflower;
- (iv) the use of modern technology
in land preparation;
- (v) use of the hybrid maize seed;
- (vi) response to hybrid maize seed
yield;
- (vii) the use of chemical fertilizers;
- (viii) the use of animal manure;
- (ix) response to a government proposal
to introduce the cultivation of
tea in the area.

Contingency tables were derived by cross-tabulating each of the dependent variables with all the independent variables. Most of the chi-square values yielded by the cross-tabulation attained significance at the .05 level. In order to interpret these relationships, let us look at selected contingency tables.

The relationship between the cultivation of coffee and socio-economic needs attains significance in most cases except with respect to purchase of valuable assets. For instance,

Table 1: The relationship between coffee growing and the need to pay school fees

Coffee growing	Need to pay school fees					Total
	Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	
Yes	32.6(30)	58.7(54)	2.8(2)	5.5(5)	1.1(1)	44.4(92)
No	32.2(37)	29.6(34)	4.3(5)	12.2(4)	21.7(25)	55.6(115)
Total	32.4(67)	42.4(88)	3.4(7)	9.2(19)	12.6(26)	100.0(207)

χ^2

30.80426

D.F

4

Conting. Coeff.

.35991

Signif.

$p > .05$

the relationship between coffee growing and payment of school fees is quite significant although the proportion of coffee growers in the whole sample is slightly smaller than that of the non-growers (see Table 1). However, a substantial proportion of coffee growers (19.3 per cent) do so in order to pay school fees for their children. The proportion is very large relative to the table's cells. Thus, the need to pay school fees does influence coffee growing at the .05 level of significance. What is the probable explanation of this result? Coffee is a major cash crop which has been grown in the area for a longer period than any other cash crop. Although it takes long to mature, farmers are assured of regular harvests throughout the years once maturity is attained. By virtue of being a perennial crop with a ready market throughout, most coffee growers are able to obtain regular income which is vital in meeting most of their needs.

Whereas the cultivation of coffee is related to the farmers' socio-economic needs, its relationship to the purchase of valuable assets is insignificant. Certainly purchase of valuable

Table 2: Coffee growing by the need to buy valuable assets

Coffee growing	Need to buy valuable assets					
	Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	Total
Yes	14.9(14)	62.8(59)	117 (11)	8.5(8)	2.1(12)	44.8(94)
No	23.3(27)	56.0(65)	7.8(9)	7.8(9)	5.2(6)	55.2(116)
Total	19.5(27)	56.0(124)	9.5(20)	8.1(17)	3.8(8)	100.0(210)

χ^2

D.F

Conting. Coeff.

Signific

4.41479

4

.14349

$P < .05$

assets is not an immediate need. In this case it is a need that is subsumed by composite measures of socio-economic needs such as the need to accumulate wealth. As shown in Table 2, the relationship between coffee growing and the need to buy valuable assets fails to attain significance at the .05 level.

Sugarcane production is another aspect of agricultural transformation which, when cross-categorized with socio-economic needs results in significant coefficients. Sugarcane as a cash crop, has the same characteristics as those for coffee. Both crops, if well tended are good sources of income which the farmers can use to meet their daily needs. Table 3 shows the relationship between the growing of sugarcane and the need to accumulate wealth. Like the case of coffee, this relationship attains significance at the .05 level. This shows that wealth, as a socio-economic need is related to sugarcane growing. In as much as most respondents grow sugarcane, for a majority of them (83 per cent) sugarcane growing is aimed at accumulating wealth. On the other hand,

Table 3: Sugarcane growing by the need to accumulate wealth

Sugarcane growing	Need to accumulate wealth					
	Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	Total
Yes	23.0(28)	50.1(61)	18.9(23)	4.1(5)	4.1(5)	58.7(122)
No	31.4(27)	26.7(23)	18.6(16)	14.0(12)	9.3(18)	44.3(86)
Total	26.4(55)	40.4(84)	18.8(39)	8.2(17)	6.3(13)	100.0(208)

χ^2	D.F	Conting. Coeff.	Signific.
16.29715	4	.26955	P>.05

the relationship between sugarcane growing and purchase of valuable assets is not significant at the .05 level. This variable, therefore, does not influence sugarcane production because the purchase of domestic assets is probably a secondary socio-economic need (see Table 4).

The relationship between the production of sunflower and most of the independent variables is not clear. Sunflower attains 5 per cent significance with four variables namely, payment of school fees, accumulation of wealth, purchase of valuable assets and family well-being. On the other hand, insignificant results are realized with respect to surplus production, insurance against starvation, diversification of income and elevation of social status. It appears that although sunflower is grown by most of the farmers (over 80 per cent) various factors in varying combinations explain this tendency (see Tables 5 and 6). These factors are inherent in the advantages of the crop. In Webuye Division, sunflower is grown as a second crop after

Table 4: The relationship between sugarcane growing and the need to buy valuable assets

Sugarcane growing		Need to buy valuable assets					Total
		Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	
Yes		17.9(22)	57.7(71)	12.2(15)	8.1(10)	4.11(5)	58.6(123)
No		21.8(19)	60.9(53)	5.7(5)	8.0(7)	3.4(3)	41.4(87)
Total		19.5(4)	59.0(124)	9.5(20)	8.1(17)	3.8(8)	100.0(210)

X²

D.F

Conting. Coeff.

Signif.

2.771.86

4

.11414

P<.05

maize harvests. Sunflower does not need plenty of rainfall and it takes a relatively short period to mature (about two to three months). In addition it does not require large pieces of land, expensive inputs and substantial labour. It is marketable throughout the year so that immediately it is harvested it is disposed for sale. This is a cash crop which is very ideal for the small-holder farmer. At least, every farmer is encouraged to grow the crop for it is "self-spreading". More so, in the months of October to January when most of the maize farms are fallow, the short rains of this period encourage farmers to grow sunflower before a major planting season for maize begins. Table 5 shows the relationship between sunflower production and the need to accumulate wealth, while Table 6 shows the relationship between sunflower production and the need to diversify income. In the former, the relationship is significant while in the latter it is insignificant. These conflicting relationships are suggestive of the fact that sunflower is grown as a matter of convenience such that no specific socio-economic factor is consistently associated with its production.

Table 5; Sunflower production by the need to accumulate wealth

Sunflower growing	Need to accumulate wealth					Total
	Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	
Yes	26.0(44)	45.0(76)	17.2(29)	7.7(13)	4.1(7)	81.3(169)
No	28.2(11)	20.5(8)	25.6(10)	10.3(4)	15.4(6)	18.7(39)
Total	26.4(55)	40.4(84)	18.8(39)	8.2(17)	6.3(13)	100.0(208)

χ^2

D.F

Conting. Coeff.

Signif.

12.62877

4

.23925

$P > .05$

Table 6: Sunflower production by the need to diversify income

Sunflower growing	Need to diversify income					Total
	Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	
Yes	37.4(64)	49.7(85)	7.0(12)	4.7(8)	1.2(2)	81.4(171)
No	48.7(19)	28.2(11)	12.8(5)	5.1(2)	5.1(2)	18.6(39)
Total	39.5(83)	45.7(96)	8.1(17)	4.8(10)	1.9(4)	100.0(210)

χ^2	D.F	Conting. Coeff	Signif.
8.18350	4	.19367	P<.05

These findings are in accord with the observations made by Todaro (1982:237), Lippit (1958), Leagans (1963) and Misiko(1976). Farmers have adopted these novel practices due to certain perceived incentives coupled with motivation. At the same time, the adoption of these crops carry the importance of helping the farmers meet their needs. For the non-adopters, they are aware of the need for innovations but do not change due to economic and environmental constraints beyond their control.

The findings are also consistent with the theory of diffusion in that a trait which seems valuable is easily integrated into the existing culture. Since farmers have knowledge of these agricultural practices through contacts with their neighbours, this stimulates them to adopt such innovations. And since diffusion of ideas into a culture is a subjective process, not all individuals will be receptive to change, hence the existence of non-adopters. Variability in ideas and values held by individuals causes this differential response to the innovations.

The use of the tractor in farm preparation also constituted an aspect of the adoption of modern technology. on the basis of direct observation, very few farmers in Webuye Division use tractors on their farms. Only farmers in the "sugar belt" use tractors on farms reserved specifically for sugarcane. This is because the Nzoia Sugar Company offers this essential service in order for the farmers to produce good-quality sugarcane. Such farms are mostly concentrated in Bokoli and Webuye locations. Apart from sugarcane the cultivation of other crops is mainly based on the use of the ox-drawn plough which is cheaper and is almost as efficient as the tractor. The major reason for most farmers in Webuye Division failing to use the tractor is neither tradition nor ignorance, but rather is a combination of different factors. The most obvious is financial constraint. Most of the farmers are small-scale cultivators whose low income does not allow them to go for expensive farm machinery such as tractors. The other factor is the nature of farm plots. Most of the farms (about 61.5 percent) in the sample

measure below 4 hectares each.

Since the use of the tractor is ideal on larger farms, most of these small-scale producers tend to prefer the ox-drawn plough which is quite cheap compared to the tractors. Thus, the farmers themselves are rational in choosing the means of land preparation. This rationality is reflected in the responses the farmers gave when interviewed. Asked about the most desirable ploughing method, 78.9 percent of the farmers in the sample were in favour of the tractor, 18.7 percent were for the ox-drawn plough, while 2.4 percent preferred the use of the hoe. As for the least desirable method, the responses were 90 percent for the hoe, 6.7 percent for the tractor and 3.3 for the ox-drawn plough. On the method personally used, 6.2 percent used the hoe, 78.1 percent used the ox-drawn plough, while 23.3 percent, used the tractor. As shown in Table 7, the potential for the use of the tractor by farmers in Webuye Division exists but it is not exploited due to the factors already noted. The relationships between the use of the tractor and all the indicators of socio-economic needs attain significance at the .05 level.

Table 7: Use of the tractor by the need to accumulate wealth

Use of the tractor	Need to accumulate wealth					Total
	Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	
Yes	6.1(3)	77.6(38)	8.2(4)	6.1(3)	2.0(1)	23.4(49)
No	32.7(52)	28.9(46)	22.0(35)	8.8(14)	7.5(12)	76.4(159)
Total	26.4(55)	40.4(84)	18.8(39)	8.2(17)	6.3(13)	100.0(208)

X^2

D.F

Conting. Coeff.

Signif.

37.91325

4

.39265

P>.05

The use of the hybrid seed was another major indicator of agricultural transformation in Webuye Division. Farmers were asked to state the variety of maize seed grown, whether hybrid, local or both. Sample responses indicate that 98.1 per cent of the farmers were using the hybrid variety; 0.5 per cent, the local variety, while 1.4 per cent used both. Thus the hybrid seed was preferred by almost all farmers due to its high-yielding characteristics. However, chi-square values for the relationships between the type of seed planted by the farmers and their socio-economic needs, are insignificant at the .05 level. Therefore, the type of seed grown is not influenced by these needs since the hybrid seed is used by almost every farmer. But, on the other hand, farmers' responses about their opinion on hybrid seed yielding capacity shows significant results when tested through chi-square. We can deduce this significance from Table 8 in the way respondents are distributed in the cells relative to the opinion scales. Consequently, an innovation is easily diffused into a community if its inherent advantages

Table 8: Hybrid seed yield and the need to purchase valuable assets

Opinion on hybrid seed yield	Need to purchase valuable assets					Total
	Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	
Excellent	11.4(13)	65.8(75)	10.5(12)	10.5(12)	1.8(2)	54.4(114)
Good	33.3(24)	48.6(35)	6.9(5)	5.6(4)	5.6(4)	34.4(72)
Fair	23.5(4)	52.9(9)	11.8(2)	5.9(1)	5.9(1)	8.1(17)
Poor		75.0(3)	25.0(1)			1.9(4)
Total	19.6(41)	58.9(123)	9.6(20)	8.1(17)	3.8(8)	100.0(209)

X^2	D.F	Conting. Coeff.	Signif.
31.86114	16	.36370	$P > .05$

can overtly be demonstrated. According to the theory of diffusion, complex innovations are difficult to understand and therefore difficult to adopt while those which are easy to understand are easily incorporated. This is the case with the hybrid seed in Webuye Division.

Every farmer, regardless of his socio-economic status, is cognizant of the fact that higher crop yields are achieved when fertilizers are applied. For instance the sample evidence shows that in Webuye, over 90 per cent of the farmers use chemical fertilizers during planting. But chi-square values for this variable in relation to socio-economic needs are varied - some attain significance while others do not. It is plausible to conclude that fertilizer application bears no direct relationship to farmers' socio-economic needs. Farmers apply fertilizers to their crops on the basis of purely attaining high yields, regardless of their needs. The same case applies to the application of other kinds of plant nutrients such as composite and animal manure. Table 9 shows the relationship between fertilizer

Table 9: Use of chemical fertilizers by the need to pay school fees

Use of chemical fertilizers	Need to pay school fees					Total
	Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	
Yes	32.5(62)	42.4(81)	3.7(7)	9.4(18)	12.0(23)	92.3(191)
No	31.3(5)	43.8(7)		6.3(1)	18.8(3)	7.7(16)
Total	32.4(67)	42.5(88)	3.4(7)	9.2(19)	12.6(26)	100.0(207)

χ^2

D.F

Conting. Coeff.

Signif.

1.29028

4

.07871

P<.05

application and the need to pay school fees. The two variables, as observed, have no direct relationship.

To test the farmers' willingness to adopt novel practices, farmers were asked whether they would support a government proposal to introduce tea growing in the area. On the basis of the hypothesized independent variables all chi-square values attain significance at the .05 level. Almost all relationships show high coefficients. This is an indication of farmers' willingness to adopt innovations, hence government attempts to introduce the crop are likely to be successful (see Table 10). Tea being a cash crop, is likely to help farmers get the cash in order to solve most of their social and economic problems.

On the basis of the observations made in the preceding literature, the number of cases in support of the hypothesis are far in excess of the cases discordant with the same hypothesis. The hypothesis is therefore accepted overall.

Table 10: Opinion on proposal to introduce tea growing by the need to accumulate wealth

Support proposal to introduce tea?	Need to accumulate wealth					Total
	Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	
Strongly support	53.7(22)	26.8(1)	7.3(3)	4.9(2)	7.3(3)	19.7(41)
Support	4.0(1)	60.0(15)	20.0(5)	8.0(2)	8.0(2)	12.0(25)
No opinion	8.3(6)	61.1(44)	20.8(15)	6.9(5)	2.8(2)	34.6(72)
Don't support	53.8(21)	23.1(9)	10.3(4)	10.3(4)	2.6(1)	18.8(39)
Strongly don't support	16.1(5)	16.1(5)	38.7(12)	12.9(4)	16.1(5)	14.9(31)
Total	26.4(55)	40.4(84)	18.8(39)	8.2(17)	6.3(13)	100.0(208)

χ^2 D.F Conting. Coeff. Signif.
 76.95669 16 .51968 P>.05

4.2 Patterns of Agricultural Transformation Relative to Famers' Social and Demographic Characteristics

In this study, it was the investigator's conception that the transformation of traditional agriculture is most likely dependent on the social characteristics of the actors, the farmers. In this section the second hypothesis is tested. Recall that the hypothesis states that agricultural transformation is most likely related to the farmers' social and demographic characteristics. The independent variable's indicators in this hypothesis are:

- (i) age in years;
- (ii) formal education;
- (iii) length of farming business;
- (iv) occupation;
- (v) number of dependants.

The variables of agricultural transformation, the dependent variables, remain the same as in the previous case but with the inclusion of new variables. Dependent variables under discussion include:

- (i) cultivation of coffee;
- (ii) cultivation of kales;
- (iii) cultivation of sugarcane;

- (iv) cultivation of sunflower;
- (v) use of the tractor in land preparation;
- (vi) ploughing method used by most farmers;
- (vii) major food crops on individual farms;
- (viii) major food crops grown by most farmers;
- (ix) major cash crops on individual farms;
- (x) major cash crops grown by most farmers.
- (xi) type of maize seed used.
- (xii) opinion on hybrid seed yield.
- (xiii) use of chemical fertilizers.
- (xiv) use of animal or composite manure;
- (xv) opinion on a proposal to introduce tea growing in the area.

Cross-tabulations were run between the independent and dependent variables. Chi-square and contingency coefficients were calculated and significance levels ascertained. The results show that most of the relationships fail to attain significance at the .05 level. Age

Table 11 Growing of kales by age

Growing of kales	Age in years						Total
	Under 25	25-34	35-44	45-49	50-54	55+	
Yes	2.9(3)	23.5(24)	26.5(27)	16.7(17)	12.7(13)	17.6(18)	51.8(102)
No		11.6(11)	21.1(29)	20.1(13)	15.8(15)	31.6(39)	48.2(95)
Total	1.5(3)	17.8(35)	23.9(47)	18.3(36)	14.2(28)	24.4(48)	100.0(197)

χ^2 D.F Conting. Coeff. Signif.
 11.89138 5 .23859 P>.05

attains significant relationships with the cultivation of kales, coffee, major food crops on the farm, major cash crops on the farm and, finally, the major cash crops grown by most farmers. The rest of the relationships are insignificant. A common feature of variable age is that most of the farmers are middle-aged regardless of whether they are innovative or not. This characteristic is typical of the sample. For the whole sample 56 per cent of the respondents were middle-aged farmers; 24 per cent were young farmers while 20 per cent were old farmers.

In table 11, it can be seen clearly that the distribution of farmers who grow kales is almost the same as for those who do not, in all the age categories. The significant chi-square and contingency coefficient imply that the two variables are certainly related. However, no specific age category is directly related to innovative behaviour hence age is not an important factor. This tendency is also observed with respect to the growing of coffee and sugarcane (See table 12). For instance, as in the previous case, the distribution of

Table 12: Growing of sugarcane by age

Growing of sugarcane	Age in years						Total
	Under 25	25-34	35-44	45-49	50-54	55+	
Yes		12.3(14)	19.3(22)	21.1(24)	15.8(18)	31.6(36)	57.9(114)
No	3.6(3)	25.3(21)	30.1(25)	14.5(12)	12.0(10)	14.5(12)	42.1(83)
Total	1.5(3)	17.8(35)	23.9(47)	18.3(36)	14.2(28)	24.4(48)	100.0(197)

X²

18.45605

D.F

5

Conting. Coeff.

.29268

Signif.

P>.05

respondents is almost equal for both types of response, that is, the production and non-production of sugarcane.

The relationship between age and the cultivation of sugarcane is significant but no age category is a determining factor. On this characteristic, sunflower production shows the opposite because a large number of farmers grows the crop. In this case the relationship is insignificant, that is, age does not influence sunflower production. Again no age category is directly associated with this innovative behaviour (see Table 13). These findings are in disagreement with the conclusions drawn by Ogionwo (1969) that young farmers were more likely to adopt new ways than the older farmers. What seems to be an important explanation here is not farmers' age but their rationality - planning and decision making, as well as the characteristics of an innovation such as profitability and its compatibility or adaptability which ensure faster adoption (Uchendu and Anthony, 1975; Vail, 1972).

Table 13: Sunflower growing by age

		Age in years					
Sunflower growing	Under 25	25-34	35-44	44-49	50-54	50+	Total
Yes	1.3(2)	18.9(30)	12.6(36)	17.6(28)	13.8(22)	25.8(41)	80.7(159)
No	2.6(1)	13.2(5)	28.9(11)	21.1(8)	15.8(6)	18.4(7)	19.3(38)
Total	1.5(3)	17.8(35)	23.9(47)	18.3(36)	14.2(28)	24.4(48)	100.0(197)

χ^2 D.F Conting. Coeff. Signif.
 2.41810 5 .11012 P<.05

The relationship between formal education and most of the transformation variables is insignificant at the .05 level. In the first place, sample distribution shows that over 81 per cent of the respondents have had formal education at different levels. About 10 per cent have had no formal education. Tables 14 and 15 show two cases of the relationship between farmers' level of formal education and agricultural transformation. The relationship between sunflower growing and formal education is insignificant, an indication that the two variables are not related, that is, a farmer's formal education does not influence his choice of growing sunflower. The growing of sunflower does not involve complex processes which require specialized understanding. Together with the advantages already noted, any farmer is motivated to grow the crop. Similarly the relationship between farmers' formal educational level and their use of chemical fertilizers is insignificant (Table 15). From past experience, all farmers understand the need for fertilizer application in crop production. Therefore, formal education by farmers does not influence their rationality in adopting fertilizer

Table 14 Sunflower growing by formal education

Sunflower growing	Level of formal education					Total
	Primary	Secondary	Middle College	University	None	
Yes	28.5(43)	40.4(61)	16.6(25)	4.0(6)	10.6(16)	81.2(151)
No	42.9(15)	22.9(61)	17.1(6)	2.9(1)	14.3(5)	18.8(35)
Total	31.2(58)	37.1(69)	16.7(31)	3.8(7)	11.3(21)	100.0(186)

χ^2

D.F

Conting. Coeff.

Signif.

4.68338

4

.15672

P<.05

application. These data do not lend support to the hypothesis. On the basis of these findings, the author disagrees with Hunt (1975), Uchendu and Anthony (1975) and Misiko (1976) who treat formal education as a crucial factor in understanding farmers' adoption of agricultural innovations. However, formal education and farmers' adoption of novel practices can reasonably be understood in terms of indirect relationships. Ogionwo (1975) found that although education and innovativeness were related, the relationship was not so strong (Goldthorpe, 1975:220-24).

The period of time over which farmers had engaged themselves in farming business was considered crucial to their adoption of agricultural innovations. The sample showed that most of the farmers had conducted farming business since the 1970s and the 1980s, accounting for about 33 per cent and 29 per cent, respectively. Those who started the business in the 1950s and the 1960s accounted for about 10 per cent and 19 per cent, respectively. A cross-categorization of this variable with all agricultural transformation

Table 15: Use of chemical fertilizers by formal education

Use of chemical fertilizers	Level of formal education					Total
	Primary	Secondary	Middle College	University	None	
Yes	31.2(53)	36.5(62)	17.1(29)	4.1(7)	11.2(19)	91.4(19)
No	31.3(5)	43.8(7)	12.5(2)		12.5(2)	8.6(16)
Total	31.2(58)	37.1(69)	16.7(31)	3.8(7)	11.3(21)	100.0(186)

χ^2	D.F	Conting. Coeff.	Signif.
1.07278	4	.07573	P<.05

variables shows that most coefficients are insignificant. Significant coefficients are realized with respect to sugarcane, coffee, cash cropping in general, use of the tractor and opinion on hybrid seed yield. Thus, length of farming business influences the production of cash crops with long "gestation" periods, and use of expensive machinery. For instance, the relationship between sugarcane a demanding crop, and length of farming business, as shown in Table 16, is significant at the .05 level. However, going by the relative distribution of respondents among the cells, no specific time period is singularly related to innovative behaviour. The rest of the variables are insignificantly related to length of farming business. For instance, as many farmers with different experiences in farming are growing sunflower, due to its inherent advantages as already noted. . Consequently, the relationship between the growing of sunflower and length of farming business is insignificant at the .05 level (Table 17). Going by this judgement, we conclude that length of farming business does not affect agricultural change.

Table 16: Sugarcane growing by length of farming business

Sugarcane growing	Length of business					Total
	Since 1980s	Since 1970s	Since 1960s	Since 1950s	Other	
Yes	24.8(30)	34.7(42)	26.4(32)	10.7(13)	3.3(4)	58.2(121)
No	36.8(32)	32.2(28)	10.3(9)	9.2(8)	11.5(10)	41.8(87)
Total	29.8(62)	33.7(70)	19.7(41)	10.1(21)	6.7(14)	100.0(208)

X²

D.F.

Conting. Coeff

Signif.

14.35472

4

.25408

P>.05

In this study, it was also the investigator's assumption that farmers who are involved in other occupations such as salaried employment and commercial enterprises were more prone to innovativeness than those without such occupations. This assumption is related to the general assumption that such farmers are willing to take the risks involved in adopting new practices because they are economically secure compared to their counterparts who are not involved in off-farm activities. However, cross-tabulations involving occupation on the one hand and agricultural transformation on the other, show that most relationships are insignificant at the .05 level. Significant levels are attained for relationships involving the cultivation of kales, coffee, sugarcane and the use of the tractor. A possible explanation for this tendency is that the cultivation of kales, coffee, and sugarcane on a commercial scale requires a substantial capital outlay. A combination of farm and non-farm occupations puts a farmer in a better position to raise such operational capital. Similarly the use of a tractor by a small-holder farmer is achieved if such a farmer has access to multiple

Table 17: Sunflower growing by length of farming business

Sunflower growing	Length of farming business					Total
	Since 1980s	Since 1970s	Since 1960s	Since 1950s	Other	
Yes	13.4(53)	33.1(56)	18.9(32)	10.1(17)	6.5(11)	81.3(169)
No	23.1(9)	35.9(14)	23.1(9)	19.3(4)	7.7(3)	18.7(39)
Total	29.8(62)	33.7(70)	19.7(41)	10.1(21)	6.7(14)	100.0(208)

χ^2

D.F

Conting. Coeff.

Signif.

1.14428

4

.07397

P<.05

sources of income. Table 18 shows the relationship between the growing of kales and occupation. This relationship is typical of other significant relationships. But, for most of the variables involving the general small-holder requirements, chi-square values show that occupation is not an explanatory factor. The variables in question include cultivation of sunflower, food-cropping, ploughing methods, seed selection and fertilizer application, among others. These variables attain insignificant levels when tested through chi-square. As shown in Table 19, farmers who use chemical fertilizers are as many as those who are engaged in other occupations, yet the relationship between the two variables fails to attain significance at the .05 level. In addition, a good proportion of the "non-occupational" farmers are using fertilizers. Thus, occupation does not directly influence innovative behaviour. This is contrary to the observations made by Brokensha and Riley (1980) and Hunt (1975) who view occupation and innovativeness as inseparable.

Table 18: Growing of kales by occupation

Growing of kales	Occupation				Total
	Employment	Trading	Other	None	
Yes	36.1(39)	23.1(25)	1.9(2)	38.9(42)	51.4(108)
No	16.7(17)	35.3(36)	3.9(4)	44.1(45)	48.6(102)
Total	26.7(56)	29.0(61)	41.4(87)	2.9(6)	100.0(210)

χ^2 D.F Conting. Coeff. Signif.
 11.23432 3 .22534 P>.05

Table 19: Use of chemical fertilizers by occupation

Use of chemical fertilizers	Occupation				Total
	Employment	Trading	Other	None	
Yes	26.8(52)	29.4(57)	2.6(5)	41.2(80)	92.4(194)
No	25.0(4)	25.0(4)	6.3(1)	43.8(7)	7.6(16)
Total	26.7(56)	29.0(60)	2.9(6)	41.4(87)	100.0(210)

χ^2

.83606

D.F

3

Conting. Coeff.

.06297

Signif.

P<.05

The last social characteristic of farmers in the series is the number of dependents. It was reasoned that agricultural transformation is a function of an individual having many dependants, a condition which forces such a person to venture into new production practices. Unlike in the preceding cases, most of the correlations between this variable and the independent variable attain significant levels when tested for chi-square at the .05 level. Most of these significant relationships involve the cultivation of all cash crops, the use of the tractor, food crops and use of the hybrid seed. A typical case is the cultivation of coffee (see Table 20). Coffee tends to generate regular income once it attains maturity. At the same time it is a perennial crop whose labour requirements are spread throughout the year. Most farmers, especially those without any other sources of income but who have many dependents, would prefer growing coffee in order to make use of the available labour and at the same time meeting their requirements for cash income. It follows that having many dependants, to a greater extent, influences agricultural transformation.

Table 20: Coffee growing by number of dependants

Coffee growing	Have many dependants?					Total
	Strongly Agree	Agree	No. Opinion	Disagree	Strongly Disagree	
Yes	28.7(27)	33.0(31)	2.1(2)	33.0(31)	3.2(3)	44.8(94)
No	32.8(38)	27.6(2)	1.7(2)	23.3(27)	14.7(17)	44.2(116)
Total	31.0(65)	30.0(63)	1.9(4)	27.6(58)	9.5(20)	100.0(210)

χ^2	D.F	Conting. Coeff.	Signif.
9.75558	4	.21070	P>.05

In this section it has been found that agricultural transformation in Webuye Division is not influenced by farmers' age, education, length of farming business and occupation. On the other hand, having many dependants is found to influence agricultural transformation. Weighing the evidence, the number of cases refuting the hypothesis far exceeds the one case in support of the hypothesis. The hypothesis is rejected.

CHAPTER 5

DATA ANALYSIS-CONTINGENCY II

5.1 Conservatism Relative to Factors of Production

Non-innovation in farming practices was viewed as resistance to, or non-adoption of, new agricultural practices or cultivars. This was conceptualized as conservatism. This was seen as not being a reflection of ignorance or backwardness but as a product of forces external to the abilities of the farmers in their efforts to adjust to change. These forces are grounded in the "factors of production" which tend to determine the degree of innovativeness among farmers. Where these factors do not act as obstacles, they are seen as an incentive to farmers, but when limited, they operate as disincentives.

In this section, data are brought to bear on the third hypothesis that conservatism on the part of individuals is a function of limited factors of production. Conservatism was conceptualized as a dependent variable while factors of production constitute the in-

dependent variable. In this regard, the indicators of conservatism were:

- (i) cultivation of millet;
- (ii) cultivation of sorghum;
- (iii) cultivation of sweet potatoes;
- (iv) cultivation of cassava;
- (v) cultivation of indigeneous vegetables;
- (vi) cultivation of groundnuts/sim sim;
- (vii) use of the hoe in land preparation;
- (viii) use of non-hybrid seed.

Data for factors of production were gathered on the basis of:

- (i) size of farming land;
- (ii) prices of chemical fertilizers;
- (iii) availability of operational capital;
- (iv) availability of labour;
- (v) favourable transportation systems;
- (vi) contact with agricultural extension agents;
- (vii) desirability of agricultural extension;
- (viii) membership of farmers' co-operative societies.

Significance tests were applied to ascertain the relationship between each dependent variable and all the independent variables based on the chi-square distribution and contingency coefficients at the .05 level.

The relationship between the size of farming land and the dependent variables is significant except with respect to the growing of indigenous vegetables and the use of the hoe. The cultivation of vegetables and the use of the hoe are traditional practices for which the size of land is not an important factor as farm-land for these activities is usually very small. The relationship between the growing of indigenous vegetables and land size as shown in Table 21 is insignificant. Here, we see that a larger proportion of the respondents (about 68 per cent) grow the crop. Going by the respondents' distribution among the cells, it is noticed that farmers with smaller pieces of land are as associated with the growing of indigenous vegetables as are their counterparts with larger pieces of land. Similarly, for the non-growers, the pattern remains the same. We, therefore,

Table 21: The relationship between the growing of indigenous vegetables and land size

Growing of indigenous vegetables	Size of land (ha)						Total
	Below 2	2-4	5-6	7-8	9-10	10+	
Yes	39.0(55)	27.7(39)	13.5(19)	9.9(14)	2.8(4)	7.1(10)	67.8(141)
No	26.9(18)	23.9(16)	10.4(7)	13.4(9)	4.5(3)	20.9(14)	32.2(67)
Total	35.1(73)	26.4(55)	12.5(26)	11.1(23)	3.4(7)	11.5(24)	100.0(208)

χ^2

D.F

Conting. Coeff.

Signif.

10.85335

5

.22269

P<.05

conclude that the size of land does not influence the growing of indigenous vegetables.

In Table 22, we see the relationship between land size and the growing of millet. In the first place, less than half of the sample (47 per cent) are respondents who grow millet. Secondly, a larger proportion of millet growers (about 75 per cent) own the smallest landholdings (less than 6 hectares in size). On the other hand, for the non-growers of millet, who represent 53 per cent of the sample, respondents with smaller landholdings still make a majority (74 per cent). Finally, the relationship between the two variables is significant at .05 level). It follows that the size of land influences crop production. This finding is consistent with the arguments presented by Hunt (1975) and Brokensha and Riley (1980) in relation to innovativeness.

Most respondents (about 90 per cent) were of the opinion that the prices of chemical fertilizers are not good. However, cross-tabulations between fertilizer prices and the dependent variables show that most cases do not

Table 22: Growing of millet by land size

Growing of millet	Size of land (ha)						Total
	Below 2	2-4	5-6	7-8	9-10	10+	
Yes	25.5(25)	27.6(27)	21.4(21)	14.3(14)	3.1(3)	8.2(8)	47.1(98)
No	43.6(48)	25.5(28)	4.5(5)	8.2(9)	3.6(4)	14.5(16)	52.9(110)
Total	35.1(73)	26.4(55)	12.5(26)	11.1(23)	3.4(7)	11.5(24)	100.0(208)

χ^2

20.38293

D.F.

5

Conting. Coeff.

.29875

Signif.

$p > .05$

attain significance. Significance is attained in the case of millet, indigenous vegetables and the non-hybrid seed. Traditionally these crops are not grown on a large scale. So the requirements for chemical fertilizers are minimal. In addition, the ideal nutrients for these crops which are grown for domestic purposes are animal or composite manure. The rest of the traditional agricultural practices are insignificantly related to the defined factor of production (fertilizer prices).

Closely related to fertilizer prices is the availability of the operational capital. Capital is an essential determinant as far as farm inputs are concerned. It is common knowledge that agricultural development is determined, in part, by the degree to which capital formation is made possible. In Webuye the main sources of capital for farmers are income generated by sale of farm produce, loans and salaried employment. However, the greatest source of farm capital was seen to be sale of farm produce which accounted for over 90 per cent of the sample. Acquisition of capital by means of loans was represented by about 40 per

cent of the respondents, while for salaried employment, only 24 per cent of the respondents were involved. Although there appear to be multiple sources of capital among the farmers, it is not easily available. Over 90 per cent of the respondents observed indicated that they experienced difficulties in obtaining the operational capital. Asked as to whether they were satisfied with the way they obtain capital, 81 per cent of them expressed dissatisfaction. However, cross-tabulation of this variable with conservatism show insignificant relationships. In short, no relationship exists between availability of operational capital and conservatism.

Labour as a factor of production shows both significant and insignificant relationships with the dependent variable. Significant relationships include those pertaining to the cultivation of millet, cassava and indigenous vegetables. Relationships involving the cultivation of sorghum and groundnuts/sim sim and the use of the hoe are insignificant. In Webuye Division farm labour is mainly borne by the farmers themselves - either family members or by the co-operation of

friends and relatives on a "merry-go-round" basis. More affluent farmers employ hired labour. In Table 23 a relationship is set between the growing of groundnuts/sim sim and farmers' satisfaction with labour availabilities. It is easily noticed that a majority of the respondents (80 per cent) do not grow these crops. At the same time a large number of them (53 per cent) are dissatisfied with labour availabilities. However, the chi-square value (highly insignificant) shows that the two variables are not related, that is, labour is not related to the growing of groundnuts and sim sim. It is, therefore, concluded that conservatism cannot be attributed to lack of sufficient labour.

Table 23: The relationship between labour and growing of groundnuts/sim sim

Growing of groundnuts/ sim sim	Labour availabilities		Total
	Satisfied	Dissatisfied	
Yes	41.5(17)	58.5(24)	19.6(41)
No	47.6(80)	52.4(88)	80.4(168)
Total	46.4(97)	53.6(112)	100.0(209)

χ^2	D.F	Conting. Coeff.	Signif.
.28511	1	.04896	P<.05

In Webuye Division, transportation of agricultural produce other than sugarcane, to the buying centres is done by means of ox-drawn sledges, ox-carts, bicycles, wheel-burrows and human potterage. Well-to-do farmers, who produce in larger quantities, use lorries. Sugarcane is transported by means of trailers from the Nzoia Sugar Company. When farmers were asked to express their opinion on transportation of their produce to buying centres, most of them were dissatisfied. Cross-tabulation, however, shows that transportation is not related to the hypothesized dependent variable. For instance, the relationship between transportation and the growing of sorghum, as shown in Table 25, is insignificant. It is evident that while a large

Table 24: Transportation by growing of sorghum

Growing of sorghum	Transportation of produce		Total
	Satisfied	Disatisfied	
Yes	28.2(20)	71.8(51)	33.8(71)
No	32.4(45)	67.6(94)	66.2(136)
Total	31.0(65)	69.0(145)	100.0(210)

χ^2	D.F	Conting. Coeff.	Signif.
.21696	1	.04299	P<.05

proportion of the respondents are dissatisfied with the means of produce transportation, a small fraction of them are engaged in the cultivation of sorghum. The insignificant relationship between the two variables shows that they are not related. Transportation does not influence the growing of sorghum. Sorghum, like other traditional cereals, has been overtaken by maize as a staple food crop. However, it is grown by some farmers mostly for home consumption and for brewing of traditional beer. For this reason, it is mostly marketed locally for it is not produced in large quantities. In actual sense, transportation is not a crucial factor in the cultivation of traditional crops. The data, therefore, do not support the hypothesized relationship.

The role of agricultural extension service was seen as one of the most important factors as far as agricultural change is concerned. Thus, it was reasoned that inadequate provision of extension service to farmers is likely to make them less receptive to innovations, thereby leading to conservatism. In this perspective, data were collected in respect of farmers' contact with

agricultural extension agents, the officials responsible for disseminating or communicating the recommended practices and innovations to farmers. Farmers were asked whether they are usually in contact with extension agents. Sample responses show that 56 per cent of the respondents had had such contacts. Out of this lot about 36 per cent usually visited the extensionists, while 54 per cent were being visited on their farms by the extensionists.

To gather more data for extension service, farmers were asked to state how often they are in contact with these agents. It was found that 16 per cent were in frequent contacts, 47 per cent had made occasional contacts, while 37 per cent had never made such contacts. On the basis of these data, all the relationships between this variable and the dependent variables fail to attain significance at the .05 level when tested for chi-square. Tables 25, 26 and 27 show some of these cases. In Table 25, we notice that the proportion of respondents who grow cassava equals that for the respondents who are accessible to extension services. Similarly, the proportion of those not growing the crop equals that for those who are in-

accessible to extension services. We get almost the same impression from Table 26. Generally

Table 25: Cultivation of cassava by contact with extension agents

Growing of cassava	Contact with agricultural extensionists		Total
	Yes	No	
Yes	56.8(67)	43.2(51)	56.7(118)
No	55.6(50)	44.4(40)	43.3(90)
Total	56.3(117)	43.8(91)	100.0(208)

χ^2	D.F	Conting. Coeff.	Signif.
.00124	1	.01222	P<.05

speaking, significant proportions of the respondents are either growing or not growing the crops in question. Similarly, for agricultural extension, the same pattern obtains although those in contact with the extensionists have a slight margin over those who are not in contact. However, despite the fact that extension services are well provided chi-square values for the relationships between the variables in question are too low, almost

Table 26: Cultivation of indigenous vegetables
by contact with agricultural extension
agents

Growing of indigenous vegetables	Contact with agricultural extensionists		Total
	Yes	No	
Yes	59.2(84)	40.8(58)	68.3(142)
No	50.0(33)	50.0(33)	31.7(66)
Total	56.3(117)	43.7(91)	100.0(208)

χ^2	D.F	Conting. Coeff.	Signif.
1.18508	1	.08558	P<.05

negligible. In Table 27, the proportion of respondents engaged in crop production decreases tremendously relative to extension services. However, the relationship between the two variables still remains highly insignificant. All these cases attest to the fact that lack of agricultural extension is not attributed to traditional agricultural practices in Webuye. These data do not hold for our hypothesized relationship.

Table 27: Cultivation of groundnuts/sim sim by contact with agricultural extension agents

Cultivation of groundnuts/sim sim	Contact with agricultural extensionists		Total
	Yes	No	
Yes	59.5(25)	40.5(17)	20.2(42)
No	55.4(92)	44.6(74)	79.8(166)
Total	56.3(117)	43.8(91)	100.0(208)

χ^2	D.F	Conting. Coeff.	Signif.
.09282	1	.03318	P<.05

Further investigations were made in order to get a general view of farmers' perception of extension services. This was intended to establish the extent to which small-holder farmers recognized the role of extension service. This question was met with mixed reactions. In all, 60 per cent of the sample respondents felt that it was desirable, 16 per cent expressed no opinion, while 24 per cent felt that it was undesirable. Tables 28 and 29 are cross-tabulations for the relationships between farmers' view of their contacts with extensionists and some of the hypothesized dependent variables.

Table 28: Growing of millet by farmers' view of extension services

Growing of millet	View of agricultural extension services					Total
	Highly Desirable	Desirable	No Opinion	Undesirable	Highly Undesirable	
Yes	32.3(32)	29.3(29)	12.1(12)	15.2(15)	11.1(11)	47.1(99)
No	20.7(23)	37.8(42)	19.8(22)	14.4(16)	7.2(8)	52.9(111)
Total	26.2(55)	33.8(71)	16.2(34)	14.8(31)	9.0(19)	100.0(210)

χ^2 D.F Conting. Coeff. Signif.
 6.63608 4 .17502 P<.05

We notice that although some farmers continue with the cultivation of these traditional crops, they are equally aware of the importance of agricultural extension. However, further probing indicated that farmers were dissatisfied with the services. Asked whether extension agents were doing good work, 24 per cent expressed approval, 32 per cent were undecided, while 44 per cent expressed disapproval. This pattern of responses reflects another problem, related to the actual personnel at the farmers' interface. Among the respondents 67 per cent felt extension officials in the area were few, 26 per cent expressed no opinion, while the remaining 7 per cent were satisfied. Cross-tabulation between farmers' view of their contact with agricultural extension agents with the dependent variable shows significant relationships with the cultivation of cassava and indigenous vegetables (see Table 29). On the other hand, insignificant relationships involve those pertaining to the cultivation of millet, sorghum, groundnuts/sim sim and the use of the hoe. It follows that even the views expressed by the respondents over extension service are at variance with their traditional production systems. It is

Table 29 : Growing of cassava by farmers' view of extension services

Growing of cassava	View of agricultural extension services					Total
	Highly Desirable	Desirable	No. Opinion	Undesirable	Highly Undesirable	
Yes	27.1(32)	29.7(35)	11.9(14)	19.5(23)	11.9(14)	56.2(118)
No	25.0(23)	39.1(36)	21.7(20)	8.7(8)	5.4(5)	43.8(92)
Total	26.2(55)	33.8(71)	16.2(34)	14.8(31)	9.0(19)	100.0(210)

χ^2

D.F

Conting. Coeff.

Signif.

11.01668

4

.22326

P>.05

generally concluded that agricultural extension service does not influence farmers' conservative farming practices. In addition, it is argued here that non-adoption of certain agricultural practices cannot be accounted for by lack of extension services in the area.

The last variable under consideration is farmers' membership of co-operative societies. This was intended to measure the farmers' degree of "social participation" relative to their production activities. The sample shows that approximately 55 per cent of the respondents were members of at least one co-operative society. Concerning their satisfaction with co-operative services, 47 per cent expressed dissatisfaction, about 36 per cent had no opinion, while 17 per cent expressed satisfaction. Regardless of their membership of co-operative societies, farmers were asked to express their opinion on the desirability of farmers' co-operative societies. The responses show that 60.5 per cent supported the idea, 34.3 per cent were undecided while 5.2 per cent did not support the idea. This shows that farmers in Webuye are highly conscious of co-operative effort and equally

Table 30: Growing of sorghum by farmers' opinion on the desirability of farmers' co-operative societies

Growing of sorghum	Opinion on the desirability of farmers' co-op. societies					Total
	Strongly Support	Support	Undecided	Don't Support	Strongly Don't Support	
Yes	26.8(19)	36.6(26)	31.9(22)	2.8(2)	2.8(2)	33.8(71)
No	25.2(35)	33.8(47)	36.0(50)	4.3(6)	0.7(1)	66.2(139)
Total	25.7(54)	34.8(73)	34.3(72)	3.8(8)	1.4(3)	100.0(210)

χ^2	D.F	Conting. Coeff.	Signif.
2.21752	4	.10222	$P < .05$

accessible to co-operative institutions. However, cross-tabulations between the variable with the dependent variable show most cases of no relationships. The cultivation of cassava and indigenous vegetables show significant relationships with opinion on the viability of farmers' co-operative societies. The cultivation of millet, sorghum and groundnuts/sim sim and the use of the hoe show insignificant relationships with the same variable. For instance, the relationship between the cultivation of sorghum and the desirability of the farmers' co-operative society as shown in Table 30 indicates that the two variables are unrelated. It is noticed that although a small fraction of the farmers are engaged in the cultivation of sorghum, a good proportion of them are aware of the need for farmers' co-operative societies. This shows that conservatism among some farmers cannot be attributed to lack of co-operative institutions or farmers' ignorance of such institutions.

In conclusion, it has been found that land, as a major factor of production, is a limiting factor leading to farmers' conservative

behavior. On the other hand, it is apparent that conservative behaviour is not contingent upon factors related to the prices of farm inputs, operational capital, labour, transportation, extension services and co-operative institutions. By weighing the two sides, it is seen that cases in disagreement with the hypothesis far outnumber the one case in support of the same hypothesis. Therefore, the hypothesis is rejected.

5.2 Patterns of Agricultural Transformation Relative to Extended Family Relations

In many societies economic activities tend to go hand in hand with modes of social organization. In such societies, especially the traditional societies, economic activities are strongly tied to kinship systems, whereby activities are collectively performed by members of a kinship community (Klaus, 1976; Mbithi, 1974).

In the present study, agricultural transformation was investigated in the realm of both intra- and inter-family relations in order to establish the extent to which economic change is reflected in social change. This is

the cornerstone of our final hypothesis which stated that the transformation of traditional agriculture is likely to be a function of changes in extended family relations. Changes in extended family relations constitute the independent variable while the transformation of traditional agriculture remains the dependent variable. The indicators of the dependent variable as in the previous cases remain the same. These are:

- (i) cultivation of kales;
- (ii) cultivation of coffee;
- (iii) cultivation of sunflower;
- (iv) cultivation of sugarcane;
- (v) use of the tractor;
- (vi) use of the hybrid seed;
- (vii) use of chemical fertilizers;
- (viii) acceptance of new farming practices.

Data for extended family relations were gathered on the basis of:

- (i) marital arrangements (monogamy, polygamy, etc.);
- (ii) communal labour;
- (iii) land tenure system;
- (iv) communal residence;

- (v) individual planning, decision-making and management of farm activities;
- (vi) opinions on individual ownership of land;
- (vii) opinions on group ownership of land.

As in the previous cases cross-tabulations were run between transformation and extended family relations and significance tests of chi-square and contingency coefficients worked out at the .05 level. The results show that nearly all the cases fail to attain significance levels. However, it is important to understand in detail the meaning underlying these relationships using selected examples in respect of our hypothesis.

The relationships between marital arrangements and agricultural transformation are all insignificant. In the first place the sample data show that monogamy is quite dominant. In addition, some households were characteristic of single-parenthood. All these combined took 77.6 per cent of the sample while the remaining 22.4 per cent were cases of polygamy. Although

Table 31: Coffee growing by marital status

Growing of coffee	Marital status					Total
	Monogamy	Single	Widowed	Devorced/ Separated	Polygamist	
Yes	57.4(54)	3.2(3)	11.7(11)	2.1(2)	25.5(24)	44.8(94)
No	62.9(73)	5.2(6)	9.5(11)	2.6(3)	19.8(23)	55.2(116)
Total	60.5(127)	4.3(9)	10.5(22)	2.4(5)	22.4(47)	100.0(210)

χ^2 D.F. Conting.Coeff. Signif.
 1.77855 4 .09164 $P < .05$

Table 32: Sunflower growing by marital status

Growing of sunflower	Marital status					Total
	Monogamist	Single	Widowed	Divorced/ separated	Polygamist	
Yes	59.6(102)	4.7(8)	10.5(18)	2.4(4)	22.8(39)	81.4(171)
No	64.1(25)	2.6(1)	10.3(4)	2.6(1)	20.5(8)	18.6(39)
Total	60.5(127)	4.3(9)	10.5(22)	2.4(5)	22.4(47)	100.0(210)

χ^2

.51902

D.F

4

Conting. Coeff.

.04965

Signif.

$P < .05$

family arrangements tend to show the prevalence of monogamy, the relationship between marital status and agricultural transformation is insignificant (see Table 31). In other words, marital arrangement does not influence agricultural transformation. Typical examples are the cultivation of coffee and sunflower as shown in Tables 31 and 32 respectively. In both cases monogamy is dominant although many farmers are growing sunflower compared to those growing coffee. In both cases chi-square values are very low.

In Webuye Division, farm labour comes from different sources - family members, friends and relatives, or it may be hired in the case of more affluent farmers. However, the sample data show that friends and relatives, in addition to family members, are important assets as far as farm labour requirements are concerned. For instance this kind of labour accounts for about 60 per cent of all the labour requirements for coffee, 65 per cent for sugarcane and 60 per cent for sunflower. The relationship between communal labour and agricultural transformation attains significance

nearly on all variables. Tables 33 and 34 show the relationships between communal labour and the cultivation of coffee, and communal labour and the cultivation of sugar-cane respectively. Coffee and sugar cane are cash crops that require extremely substantial amounts of labour. For coffee, the major tasks include planting, regular weeding, top dressing, mulching, spraying of pesticides, and picking the ripe berries (harvesting). All these tasks are the responsibility of individual farmers. The major tasks in the cultivation of sugar cane are planting, weeding and top dressing. Ploughing and harvesting are borne by the Nzoia Sugar Company. Under these circumstances family labour appears to be quite inadequate when employed alone. Most small-holder farmers are low-income earners who may not afford hiring the labour in return for payment. Therefore, communal labour becomes viable, calling for the assistance of friends and relatives. Because of this, individuals tend to maintain close kinship ties. Corporate labour and other tasks which require collective responsibility are a reflection of the continuation of kinship ties, drawing in members of the extended families. In Table 33, we find

Table 33: Cultivation of coffee by communal labour

Growing of coffee		Communal labour		Total
		Yes	No	
Yes		60.6(57)	39.4(37)	44.8(94)
No		62.1(72)	37.9(44)	55.2(116)
Total		61.4(129)	38.6(81)	100.0(210)

χ^2	D.F	Conting. Coeff.	Signif.
.00479	1	.01461	P<.05

that communal labour is employed by a greater proportion of the respondents regardless of whether they grow or they do not grow coffee. In addition, a majority of the coffee growers employ communal labour. We get the same impression from data involving communal labour and the cultivation of sugar cane (Table 34). Arising out of this is the conclusion that despite agricultural transformation having taken place, communal labour, which is characteristic of traditional economic systems, still exists. Since Chi-square values for the relationships between agricultural transformation and communal labour are extremely insignificant, it follows that the two variables are unrelated, that is, agricultural

Table 34: Cultivation of sugar cane by communal labour

Growing of sugar cane	Communal labour		Total
	Yes	No	
Yes	65.9(81)	34.1(42)	58.6(123)
No	55.2(48)	33.8(39)	41.4(87)
Total	61.4(129)	38.6(81)	100.0(210)

X^2	D.F	Conting. Coeff.	Signif.
2.02355	1	.10747	P<.05

transformation is not influenced by change in extended family relations as defined by labour arrangements. In accordance with these findings we reject our hypothesis, that is, although traditional agriculture has undergone change, continued extended family relations are vital for the sustenance of labour requirements.

Land tenure systems in Webuye seem to have lost the traditional impetus of corporate ownership. In Webuye, two modes of land acquisition were found operative - acquisition through inheritance and personal purchase. The sample shows that about 60 per cent of the respondents obtained their

pieces of land through inheritance. This is purely a traditional trait. On the other hand, 33 per cent of the respondents obtained their pieces of land by means of personal purchase. The remaining 7 per cent acquired land through a combination of both inheritance and purchase. On land control, it is noticed that about 95 per cent of the respondents have exclusive rights in their pieces of land. In other words, land control is an individual affair. However, some few instances show that land is controlled by clan leaders or even village heads. As evidence for individual ownership of land, respondents were asked to show whether they possessed title deeds to their plots. It was found that 76 per cent of them owned title deeds while the remaining 24 per cent did not. Under this arrangement, however, significance tests for the relationship between land tenure and agricultural transformation attain very low levels. All are insignificant at the .05 level. Therefore no relationship exists between land tenure and agricultural transformation. Tables 35 and 36 show the relationship between land tenure and some variables of agricultural transformation.

In both cases, the relationship between the two variables in question are too insignificant, hence a reflection of no association between them.

Table 35: Growing of coffee by land control

Growing of coffee	Land control			Total
	Individuals	Headmen	Elders	
Yes	95.7(89)	1.1(1)	3.2(3)	45.1(93)
No	94.7(107)	2.7(3)	2.7(3)	54.9(113)
Total	95.1(196)	1.9(4)	2.9(6)	100.0(206)

χ^2	D.F	Conting. Coeff.	Signif.
.71808	2	.05894	P<.05

Therefore changes in land tenure systems cannot be said to be associated with agricultural change. Plausibly the relationship between the two variables can be viewed as random. Thus, data on these variables do not support our hypothesis.

Apart from the actual observations of land tenure system, respondents were asked to express opinion on which system of land tenure, individual or corporate, they most preferred. On group ownership of land, about 85 per cent considered it

Table 36: Growing of sugar cane by land control

Growing of sugar cane	Land control			Total
	Individuals	Headmen	Elders	
Yes	96.7(118)	1.6(2)	1.6(2)	59.2(122)
No	92.9(78)	2.4(2)	4.8(4)	40.8(84)
Total	95.1(196)	1.9(4)	2.9(6)	100.0(206)

χ^2	D.F	Conting. Coeff.	Signif.
1.88434	2	.09521	P<.05

poor or very poor, about 7 per cent considered it fair, while 8 per cent found it good or very good. When data on this variable are cross-tabulated with the dependent variable, some cases attain significance while others do not. Cases which attain significance include: innovations related to the cultivation of kales, sugar cane and sunflower; the use of the tractor; and opinion on the proposal to introduce tea growing. For these innovations, which involve a majority of cash crops, it is inferred that co-operation among members of the extended family in the form of corporate ownership of land, is necessary in order to meet the labour demands and expenses that may be incurred. Table 37 shows the relationship between the cultivation of kales and

Table 37: Growing of kales by attitude towards group ownership of land

Growing of kales	Attitude towards group ownership of land					Total
	Very poor	Poor	Fair	Good	Very good	
Yes	46.3(50)	33.3(36)	10.2(11)	6.5(7)	3.7(4)	51.4(108)
No	29.4(30)	61.8(63)	3.9(4)	3.9(4)	1.0(1)	48.6(102)
Total	38.1(80)	47.1(99)	7.1(15)	5.2(11)	2.4(5)	100.0(210)

X²

18.09183

D.F

4

Conting. Coeff.

.28163

Signif.

P>.05

attitude towards group ownership of land. It can clearly be seen that although a reasonable proportion of respondents are growing kales, a very large proportion of them have a negative attitude towards group ownership of land. Thus, the significant relationship between the two variables could be viewed as a reflection of this attitude, otherwise it renders the relationship meaningless. On the other hand cases which show insignificant relationships may be viewed as instances where collective responsibility is irrelevant. Examples here include the cultivation of coffee, the type of seed used, and use of chemical fertilizers and animal manure. Under such practices, it seems group ownership of land is a liability rather than an asset. Table 38 shows the relationship between coffee growing and attitude towards group ownership of land. It can be seen that while a smaller fraction of the respondents cultivate coffee, most of them are opposed to group ownership of land. Consequently the relationship between the two variables is insignificant.

Table 38: Coffee growing by attitude towards group ownership of land

Growing of coffee	Attitude towards group ownership of land					Total
	Very poor	Poor	Fair	Good	Very good	
Yes	28.7(27)	56.4(53)	8.5(8)	4.3(4)	2.1(2)	44.8(94)
No	45.7(53)	39.7(46)	6.0(7)	6.0(7)	2.6(3)	55.2(116)
Total	38.1(80)	47.1(99)	7.1(15)	5.2(11)	2.4(5)	100.0(210)

χ^2	D.F	Conting. Coeff.	Signif.
7.81076	4	.18937	P<.05

To safeguard against possible bias, respondents were also asked to express their attitude towards individual ownership of land. It was found that only about 4 per cent viewed the system as being poor, while about 9 per cent said it was fair. Over 85 per cent highly favoured the system. Cross-tabulations between this variable and the dependent variable take the same pattern, almost similar, to those involving group ownership of land. Significant levels are achieved for relationships involving: the cultivation of kales, sugar cane and sunflower; the use of the tractor; opinion on hybrid seed yield; and opinion on the proposal to introduce the growing of tea. On the other hand, relationships involving the cultivation of coffee, the type of maize seed used, and the use of chemical fertilizers and animal manure, are quite insignificant. For instance, Table 39 shows that no relationship exists between the growing of coffee and individual ownership of land. However, most of the respondents in the sample are in favour of individual ownership of land.

Table 39: Coffee growing by attitude towards individual ownership of land

Growing of coffee	Attitude towards individual ownership of land					Total
	Very poor	Poor	Fair	Good	Very good	
Yes	3.2(3)	1.1(1)	11.0(11)	55.9(52)	28.0(26)	44.9(93)
No	.9(1)	2.6(3)	7.0(8)	48.2(55)	41.2(47)	55.1(114)
Total	1.9(4)	1.9(4)	9.2(19)	51.7(107)	35.3(73)	100.0(207)

χ^2

6.53572

D.F

4

Conting. Coeff.

.17495

Signif.

P<.05

Practically, the system of land tenure in Webuye is that of private as opposed to corporate ownership. Private tenure systems call for changes in extended family relations. On the other hand, corporate tenure systems tend to maintain and lead to continuance of extended family relations. But opinion surveys show that neither of these two systems is directly related to agricultural transformation. In other words, land tenure system does not influence innovative behaviour. In so far as statistical evidence tallies with empirical reality, the findings are incongruent with the hypothesized relationship. The hypothesis is not supported by data on land tenure and agricultural transformation.

Change in extended family relations implies that collective responsibilities and burdens are eschewed. Such change leads to individualism which calls for personal planning, decision-making and management of farm activities. About 72 per cent of the respondents in the sample supported this view. Statistical relationships between this variable and transformation variables attain significance in most cases. Insignificant relationships are those

pertaining to the type of maize seed used and the use of chemical fertilizers and animal manure. Generally speaking, individualism is more skewed. This is probably because such a system leads to better management of farming activities and avoidance of intra-family strife.

The last independent variable in our hypothesis is communal residence. Here, concern was on whether a farmer stays with some relatives in his estate or not, and the kinds of relatives in residence. Most respondents were found to stay with their relatives both the immediate ones and members of the extended family. The sample data show that kinship ties among the members of most families are very much pronounced. Over 70 per cent of the respondents are found to be staying with their relatives ranging from close kins to the distant ones. However, correlations between communal residence and agricultural change are insignificant in most cases. Significant relationships are achieved with respect to the cultivation of coffee and sugarcane, the use of chemical fertilizers and opinion on the proposal to introduce the growing of tea. Since these practices are demanding in terms of

labour requirements, staying with relatives is an asset. However, the many cases of insignificant relationships point to the fact that communal residence does not influence agricultural transformation. In any case, innovation or non-innovation may be viewed as an individual affair by the farmers themselves, irrespective of their relatives. Table 40 shows the relationship between the growing of sunflower and staying with relatives. As it can be seen, as many farmers are growing sunflower as those who stay with their relatives. However, the relationship between the two variables is insignificant at the .05 level.

In testing the last hypothesis it has been found that marital arrangements, communal labour, communal residence and land tenure are not associated with agricultural transformation. On the other hand the traits of individualism are associated with agricultural transformation. Since the cases in conflict with the hypothesis exceed by far the cases in support of the same hypothesis, the hypothesis is rejected. Thus, although agricultural transformation in Webuye

Table 40: Growing of sunflower by communal residence

Growing of sunflower	Living with relatives		Total
	Yes	No	
Yes	73.1(122)	26.9(45)	81.5(167)
No	68.4(26)	31.6(12)	18.5(38)
Total	72.2(148)	27.8(57)	100.0(205)

χ^2	D.F.	Conting. Coeff.	Signif.
.14043	1	.04015	P<.05

is observed to have taken place, the importance of the extended family cannot be ruled out. According to Ogionwo (1969) traditionalism is not an obstacle to modernity and development; hence tradition and modernity are mutually reinforcing rather than being in conflict. The role of the extended family is important in terms of division of labour, supply of skill, training, accumulation of wealth and counselling of the members. People can, therefore, adopt new methods without necessarily having to disengage themselves from inter-familial ties.

In a nutshell, the process of agricultural transformation in Webuye Division lends support to the theory of diffusionism. Most of the farming practices have come about as a result of this process by means of different channels such as communication and sharing, that is, through contact between the farmers themselves or between the farmers in the community and their neighbouring communities or government agents. At the individual level, farmers have either accepted, rejected or modified such innovations in order to suit their environment, in which case, they become institutionalized.

CHAPTER 6

CORRELATION AND REGRESSION ANALYSIS

Correlation

This method was used essentially to establish the linear relationship between two variables in the light of the hypothesized relationships. Like in the case of the previous technique, the use of this method is discussed in the order of the four hypotheses.

Hypothesis 1: It is most likely that agricultural transformation is a consequence of modern socio-economic needs.

The results of Pearson correlation show that agricultural transformation in Webuye is both negatively and positively related to farmers' socio-economic needs (see Table 41).

The growing of kales is negatively related to farmers' opinion on the desirability of both cash and food crops ($r = -.3357$). The major reason for this relationship is that kales, which are grown for both food and cash, are now being grown at a decreasing rate and hectareage as a result of competition from sunflower and other cash crops.

This is especially towards the end of the year during the short rains. On the other hand, the growing of kales and farmers' opinion on a government proposal to introduce tea growing in the area are positively correlated ($r=.3424$), because both are income-generating crops. Payment of school fees, as a socio-economic need, is positively related to farmers' opinion on a government proposal to introduce tea growing in the area ($r=.4432$). This shows that since tea is a cash crop that is well-paying, income generated by tea could help farmers meet this essential need. This is conceived as a function of influence from the neighbouring region of Mount Elgon where tea is grown and farmers have been able to earn enough income which, in turn, has helped them meet most of their socio-economic needs. In the event of farmers in Webuye adopting tea, this then, could easily be attributed to such external influence. In terms of the diffusionist theory, this can be viewed as some kind of change resulting from culture contact (Clifton, 1976).

Purchase of valuable assets and farmers' desire to grow both cash and food crops are negatively related ($r= -.3479$).

This is a function of the decreasing hectareage of land as a result of land subdivision. In the 1960s and the 1970s land nectareage per individual farmer was adequate, which is not the case at present. Consequently, cash income from crop production is not sufficient for most farmers to buy a substantial amount of assets. The end result is that most of them tend to go for one or two heads of livestock at the same time meeting the requirements for domestic consumption.

The desirability of both cash and food crops is found to be positively related to insurance against starvation ($r=.3886$). This is more so with regard to food crops, especially maize, whereby the diffusion of the hybrid seed has been to a maximum. Backed by the adoption of recommended fertilizers, the increase in yields is an assurance against starvation.

Farmers' response to tea growing shows positive correlations with diversification of sources of income ($r=.5789$), elevation of one's social status ($r=.3434$), and the production of other cash crops in the area ($r=.4077$). This implies that farmers are willing to adopt the crop

due to the characteristics associated with cash-crop production, that is, more income and therefore a higher standard of living, which defines one's social status. These findings are in accord with the observations made by Misiko (1976) and Leagans (1963) that the adoption of agricultural innovations is a function of the advantages and benefits inherent in the innovations. Again, following the theory of diffusion, innovations which are beneficial to a community are easily adopted and incorporated into the existing culture than those which are complex and difficult to understand.

Hypothesis 2: Agricultural transformation is related to farmers' social and demographic characteristics.

For this hypothesis, the results of Pearson correlation show that the variables which correlate most with agricultural transformation are age, occupation, family size, farmers' children attending school, coffee production, sugarcane production, general cash-cropping, and sunflower production (see Table 42). Age and farmer-training

are inversely related ($r = -.1573$). The implication is that farmers' attendance of agricultural training decreases with increasing age. It is inferred that older farmers are more likely not to have had any training compared to young farmers. The reasons for this trend are quite complex but it seems experience is an explanatory factor. In other words, older farmers tend to be more experienced in farming and therefore do not find the need for farmer training. This finding is in accord with the observation made by Ogionwo (1969), that is, age and innovativeness are inversely related with young farmers being more innovative but not very strongly so.

Occupation and attendance of farmers' training are positively related ($r = .2861$). Certainly farmers' engagement in other occupations contributes to their awareness of the importance of farmers' training. This finding is similar to what Brokensha and Riley (1980) and Hunt (1975) found out. Family size and farmers' response to tea growing are also positively related implying that the larger the size of family an individual has, the more he is willing to grow tea.

Consequently, income generated by such a cash crop is essential for the upkeep of such a family. Similarly, farmers' children attending school and the farmers' desire to grow both cash and food crops are positively related, although the relationship is a weak one ($r=.1030$). This is because such children need both food as well as school fees for their education.

Whereas coffee production is negatively related to farmers' response to the introduction of tea ($r=-.3559$) it is positively related to farmers' training ($r=.2037$) and their desire for both cash and food crops ($r=.2066$). It follows that as long as farmers continue to grow coffee, their chances of adopting tea decrease because both crops have similar characteristics in terms of care, maintenance and disposal after harvest. The adoption of coffee increases with farmer training and by virtue of it being a cash crop. Similarly, sugarcane production is inversely related to the farmers' response to the introduction of tea ($r=-.3568$). The same state of affairs applies with respect to sunflower production and farmers' response to the introduction of tea ($r=-.1666$). This shows that where cash crops are

dominantly established, interest in a new cash crop tends to decline. This is more so where land hectareage is small and the new cash crop in question is not yet being cultivated. In terms of the theory of diffusion, an innovation that does not prove to be superior to the existing practices is less likely to be adopted. Finally, cash-cropping in general is found to be positively related to farmers' opinion on a proposal to introduce tea growing in the area. This shows, in general terms, that farmers in Webuye have a clear perception of cash-cropping and are willing to do so if more opportunities and incentives for the adoption of new cash crops are provided. Here the most important factor is farmers' indigenous knowledge (local perception) of environmental conditions relative to crop production. If this is understood, it becomes easier to introduce novel practices (Ember and Ember, 1973:518; Norman, 1977; Barker, Oguntoyinbo and Richards, 1977; Silberfein, 1977; the National Academy of Sciences, 1977).

Hypothesis 3: Conservatism on the part of individuals is an effect of limited factors of production.

The results of Pearson correlation for these relationships are shown in Table 43. The size of farming land is positively related to farmers' view of their contact with agricultural extension agents ($r=.3459$) as well as to the traditional method of grain storage ($r=.3607$). The implication is that, despite land shortage, farmers are aware of the importance of agricultural extension. Therefore extension is not a limiting factor in agricultural change. Similarly, storage facilities do not affect agricultural change. However, land size is inversely related to farmers' membership of co-operative societies ($r=-.2593$), their desire for farm credit ($r=-.3905$), and access to credit facilities ($r=-.3775$). This is interpreted as farmers' inaccessibility to these institutions. Consequently lack of these institutions is seen to be a limiting factor.

The growing of indigenous vegetables is positively related to market availabilities ($r=.3103$) and storage facilities ($r=.3236$). Thus market and storage facilities are not limiting

factors leading to farmers' conservative behaviour. However, the growing of indigenous vegetables and farmers' desire for farm credit are negatively related ($r = -.3697$).

The use of the local maize seed is positively related to capital, labour and market availabilities, as well as to storage facilities. This shows that the unavailability of these facilities is not a limiting factor since the local maize seed is generally used on a small-scale whereby capital, labour and market, are locally available, often in excess. On the other hand, the use of the local seed is negatively related to farmers' desire for farm credit. Thus, the use of the local seed does not require one to secure credit for investment in farming. The fact that local seeds are grown on a smallscale, usually close to the homestead, means that loan procurement is almost impossible.

Fertilizer prices, another factor in agricultural production, is positively related to labour and market availabilities, produce transportation, farmers' satisfaction with the current loaning system, and traditional methods of grain storage. Therefore, and despite the fact that

farmers are not in favour of fertilizer prices, they have to adopt fertilizer application because other factors act as incentives for crop production. Such factors include labour, marketing and transportation. Consequently, unfavourable fertilizer prices do not lead to farmers' non-adoption of new agricultural practices. However, fertilizer prices and farmers' desire for farm credit are negatively related ($r = -.4979$) implying that while most of the farmers are against the current fertilizer prices, most of them have the desire for farm credit.

The findings presented above show that not all production factors give rise to farmers' conservative attitudes. It is concluded here that farmers' non-adoption of agricultural innovations should be viewed as an individual affair, not involving the whole community. The most crucial factor is found to be farm credit. Thus the hypothesized relationship between farmers' conservative behaviour production factors does not hold.

Hypothesis 4: The transformation of traditional agriculture tends to be influenced by changes in extended family relations.

In Table 44 are presented the results of correlations involving agricultural transformation and extended family relations. As in the previous cases, the correlations are both positive and negative.

The relationship between the growing of kales and farmers' attendance of farm demonstration programmes is positive. This indicates that the chances for farmers to grow kales increase with increasing attendance of farm demonstration programmes whereby most of the attendants are likely to be members of the same kinship group. Again, farmers' attitudes towards their relatives positively correlates with their growing of kales. But it is also found that extended family relations are conceived by farmers as obstacles to progress. However, this attitude is positively related to the growing of kales. For the present study, it is concluded that kinship ties among members of extended families do not affect the adoption of agricultural innovations.

TABLE 44 Correlation Matrix for selected Variables of agricultural transformation and extended family relations.*

V 112	.0443	.0117	-.0673	.0801	-.1437	-.2934	-.3351	-.0287	.1110	1.0000								
V 139	-.0651	-.0656	-.0219	.1711	-.1034	-.1174	-.1710	-.1016	-.0651	-	1.0000							
V 143	.1380	-.3357	.2066	.2739	.0674	-.2716	-.1452	-.0597	.0079	-	-	1.0000						
V 169	.1472	.3282	-.0357	-.1800	.0464	.1641	.0336	.0635	.0781	-	-	-	1.0000					
V 170	.0291	-.1203	.2035	.2052	.0139	-.1866	-.0375	-.1468	.0291	-	-	-	-	1.0000				
V 182	-.1069	-.0560	.3757	.2529	.0458	-.0744	.0240	.1080	.0373	-	-	-	-	-	1.0000			
V 197	.0222	.0610	-.1008	-.1369	-.1487	.1700	.1875	.0060	-.0423	-	-	-	-	-	-	1.0000		
V 199	.0443	.3047	-.3286	-.3486	-.0981	.2979	-.0127	.0437	-.2226	-	-	-	-	-	-	-	1.0000	
V 200	.0781	.3662	-.2678	-.3280	-.1424	.3173	.1079	.0635	-.1985	-	-	-	-	-	-	-	-	1.0000
V 201	.0964	.3424	-.3559	-.3568	-.1666	.4077	.2484	.1512	.0964	-	-	-	-	-	-	-	-	-
	037	042	044	045	046	087	090	094	095	112	139	143	169	170	182	197	200	201

* The dashes in the Matrix represent Correlation coefficients that could not be computed*

Variable Labels

- 037 Beans
- 042 Kales
- 044 Coffee
- 045 Sugarcane
- 046 Sunflower
- 087 Major Cash Crop
- 090 Hybrid seed
- 094 Animal Manure
- 095 Chemical fertilizers
- 112 Communal labour
- 139 Desirability of new food crops
- 143 Desirability of both cash and food crops
- 169 Attendance of farm demonstration programmes
- 170 Attendance of farmers' training
- 182 Communal residence
- 197 Individual ownership of land
- 199 Relatives as promoters of progress
- 200 Relative as obstacles to progress
- 201 Proposal for tea production.

Farmers' opinion on the desirability of both cash and food crops is negatively related to their growing of kales ($r = -.3357$). This is an indication of the decreasing scale of kale production arising out of competition from the major food and cash crops. In such cases kales tend to be grown mainly for home consumption. Growing kales for sale is a secondary objective by most farmers. But contrary to this, the relationship between the growing of kales and farmers' response to a proposal to introduce tea growing in the area, is positive ($r = .3424$). This implies that, whereas farmers have already adopted the growing of kales, they find tea to be more lucrative, hence they are more willing to grow it although it is not yet under production.

Coffee production is positively related to communalism, that is, members of extended families are found to be occupying common residence ($r = .3757$). The reason for this arrangement is that coffee is too demanding in terms of labour requirements and so co-operation among members of extended families is vital in providing this essential need. However, the relationship between coffee production and farmers' opinion on relatives

as promoters of progress is found to be negative ($r=-.3286$). In this vein, it is concluded that although an extended family is vital for the maintenance of group solidarity, the demands exerted on an individual by such a group make it impossible for him to make personal and independent judgements. In this situation, individuals tend to avoid such strong relations.

Coffee production and farmers' response to a proposal to introduce tea in the area are negatively related for the reason already noted, that is, both have the same characteristics such that farmers are unable to perceive any advantages in tea for which coffee lacks.

Farmers' opinion on relatives as promoters of progress, as well as being obstacles to progress, and their response to the introduction of tea in the area, are all negatively correlated with sugarcane production. As already noted, strong kinship ties have both advantages and disadvantages. Sugarcane production in Webuye is an activity for which involvement of the extended family is a liability rather than an asset. Most of the requirements for sugarcane production are borne by the Nzoia Sugar Company. These include provision

of inputs, transportation and marketing, in addition to land preparation. For most of the activities, individual, rather than collective decision-making, is more favoured. Consequently, maintenance of strong kinship ties or reliance on relatives seems to be irrelevant.

Farmers' response to a proposal to introduce tea growing in the area, and sugarcane production are negatively related implying that as farmers greatly adopt sugarcane production, their interest in a new crop such as tea, declines. In the first place, tea takes a relatively longer period to mature, compared to sugarcane. Secondly, tea requires great care and is prone to destruction through natural hazards (such as leaf rot and damage caused by hailstones). Thus, sugarcane has an edge over tea.

Cash-cropping in general is positively related to farmers' opinion on relatives as obstacles to progress ($r=.3173$) and their response to a proposal to introduce tea growing in the area ($r=.4077$). It follows that, although farmers are in favour of cash-cropping, they are equally aware of the dangers of the kinship group such as family parasitism through

income distribution. The positive relationship between cash-cropping and farmers' response to a proposal to introduce tea growing in the region is a pointer of their willingness to adopt more cash crops, other factors being held constant.

This analysis of the relationship between agricultural transformation and the extended family shows that agricultural change does not necessarily result from complete alteration of kinship relations. Thus the extended family is not necessarily an impediment to progress, hence tradition and modernity should not be seen as opposite dimensions but as mutually reinforcing each other. As observed by Ogionwo (1969), attachment to the extended family should not be viewed as an obstacle to modernity and development. In essence, people can adopt new methods because they are perceived to be more effective means to achieving traditional ends (Goldthorpe, 1975:222). For instance, a farmer may be encouraged to adopt recommended practices with the hope that they will increase his income and so enabling him to discharge his family responsibilities better. Under the theory of diffusion, new ideas which are borrowed may be modified and incorporated into the existing ones in order to suit the prevailing circumstances. Thus traditional practices which are not prejudicial to modernity are maintained. Such is the case of the extended family in Webuye.

6.2 Regression

In regression analysis, different dependent (effect) variables, measured in different units, were regressed on their respective independent variables. In using multiple regression, the investigator sought to determine the degree of linear dependence of the dependent variables on their respective independent variables. Specifically, the concern was with the strength of the dependence or, equivalently with the amount of variation in each dependent variable that can be explained by linear dependence on its respective independent variables operating jointly. This purpose was achieved through multiple R and R^2 . Since the regression coefficient values are partial regression coefficients, they were used as measures of the influence of each independent variable upon the dependent variable with adjustments made for all other pertinent variables. Moreover, the researcher was interested in the relative importance of each independent variable in terms of its influence on the dependent variable. And since the independent variables were measured in different units, unstandardized regression coefficients could not be used. Consequently, standardized regression coefficients were used with respect to determining the relative effect of each independent variable on

the pertinent dependent variable. All this was done through stepwise regression.

Discussion of regression analysis is in the order of the four hypotheses. The first hypothesis states that the transformation of traditional agriculture is a consequence of modern socio-economic needs. The dependent variable (agricultural transformation) was measured by a rating scale reflecting impressions of farmers' opinion on the hybrid seed yield, and the viability of tea growing in the area. On the other hand, the measures of the independent variable (modern socio-economic needs) were payment of school fees, the need to accumulate wealth, the need for surplus production, the need to thwart starvation, the need to purchase valuable assets, the need to diversify income, the need to elevate social status, and the need for the general well-being of the family

The results show that variable opinion on hybrid seed yield is affected by variables need to check starvation, school fees, purchase of valuable assets, and elevation of social status. Their multiple correlation with opinion on hybrid seed yield is $R = .43336$. Thus, the explained variance

in opinion on hybrid seed yield is about 19 percent - ($R^2 = .18780$). The unstandardized regression coefficients show that a change of one unit in variable need to elevate social status affects the greatest change in opinion on hybrid seed yield when the effects of other independent variables in the equation are controlled statistically. Another independent variable worth noting is need to pay school fees. These two are marked predictors of opinion on hybrid seed yield. But in terms of relative contribution, the most important variable is need to check starvation by criterion of beta weight (.25419). Table 4^b is a summary of these results. A general observation about the table is that as farmers continue to use the hybrid maize seed, the need for payment of school fees, purchase of valuable assets and elevation of social status, decreases. These needs have to be borne by other means other than the proceeds generated by maize. Therefore, the hybrid seed, with its high yielding capacity, is used mainly to minimize starvation, since maize is a major food crop. The five independent variables in Table 4^b account for 19 percent of the variance in opinion on hybrid maize seed yield of which 10 percent is due to variable need to check starvation. Other predictor variables that were

included in the regression equation are accumulation of wealth, surplus production, diversification of income, and general family well-being. But they contributed nothing to explained variance. To be sure most of the variance (about 80 percent) in opinion on hybrid maize seed yield is not explained by the independent variables in the table due to errors of sampling as well as measurement and also other predictor variables not included in the regression run. Be that as it may, variable need to check starvation was realistically identified as a major predictor of farmers' use of hybrid maize seed.

On a government proposal to introduce tea growing in the area (the dependent variable), only two variables - the need for the general well-being of the family and the need to accumulate wealth, turned out to have significant predictive value.

Table 45 : Regression of farmers' opinion on hybrid maize seed yield , on need to check starvation, pay school fees, purchase assets and elevate social status.

Independent Variable	R ²	B	Beta	SE B
1. Check starvation	.10240	.25847	.25419	.06832
2. Pay School fees I	.12568	-.46904	-.16901	.17556
3. Pay School fees II	.14409	-.28638	-.16491	.11117
4. Purchase assets	.16630	-.21529	-.17130	.08507
5. Elevate Social Status	.18780	-.61803	-.14722	.26596
(Constant)	.53187			

The total variance explained by these two independent variables is about 15 percent ($R^2 = .14836$). In comparative terms the more important of the two as indicated by the standardized regression coefficient of .25791 is the need for the general well-being of the family. Table 46 is a summary of this result.

The statistical relationship between the independent variable and the dependent variable is well consistent with the general state of affairs. Tea is a cash crop with a stable market demand. It follows that the cultivation of such a lucrative cash crop as tea is likely to generate high income for the small-scale farmers. Under such circumstances, they are likely to acquire wealth, thus raising their standard of living.

Table 46: Regression of proposal to introduce tea growing on need for general family well-being and need to accumulate wealth.

Independent Variable	R ²	B	Beta	SE B
1. Family well-being	.10692	.21146	.25791	.05554
2. Accumulate Wealth	.14836	.19556	.21496	.06162
(Constant)	.01989			

The remaining variables - the same ones that were used as regressors of variable opinion on hybrid maize seed yield-were found to have no significant influence on proposal to introduce tea growing.

In conclusion, the results of multiple regression analysis show that the need to minimize starvation, payment of school fees, purchase of valuable assets, elevation of social status, accumulation of wealth, and the general well-being of the family, are socio-economic needs of farmers that are predictively related to agricultural transformation. However, payment of school fees, purchase of valuable assets, and the need to elevate social status, are negatively

related to agricultural transformation; while the need to minimize starvation, acculation of wealth and general family well-being show positive relationships with agricultural transformation. On the other hand, the need for surplus production and the need to diversify income are not related to agricultural transformation. Generally, these results are in accord with chi-square and contingency coefficient values discussed earlier which support the hypothesis that agricultural transformation is most likely a consequence of socio-economic needs.

The second hypothesis states that agricultural transformation is most likely related to the farmers' social and demographic characteristics. As in the preceding hypothesis, the independent variable (agricultural transformation) was measured by farmers' opinion on hybrid maize seed yield, and their response to a proposal for the introduction of tea growing in the area. Farmers' social and demographic characteristics as a factor of agricultural transformation was operationalized in terms of age, educational level, years of schooling, highest class reached, length of farming business, occupation and family dependents, as independent variables.

Table 47 shows that a one unit change in variable age has the greatest effect on opinion on hybrid seed yield. Length of farming business also has a marked effect on the dependent variable. As regards the influence of each predictor, the most important independent variable is length of farming business with a beta weight of .24563. This means that length of farming business, which determines a farmers' experience, is an important factor determining a farmers' awareness and subsequent adoption of new farming practices than do the other three factors. This is more so with respect to the use of the hybrid maize seed. Through experience, farmers can understand the superiority of the hybrid seed over the traditional or local ones.

Occupation, age and family dependants are predictors of agricultural transformation but their associated regression coefficients are negative. The negative slope of farmers' opinion on hybrid maize seed yield, on age (-5.41683) is plausibly due to the fact that the value attached to hybrid maize seed yield seemingly decreases with increasing age such that for the old farmers it becomes confounded with experience. Farmers can either plant hybrid seed or non-hybrid ones. As family size increases the probability of using hybrid seeds decreases while the probability of using non-hybrid seeds increases.

Money that would have been used to buy hybrid seeds is spent on basic family needs. That is why the slope of opinion on hybrid maize seed yield on family dependants is negative (-.16227). Education is found to be totally unrelated to farmers' opinion on hybrid maize seed yield. From the practical point of view, the use of hybrid seeds is widespread such that their use does not call for any kind of formal education on the part of farmers. Thus, differences in educational levels among farmers do not explain their response to, or their understanding of the yielding capacity of, the hybrid seed. The results of these observations are summarized in Table 47. These results are only partly consistent with the hypothesis. This is because the amount of variance in the dependent variable that is explained by the four independent variables is generally too low ($R^2=.14162$). In addition, the standard errors involved are relatively high especially for age and length of farming business. This leads to our rejection of the hypothesis because many of the hypothesized independent variables fail to operate as predictors of the dependent variable.

48 Regression of farmers' opinion on hybrid maize seed yield, on length of farming business, occupation and family dependants.

Table 47: Regression of farmers' opinion on hybrid maize seed yield on length of farming business, occupation, age and family dependants.

Independent variable	R ²	B	Beta	SE B
1. Length of farming business	.05847	.47453	.24563	.12966
2. Occupation	.09500	-.16699	-.16058	.06972
3. Age	.11826	-5.41683	-.15635	2.30817
4. Family dependants	.14162	-.16227	-.15523	.06956
(Constant)	.65041			

The results for farmers' response to a government proposal to introduce tea growing in the area show a positive relationship with farmers' social and demographic characteristics although this relationship is not so strong (R=.38222). However, only three independent variables emerge to be predictors of the independent variable. These are family dependants, education and length of farming business. The best predictor of the dependent variable is found to be education with a beta weight of .26031. It follows that since farmers in Webuye Division are not growing tea at present, its adoption will need an understanding of the principal practices involved in tea production. For new technical ideas, farmers who have had formal education are likely to understand them better than those farmers without such education. This is especially the case at the inception than in subsequent periods.

The next best predictor of the dependent variable is found to be family dependants. Sample evidence shows that most of the respondents tend to have many dependants who need the support of family heads, in this case, the respondents. Consequently, the regression coefficient for this variable and farmers' response to the proposal to introduce tea growing in the area is positive ($\beta = .23327$). It follows that farmers are willing to adopt tea due to its obvious advantage as a cash crop. It is inferred that with the income that may be obtained from the sale of tea, farmers will be in a better position to support their family members. At the same time, they can easily exploit the labour that may be provided by such members which is a prerequisite for tea production.

The last predictor of the dependent variable is length of farming business. It is true that experience is a crucial factor in the adoption of agricultural innovations by farmers. Individuals with many years of farming are better placed by criterion of experience to face the risks involved in adopting new crops than those without such experience. This is more so with respect to cash crops which are too demanding compared to the food crops.

The three predictor variables discussed above account for about 15 percent of the variance in the dependent variable ($R^2=.14609$). Like in the previous case of farmers' opinion on hybrid maize seed yield, many of the hypothesized independent variables fail to operate as predictors of the dependent variable. Thus, only three variables are identified as predictors of farmers' response to a government proposal to introduce tea growing in the area (see Table 48). This accounts for the low variance that is explained in the dependent variable. And, although a relationship exists between the three predictor variables and the dependent variable, their effect remains minimal.

Table 48: Regression of proposal to introduce tea cultivation, on family dependants, education, and length of farming business.

Independent variable	R^2	B	Beta	SE B
1. Family dependants	.06000	.20220	.23327	.05773
2. Formal education	.12534	.28794	.26031	.07229
3. Length of farming business	.14609	.20089	.14700	.09089
(Constant)	.07279			

The other variables are found to have no predictive value on the dependent variable. The number of years of schooling and class reached have no explanatory effect on the dependent variable. Each of these variables is highly correlated with variable formal educational level. And when used as predictors they (years of schooling and class reached) yielded very high standard errors. This is a problem of multicollinearity. Be that as it may, their explanatory value was not actually nil, because of their high correlation with formal educational level. Similarly, variables age and occupation have insignificant predictive effect on tea cultivation but for a different reason. The basic explanation for this state of affairs is that these variables (age and occupation) are parameters in the sense that with or without tea cultivation, they do not change. These findings and others derived from both chi-square and contingency tests of significance, and correlation analysis, prompt us to reject the hypothesis that the transformation of traditional agriculture is most likely related to farmers' social and demographic characteristics.

The third hypothesis states that conservatism on the part of individuals is an effect of limited factors of production. The dependent variable, conservatism, was measured by farmers' use of local or traditional maize seed.

The independent variable, factors of production, was measured in terms of size of land, prices for chemical fertilizers, operational capital, labour, produce transportation, contact with agricultural extension agents, farmers' view of their contact with agricultural extension agents, and the desirability of farmers' co-operative societies. The results of regression of the dependent variable on the independent variables are shown in Table 49.

Table 49:Regression of farmers' conservatism, on fertilizer prices, Operational Capital, Size of land, and farmers' view of contact with agricultural extension agents.

Independent variable	R ²	B	Beta	SE B
1. Fertilizer Prices	.26978	-.42877	-.43015	.06030
2. Operational Capital	.31880	.27157	.21420	.07410
3. Size of land	.33571	-.13104	-.12736	.06044
4. View of Contact with Agricult. Ext. agents	.34868	.16062	.11833	.08049
(Constant)	.19023			

These results show that the hypothesized independent variables that markedly predict conservatism are fertilizer prices, operational capital, size of land and farmers' view of agricultural extension. Their multiple correlation with conservatism is $R = .59049$, and the explained variance in the dependent variable is about 35 percent, showing that the four variables together, markedly

account for variance in farmers' conservatism, (the dependent variable). On the other hand, it is found that labour, produce transportation, contact with agricultural extension agents and the desirability of farmers' co-operative societies, have insignificant effects on conservatism. In other words, these variables do not predict farmers' non-innovative behaviour. For small-holder farmers, labour is usually not a problem because much of it is provided by family members with the assistance of relatives and friends. Produce transportation is not an important factor since most of the produce is sold locally at the market centres. Extension and co-operative services seem to be widespread such that most of the farmers are aware of the need for such institutions. To put it differently, variables labour, transportation, contact with extension agents and desirability of co-operative societies, are parameters with respect to farmers' conservatism.

Among the predictors of the dependent variable, fertilizer prices has the greatest effect, accounting for about 27 percent of the variance in the dependent variable. The regression coefficient, however, is negative, implying that as fertilizer prices go high,

farmers have to strain in order to meet the expenses; otherwise they keep their productive forces low. Operational capital accounts for about 5 percent of the variance in the dependent variable but regression coefficients show a positive relationship. This implies that farmers are likely to continue with traditional practices if they experience problems in getting the necessary operational capital for their farm activities. But with the availability of capital, conservatism is likely to be kept at minimum. The size of farming land seems to be a minor factor for it accounts for only 2 percent of the total variance in the dependent variable. The same applies to farmers' view of their contact with extension agents. Although these factors are related to conservatism, their effect is almost negligible.

In general terms, these findings show that a great many of the hypothesized factors do not influence conservatism on the part of the farmers. Only fertilizer prices and operational capital are crucial factors. In so far as the findings of regression analysis are consistent with those of the other analytical procedures already discussed, the hypothesis is rejected.

The last hypothesis states that the transformation of traditional agriculture is likely to be a function of changes in extended family relations. Changes in extended family relations, the independent variable, was measured in terms of communal farm labour, land control, communal residence, individual management of farm activities (individualism), individual ownership of land, group ownership of land and farmers' opinion on reliance on relatives. The measures of the dependent variable remained as in the previous cases, that is, farmers' opinion on hybrid maize seed yield and their response to a proposal to introduce tea growing in the area. Each of the dependent variable was regressed on the independent variables.

The best predictors of farmers' opinion on hybrid maize seed yield are found to be group ownership of land, communal labour, reliance on relatives and individualism ($R = .045660$). However, the total variance in the dependent variable, as explained by the four variables is only about 20 percent (see Table 50). Most of this variance (about 11 percent) is explained by group ownership of land. It follows that although farmers generally eschew group ownership of land for certain reasons, the existence of the system does not necessarily hinder them from adopting new agricultural practices. Indeed, the system

exists in the form of a large extended family residing and working on a piece of land under one title, usually in the name of the family head. In this case, the transformation of traditional agriculture does not necessarily involve a break up of traditional systems of land tenure in the form of corporate ownership of land. Such systems are generally based on collective responsibility based on extended family organization.

Communal labour and reliance on relatives are both inversely related to farmers' opinion on hybrid maize seed yield. The negative slopes imply that whereas farmers become more innovative, traditional systems of communal labour and reliance on relatives decrease. Finally, individualism is found to be positively related to farmers' opinion on hybrid maize seed yield although the associated regression coefficient is low. The advantage of individual responsibility is that a farmer is set better to plan, make decisions and manage his farm activities more effectively than is with collective responsibility.

51: Regression of farmers' opinion on hybrid
seed yield, on group ownership of land, communal
labour, reliance on relatives and individualism.

Table 50: Regression of farmers' opinion on hybrid seed yield, on group ownership of land, communal labour, reliance on relatives and individualism.

Independent variable	R ²	B	Beta	SE B
1. Group ownership of land	.10563	.23085	.23138	.06623
2. Communal labour	.16844	-.21818	-.21329	.06712
3. Reliance on relatives	.19013	-.32721	-.15429	.13744
4. Individualism	.20848	.14458	.14099	.06715
(Constant)	.70464			

The remaining independent variables are found to have no predictive value on the dependent variable. These include land control, communal residence and individual ownership of land. In actual fact these variables are related to the four principal predictor variables already noted.

For farmers' response to a government proposal to introduce tea growing in the area, five independent variables are found to correlate with this variable ($R = .45106$). These are individualism, communal residence, individual ownership of land, land control, and reliance on relatives. The other variables, that is, communal labour, and group ownership of land do not affect the dependent variable.

The total explained variance in the dependent variable is 20 percent. Most of this variance is explained by individualism. However, the associated regression coefficient is negative. It is inferred that although farmers tend to favour individual responsibility, the demands of tea as a cash crop do not call for individualism. Certainly, labour is one of such demands. Communal residence, the next important predictor of the dependent variable, is also negatively related to the dependent variable. Finally, individual ownership of land, land control and reliance on relatives are all positively related to the same dependent variable. However, their associated regression coefficients remain low. These results are shown in Table 51.

Table 51: Regression of proposal to introduce tea cultivation, on individualism, communal residence, individual land ownership, land control and reliance on relatives.

Independent variable	R ²	B	Beta	SE	B
1. Individualism	.12112	-.21936	-.26387	.06146	
2. Communal residence	.15156	-.17401	-.19316	.05879	
3. Individual land ownership	.17034	.41741	.14304	.18666	
4. Land control	.18676	.34104	.14242	.15251	
5. Reliance on relatives	.20345	.12752	.15413	.06244	
(Constant)	.44284				

In testing the final hypothesis, it has been found that the relationship between agricultural transformation and family organization is a complex one. For instance, both corporate and individual ownership of land are positively related to agricultural transformation. In another case, the traditional systems of communal labour and communal residence are both negatively related to agricultural transformation. Yet, in another case, individualism is negatively related to agricultural transformation in one instance (farmers' response to tea growing) but positively related to the same variable in another instance (opinion on hybrid maize seed yield). Finally, while reliance on relatives has both its merits and demerits, one case shows a positive relationship with agricultural transformation (response to tea growing) while the other shows a negative relationship (opinion on hybrid maize seed yield). These results show that extended and nuclear forms of family organization are both associated with innovativeness. Thus, no specific category of family organization is particularly identified with agricultural change, contrary to the initial assumption that agricultural change is an outcome of the disintegration of the extended family through total emancipation of the nuclear family. This leads to our rejection of the last hypothesis. It is concluded that both traditional and

modern institutions are co-existent and mutually reinforcing each other rather than being in conflict. Extended family relations are maintained because of their advantages such as training of members, supply of skills and accumulation of wealth. This is collective effort which can be of great benefit to members of the extended family. However, the disadvantages of extended families lie in competition, jealousy and exploitation among members, often perceived as family "parasitism". Because of these complexities, individuals generally devise mechanisms by which they can exploit the benefits of extended family relations while at the same time minimizing the demands of such relations.

CHAPTER 7

FACTOR ANALYSIS

Factor analysis was used essentially to discern the unities in the sample data. Specifically, it was used to classify and reduce the data for further exploration and to define certain relationships in the data. Principal factoring (principal components analysis) method was used to extract factors and it yielded five significant orthogonal factors. The results of this analysis are displayed in Table 52 in the form of a factor matrix.

The five factors, in their order of significance are:

1. Rationality and awareness;
2. Production determinants;
3. Social characteristics;
4. Social-status aspiration;
5. Kinship relations.

The variable with the largest communality arising out of the five factors turned out to be the need to purchase household items ($h^2 = .67544$) while that with the least communality was co-operative Services ($h^2 = .19867$).

Table 52: Factor Matrix for Sample data

VARIABLE	FACTORS					COMMUNALITY
	1	2	3	4	5	
1. Desirab of agric. exten. service	.64556	-.40959	.00590	-.06363	-.11583	.60201
2. Desirab. of farm credit	.64089	.43035	.00006	.00695	.02303	.59652
3. Chem. fertilizer prices	-.62704	-.28828	.04707	.02036	.16725	.50689
4. Need for family well-being	-.62184	.33438	.17439	.23364	-.00643	.58353
5. Desirab. of both cash and food crops	.57436	.06780	.02428	-.02200	-.33507	.44783
6. Desirab. of more cash than food crops	-.57336	.17173	.14921	-.24950	.15901	.46802
7. Desirab. of more food than cash crops	-.55231	.27657	.18019	-.09207	.12283	.43758
8. High interest on farm credit	-.53831	.40795	-.17072	.18360	-.09431	.52795
9. Diffic. to obtain operational capital	.53753	-.12586	.00067	-.32610	.39356	.56601
10. Contact with agric. exten. agents	.51332	-.30367	.33933	-.07760	-.09321	.48557
11. Co-operative services	-.41714	.06863	.00930	.08968	-.10874	.19867
12. Satisf. with farm production	-.10690	-.66817	.33317	.00074	.09051	.57707
13. Opinion on hybrid seed yield	.07626	-.60700	.11557	.16077	-.01077	.41360
14. Have many dependants	-.17466	.58336	.43560	-.12022	.10076	.58517
15. Need to check starvation	.47783	.57687	-.00637	-.06423	-.07959	.57160
16. Good agric. exten. services	.19435	-.57372	.23202	.17569	-.28240	.53137
17. Soil fertility	.08603	-.48821	.20829	.14454	-.23590	.36567
18. Adequate farming land	-.23451	-.47234	.37697	.05055	-.01700	.42306
19. Road conditions	.20852	-.45428	-.02680	.24005	-.02658	.30890
20. Size of farming land	.40680	.44008	-.40123	-.06726	-.04543	.52673
21. Need for school fees	-.26166	.34891	.60069	.00911	.08116	.55771
22. Age	.25008	.09108	-.48641	-.14548	-.10109	.33881
23. Desirab. of farmers' co-op. Society	.02879	.20303	.45286	-.32732	.25138	.41752
24. Only rich farmers get farm credit	-.24206	.28469	-.39119	.36807	-.08506	.43539
25. Need for surplus production	.30857	-.02123	.37548	.37335	.34542	.49538
26. Need to purchase household items	-.18528	.28522	.03905	.71333	-.22226	.67544
27. Need to purchase valuable assets	-.15128	.23633	.04798	.65280	-.28795	.59011
28. Need for good market	.31252	.15387	.11726	.52127	.25479	.47173
29. Need to elevate social status	.00008	.08325	.29873	.49612	.22829	.39443
30. Education	.11709	.28480	.04580	.40445	-.24030	.31824
31. Relatives promote progress	-.15364	.03529	.26077	-.11193	-.66975	.55396
32. Relatives hinder progress	.16127	-.04756	-.27647	.17810	.62386	.52563
33. Need to diversify income	.21623	.10874	.34130	.17286	.50775	.46276
34. Corporate ownership of land	.01081	.15446	-.32361	.06906	.42231	.32282
35. Indiv. planning and decision-making	-.01482	.23181	.33419	-.14398	-.35774	.31435
36. Have few dependants	.03797	-.41198	-.39057	.19077	-.05688	.36334
37. Land Tenure	.02792	-.15593	-.25459	.30435	.26838	.25457
38. Desirab. of both old and new food crops	.24536	-.42130	.18322	-.07537	-.06520	.28119
39. Desirab. of new food crops only	-.48012	-.31982	-.31658	-.18132	.11591	.47934
40. Use of Chem. fertilizers	.03907	-.42713	.04952	.30171	.01336	.27757
41. Support proposal to introduce tea	-.08611	.09957	.30866	-.06559	.28777	.19970
EIGENVALUE	5.02540	4.87706	3.07917	2.82753	2.63358	
PERCENT OF TOTAL VARIANCE	12.25707	11.89526	7.51017	6.89641	6.42336	44.98230

FACTOR LABELS

1. Rationality and awareness.
2. Production determinants.
3. Social characteristics.
4. Social - Status aspiration.
5. Kinship relations.

The first factor delineating the largest pattern of relationships in the data was designated farmers' rationality and awareness of the need for technical innovations. The second factor consists of a cluster of variables which were named production determinants. The third factor was designated farmers' social characteristics, while the fourth one was named social-status aspiration. The last factor was named kinship relations.

The variables with high loadings on the first factor, rationality and awareness, include the desirability of agricultural extension services (.64556) and farm credit (.64089), farmers' opinion on chemical fertilizer prices (-.62704), the need for family well-being (-.62184), the desirability of both cash and food crops (.57436), the desirability of more cash-crops than food-crops (-.57336), high interest rates on farm credit (-.53831), difficulties in obtaining the operational capital (.53753), and farmers' contact with agricultural extension agents (.51332). This pattern of variables, among others, means that farmers' rationality and level of awareness are crucial factors to consider in accounting for agricultural change. For instance, farmers are both aware and have a clear perception of the need for agricultural extension and are actually exposed to agricultural extension services.

Similarly, because of their rationality, farmers know the importance of farm credit in relation to agricultural production. However, high interest rates on farm credit are likely to act as disincentives to farmers towards this end. Farmers also have a clear perception of the need for the necessary operational capital for better performance in their production activities, although the acquisition of the operational capital tends to pose serious problems, especially to those whose income is too low.

Farmers' rationality is further revealed to the extent that they show preference for both food and cash-crops rather than for certain categories of crops. Thus, the desirability of both cash and food-crops is positively loaded onto factor rationality, while the desirability of cash-crops than food-crops, and vice-versa, are negatively loaded onto the same factor. Farmers have also a rational preference for both old and new food crops as opposed to the desirability of new food crops only, an issue that seems to be irrelevant.

Farmers' opinion on fertilizer prices, the need for family well-being, and co-operative services are inversely loaded onto the factor. Thus, farmers are aware that the use of chemical fertilizers increases

production and that is actually their expectation. However, increased production is inhibited by high fertilizer prices. Likewise, it is farmers' expectation that improved farm production might lead to family well-being but this end may not be realized due to limitations imposed by other social forces. Finally, farmers are quite aware of the importance of co-operative societies, but active participation tends to be hampered by, among other things, organizational problems, hence co-operative services seem to be inadequate. In short, this first factor most plausibly suggests that the transformation of traditional agriculture can be explained in terms of the perceptions, attitudes and level of awareness of the farming population. This is a function of the use of rationality in effecting change. This factor accounts for about 12 percent of the total variation in the sample data.

The second factor pattern, which has been designated production determinants, accounts for about 12 percent of residual variance in sample data. The variable with the highest loading on this factor is satisfaction with farm production (-.66817). However, the negative coefficient means that farmers are generally dissatisfied with the current production.

This general dissatisfaction with farm production is closely related to other factor loadings such as those involving farmers' opinion on hybrid seed yield (-.60700), good agricultural extension services (-.57372), soil fertility (-.48821), adequate farming land (-.47234), road conditions (-.45428), having few dependants (-.41198) and the use of chemical fertilizers (-.42713). Most of these variables are interrelated. In the first place hybrid maize seed yield could be viewed as being below farmers' expectations. Thus, low yields could be attributed to poor soils, inadequate farming land or inadequate fertilizer application. The low yields could also be attributed to inadequate extension services in the sense that proper methods of the use of the hybrid seed are inadequately communicated to farmers or probably such methods are never conveyed to them. Secondly, soil fertility depends on good extension services whereby recommended agricultural practices for maintaining the fertility of the soil on the farms are adopted. This also applies to the use of chemical fertilizers. Therefore, limitations on the part of some of these variables are likely to affect related variables.

Whereas having many dependants is positively loaded onto production determinants (.58336), having few dependants is negatively loaded onto the same factor (-.41198). The implication is that farmers with many family dependants are more likely to improve their production by adopting recommended practices than those with few dependants. This is because the many dependants pose challenges to individual farmers in terms of the provision of essential needs and general family maintenance. In this situation, such farmers are more willing to try new ways in order to increase production, thereby meeting these challenges. Farmers with few or no dependants are more likely to be contented with what they are already producing.

The need to check starvation and size of farming land have positive loadings of .57687 and .44008 respectively. The interpretation is that since food production in large quantities is dependent upon better agricultural practices, farmers are more willing to transform their farms with the hope of increasing food production and some assurance that starvation is kept at bay. It is also interpreted that agricultural change is more likely where land hectareage is high. Thus, the propensity to change increases relative to increasing land hectareage.

The third factor is descriptively labelled social characteristics. The variable with the highest loading on this factor is the need to pay school fees, with a factor loading of .60069. The implication here is that most of the farmers are educating their children. It follows that farmers who have the responsibility of paying school fees for their children are more willing to adopt agricultural innovations with a view to improving their farm production, hence increased farm output. High proceeds from this output is an assurance for higher income that may be used to meet this social obligation. The next important variable loading on factor social characteristics is farmers' age. However, this loading is negative (-.48641). This implies that the salience of age is declining with respect to the adoption of agricultural innovations. Indeed, elsewhere in this thesis, it has been demonstrated that the young, middle-aged and old farmers do not differ with respect to adoption. This is contrary to long held notions that young farmers are likely to be more innovative than the older ones. In the present situation most farmers, both the old and the young, are exposed to different sources of information such as extension service,

mass media and local agricultural demonstration programmes.

The desirability of farmers' co-operative societies is positively loaded onto social characteristics (.45286). This suggests that farmers have a reasoned sense of social participation and co-operative effort. By participating in social activities, farmers are likely to learn new ways and are likely to adopt norms associated with change. This is the essence of social interaction. The next variable loading on social characteristics is the notion that only the rich farmers have access to farm credit facilities. The idea is that a kind of discrimination in extending farm credit to farmers is practised in most financial institutions whereby the more affluent farmers are favoured at the expense of the poorer ones. However, the negative loading for this variable (-.39119) implies that most farm credit goes to the relatively poor farmers than to rich farmers if for no reason other than that the rich ones constitute quite a small proportion of the farming population in Webuye Division.

Other important variable loadings onto social characteristics are those pertaining to the need for surplus production (.37548) and farmers' support for a proposal to introduce tea growing in the area (.30866). To some extent, this means that farmers are generally receptive to change, given the appropriate incentives. Farmers' social characteristics, being an independent factor, accounts for about 8 percent of the explained residual variance in the sample data.

The fourth factor is social-status aspiration. Most of the variables that define this factor pattern have positive factor loadings. The highest loadings involve the need to purchase household items (.71333) and the need to purchase valuable assets (.65280). In this respect, farmers seek to transform their agricultural practices with the expectation that it will lead to higher incomes. The rationale behind their desire to purchase household items and valuable assets is simply an aspiration for high status. Since it is prestigious to own valuable assets and other belongings, most farmers tend to strive for the attainment of this goal. Closely related to these characteristics are the need for a good market (.52127) and the need to elevate social status (.49612).

Other important variable loadings onto social-status aspiration are education (.40445) and land tenure (.30435). The implication is that social-status aspiration increases with increasing education. As far as land tenure is concerned, the common practice in Webuye Division is individual, as opposed to group or corporate, ownership of land. This is because individuals are better placed to exploit fully their individual plots. At the same time it is easier for them to plan, make decisions and manage farm activities individually than as a group. In this case, individualism, on the basis of land tenure, carries the traits associated with social status. The loadings on this factor generally indicate that agricultural transformation increases relative to farmers' aspiration for social status. This factor accounts for about 7 percent of the total variation in the data.

The last factor is kinship relations. The major variables that define this factor pattern are relatives promote progress (-.66975), relatives hinder progress (.62386), the need to diversify income (.50775), corporate ownership of land (.42231), and individual planning, decision-making and management of farm activities (-.35774). Generally,

that pattern attests to the fact that strong kinship ties are favoured or resisted by members of kin-groups depending on circumstances or conditions at hand. Thus, such ties have both advantages and disadvantages. Maintenance of kinship ties is, therefore, a situational state of affairs.

These coefficients, further, show that farmers do not favour the idea that relatives promote progress while at the same time being in favour of the fact that relatives hinder progress. This is a disadvantage of strong kinship ties or "familism" with tendencies towards family "parasitism". In such a situation, it is probable for one to be discouraged to work hard since such hard work may not be rewarded. In other words, one lacks the drive or urge towards individual social or economic achievement. On the other hand, the coefficients for the need to diversify income, and corporate ownership of land are positively loaded onto factor kinship relations. This is an indication of the advantage of strong kinship ties. Again, individual planning, decision-making and management of farm activities is negatively loaded onto the same factor, an indication that collective

responsibility is being favoured, while individualism is being avoided. In all these cases, the role of strong kinship ties, especially among members of the extended family, is important in terms of division of labour, accumulation of capital and the supply of knowledge (skill and training). This is a function of pooling together production resources and efforts. Therefore, attachment to the family should not be regarded as an obstacle to modernity or development. In actual fact, extended family relations constitute complex domains which vary from one context to another. In this case, agricultural change is viewed as not necessarily being dependent upon changes in kinship relations. Thus, tradition and modernity are not necessarily opposed dimensions. This last factor, kinship relations, explains about 6 percent of the total variance in the data.

In conclusion, the results of factor analysis reveal that sample data on agricultural transformation in Wevuye Division are structured into five principal patterns. These are farmers' rationality and awareness of the need for change, production determinants, farmers' social characteristics, social- status aspiration, and kinship relations.

The largest variation in the data is accounted for by farmers' rationality and awareness, while the least variation is explained by kinship relations. The five factors account for about 45 percent of the total variance in the sample data.

CHAPTER 8

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

In an attempt to understand the major forces behind the transformation of traditional agriculture in Webuye Division, certain inferences have been made relating to the findings that were derived from a variety of data-analytic techniques. This study is concluded with a focus on these major findings and a reflection on the existing literature and the current analysis and their implications in terms of the diffusionist theory.

General observations and evaluation

Agricultural transformation in Webuye is relatively well established and there are prospects that this trend will be maintained given the necessary incentives. There is great potential for farmers to adopt new farming methods, recommended practices and new crops, especially the cash crops. However, both traditional and modern agricultural practices are found to co-exist, with the latter having an edge over the former. This co-existence of the two forms of agricultural

production is contingent upon the perceived advantages in each form of production and the prevailing circumstances.

The various data-analytic techniques used here indicate that the process of agricultural transformation in Webuye has been a consequence of modern socio-economic needs. It is inferred that these needs create conditions which make traditional agricultural practices quite inappropriate in the prevailing circumstances. Agricultural change, by means of farmers' adoption of innovations becomes viable because it leads to efficient production, better exploitation of the productive forces and increased production. For instance, the cultivation of coffee is found to be significantly related to farmers' socio-economic needs. The need to pay school fees is found to influence coffee production because it is a cash crop which generates regular and relatively high-level income for the farmers. This income is vital in meeting most of their socio-economic needs. On the other hand, the need to buy valuable assets does not influence coffee production. This is a variable whose variability overlaps with that of other component measures of socio-economic needs such as the need to accumulate wealth, the need

to pay school fees, the need to diversify income and the need to elevate social status.

The production of sugarcane is also influenced by farmers' socio-economic needs, especially the need to accumulate wealth. However, like coffee production, it is not influenced by the need to buy valuable assets. In this case, the need to purchase valuable assets, remains a secondary determinant of agricultural transformation. Both coffee and sugarcane have been adopted because they generate cash which enables individuals and families/ households to meet various socio-economic needs.

Sunflower production is not consistently associated with socio-economic factors. For instance, the need to accumulate wealth influences sunflower production while the need to diversify income does not. Therefore, the adoption of sunflower is a matter of convenience on the part of individual farmers. Sunflower is grown because of its inherent advantages. It does not need plenty of rainfall, it matures fast, it does not require that farmers have large tracts of land or substantial labour and capital outlay, and it is marketable throughout the year. Sunflower is therefore a self-

spreading cash crop which is ideal for small-holder farmers.

The use of the tractor is also influenced by farmers' socio-economic needs. However, due to economic constraints and the small size of the landholdings, most farmers have preferred the use of the ox-drawn plough which is cheaper and ideal for small-holder farmers. This is a function of the rationality, local perceptions and indigenous knowledge, held by the farmers.

The use of the hybrid seed is found to be dependent upon farmers' socio-economic needs. Since the hybrid seed has a high yielding capacity than the local seed, its adoption has been to the maximum. Because higher income is contingent upon high yields, the hybrid seed has met wider acceptance. On the other hand, the use of chemical fertilizers is only influenced by some socio-economic factors and not by others. We can deduce that fertilizer application is adopted entirely to attain high yields regardless of the farmers' needs.

Farmers' opinion on a proposal to introduce tea growing in the area is found to be significantly related to their socio-economic needs. This is

because tea, like sugarcane and coffee, is a cash crop. Being a cash crop, farmers have a positive disposition towards its adoption with the hope that it will lead to an increase in their farm income - which in turn may be used to meet other socio-economic needs.

These findings lead to our acceptance of the first hypothesis that the transformation of traditional agriculture is a consequence of modern socio-economic needs. These needs motivate farmers towards change. According to Lippit (1958) change results from motivation force which creates dissatisfaction with the existing systems. Similarly, Leagans (1963) found that important changes are those which help people meet their needs for biological, economic, social, aesthetic and moral well-being. In the same line, Misiko (1976) maintained that farmers are aware of the need for innovations but do not change due to immediate physical, economic and biological environmental constraints. Therefore, farmers are willing to adopt agricultural innovations if the perceived incentives are strengthened while the perceived disincentives are weakened or removed. In Webuye, the production of coffee, sugarcane and sunflower, and the use of hybrid seed and chemical

fertilizers are innovations whose advantages can overtly be demonstrated. On the other hand, farmers are quite aware of the need for the use of the tractor but many of them do not use it due to certain constraints, mainly economic. Thus, lack of innovation is not due to poor motivation or fear of change but a result of inadequate or unprofitable opportunities (Todaro, 1982:237). According to Klaus (1976) change is usually inhibited by technical and economic obstacles such as expensive farm machinery and low-level productive forces.

It is evident that the main aspects of agricultural change in Webuye have been technological and socio-economic. These aspects were observed by Johnston and Kilby (1975) and Malassis (1975). This change is also aimed at increasing agricultural output and improving income distribution (Johnston and Mellor, 1961, Myrdal, 1966; and Owens and shaw, 1972). In addition, such change, could be a result of superior economic and technological alternatives undermining traditional functions (Dalton, 1971). However, such change is subject to the resources and abilities of the

actors (Eisenstadt, 1966, 1970).

In terms of the diffusionist theory, the process of agricultural change in Webuye can be attributed to outside forces, especially the neighbouring communities and the change agents. Long (1977) observes that the spread of technical innovations is an outcome of external forces. Thus the adoption of the major cash crops in Webuye has been a result of government encouragement through intensive extension services. Secondly, since the adoption of new ideas is a subjective process, not all individual farmers have adopted the principal innovations that have been examined. The adoption of these innovations is, therefore, not uniform. Finally, most of the innovations have been adopted because they are seen to be beneficial to the community. This is the case with respect to the cultivation of coffee, sugarcane and sunflower and the use of hybrid maize seed and chemical fertilizers.

The hypothesis that agricultural transformation is most likely related to farmers' social and demographic characteristics has been rejected. The main social and demographic

characteristics of the farmers included age, formal education, length of farming business, occupation and family dependents. It was the investigator's contention that older farmers were more likely to be less innovative, that farmers who had had formal education were more innovative, and that farmers with long experience in farming and those with many dependants were also more innovative than those with little or no experience, as well as those with few dependants.

The findings reveal that although age is partially associated with certain aspects of agricultural transformation such as cash-cropping, no specific age category is directly identified with innovative behaviour of which cash-cropping is an aspect. Old and young farmers exhibit similar behavioural characteristics, and by the same token the difference between middle-aged and young farmers is so trivial that it cannot but be attributed to sampling error. This leads to the conclusion that age is not an important determinant of farmers' receptivity of agricultural innovations. This finding contradicts the notion that young farmers are more innovative than older farmers

(Klaus, 1976 and Ogionwo, 1969). Thus the view that older farmers are conservative and do not welcome new ideas on the premise that innovations are strange things which should be done away with, is not supported by this study.

Formal education is found to be a less important determinant of agricultural change. Most of the relationships between the major indicators of agricultural transformation and formal education are insignificant. For instance, it has been found that the production of sunflower and the use of chemical fertilizers are innovations which have been adopted by farmers with different educational levels including the illiterate members. This finding constitutes an empirical refutation of arguments advanced by Brokensha and Riley (1980:268), Hunt (1975) and Uchendu and Anthony (1975) that formal education is a crucial factor in understanding farmers' innovative behaviour. However, formal education is only likely to be important where complex innovations are involved such as modern farm machinery, pesticides and herbicides. A probable explanatory factor related to formal

education is farmers' management ability and experiences gained from outside contact.

Length of farming business is related to sugarcane and coffee production and the use of the tractor. It is inferred that farmers' experience only influences their adoption of cash crops with long gestation periods, and their use of expensive farm machinery. For cash crops which mature faster, such as sunflower, experience in farming business does not account for farmers' innovative behaviour. In this case farmers who are less experienced are found to be as innovative as those with long experience. It is observed here that length of farming business does not necessarily affect agricultural change among small-scale producers. What seem to be important factors here, are economic opportunities and the characteristics of the innovations in question. In a similar vein, Garst (1972) points out that the compatibility of an innovation with existing practices and its adaptability to local conditions ensures faster adoption (Garst, 1972). Under these circumstances, farmers will be more willing to adopt agricultural innovations irrespective of their experiences in farming.

Occupation is found to influence certain aspects of agricultural transformation. These are, the cultivation of kales, coffee and sugarcane and the use of the tractor. For these practices, a farmer is in a better position to undertake if he has access to multiple sources of income. On the other hand, it has been found that for aspects characteristic of the general smallholder producer, occupation is not an important explanatory factor. These aspects include the cultivation of sunflower, and food crops, ploughing, seed selection and fertilizer application. Be that as it may, the data of this research generally indicate that occupation has no direct influence on farmers' innovative behaviour contrary to the common view that occupation and innovativeness are inseparable (Brokensha and Riley, 1980; Hunt, 1975).

Finally, it has been observed that having many dependants contributes to farmers' adoption of agricultural innovations. This has been found to affect the production of both cash and food crops, and the use of the tractor and hybrid seed. Thus, a farmer with many dependants strives to improve his farm with the hope that it will lead to greater

production in order to meet the requirements for both food and cash income. Innovation is therefore seen as a response to pressure exerted by the many dependants.

It was also hypothesized that conservatism or non-innovation was a function of limited factors of production. The factors of production that were considered included land, prices of farm inputs, operational capital, labour, transportation, agricultural extension and co-operative services.

The findings show that conservatism is influenced by the size of farm land. More specifically, farmers with larger pieces of land are more innovative than those with smaller landholdings. Thus, most of the traditional farming practices are influenced by land size. Such practices include the cultivation of millet, sorghum, sweet potatoes, cassava and groundnuts/sim sim, the use of the hoe in land preparation, and the use of the local (non-hybrid) seed. Therefore, land is found to be an important factor accounting for farmers' innovative behaviour (Brokensha and Riley, 1980; Garst, 1972; Hunt, 1975; Uchendu and Anthony, 1975).

However, the cultivation of indigenous vegetables and the use of the hoe are not influenced by size of farmland. These are traditional practices for which size of farmland is not an important factor. Clearly, cropland devoted to indigenous vegetables tends to be small compared to land allocated to other crops; and, generally, parcels of land prepared by means of the hoe are usually small. For these two practices, therefore, the size of land seems to be a less important factor. It is generally concluded that the size of farm land influences farmers' conservative behaviour where both intensive and extensive production are involved.

The prices of farm inputs, especially chemical fertilizers do not affect farmers' conservative behaviour. Although the high prices of chemical fertilizers pose serious constraints to most farmers, the application of chemical fertilizers is highly diffused. This attests to the fact that even small-holder producers have a lucid understanding of the need for such farm inputs as chemical fertilizers which are compatible with the more traditional practices such as the application of animal or composite manure. It is concluded that prices of

farm inputs do not constitute a force of farmers' conservatism.

Availability of operational capital is also found not to influence farmers' conservative behaviour. Despite the fact that capital is a constraining factor to most farmers (over 80 percent), it is not unproblematically related to conservatism. This is because even some well-to-do farmers who are endowed with capital resources have been found to exhibit conservatism (non-innovative behaviour). On the other hand, the less affluent farmers have been found to be as innovative as the more affluent ones. Therefore, operational capital, as a factor of production, does not account for conservatism.

Farm labour, as a resource, is not related to non-innovation. It has been observed that, in Webuye Division, farm labour for individual farmers is usually provided by family members and relatives (friends) on the basis of reciprocity. The more affluent farmers employ hired labour. For most of the farm activities, reciprocal labour is predominant. Since there exist intimate relations among members of a given locality, the requirements for farm labour are met by these members, hence labour is not a constraining factor. Consequently, non-innovation

or conservatism cannot be attributed to limited resources of farm labour.

Closely related to the above factor is transportation. It has been found that marketing of farm produce is done on a local scale, that is, within the village market centres, with the exception of sugarcane. For large-scale producers, the produce is marketed in the immediate urban centres. Where the produce is marketed locally, transportation is necessitated by means of ox-carts and sledges. For small-quantity products, transportation is mainly by bicycle, wheel-barrow or human portage. Where the produce is marketed in urban centres, lorries are used. On the basis of significance tests, it has been established that, although transportation of farm produce is hampered by poor communication networks (infrastructure), it does not influence farmers' conservative behaviour. Both the more innovative and the less innovative farmers are equally affected by this poor infrastructure, thus affecting produce transportation to market centres.

Turning to agricultural extension services in the area, it is observed that most farmers are exposed to, and are aware of the need for this essential service. But analysis shows that

conservatism or non-innovation is not influenced by lack of extension services. For instance, the cultivation of cassava, indigenous vegetables and groundnuts/simsim is not related to farmers' contact with agricultural extension agents. Similarly, there is no relationship between the cultivation of millet and farmers' view of extension services. However, the cultivation of cassava is found to be significantly related to the farmers' view of extension services. Thus, despite the fact that farmers are aware of the need for extension service, they often find traditional agricultural practices to be important. The same trend is observed with respect to co-operative services. Although farmers were found to be highly conscious of the importance of co-operative societies and are actually accessible to co-operative institutions, they still practised traditional forms of agricultural production. It was, therefore, concluded that both extension and co-operative services do not affect farmers' conservative attitudes.

Of all the hypothesized factors of production, only land size is found to be an explanatory factor accounting for farmers' conservative attitudes. This leads to the rejection of the hypothesis that

conservatism on the part of farmers is a result of the limited factors of production. A majority of the effect variables, namely, prices of farm inputs, operational capital, farm labour, transportation, extension and co-operative services, do not account for farmers' conservative attitudes as far as Webuye Division is concerned. These findings run counter to a number of conclusions drawn by specialists on agricultural change. Todaro (1982:240) noted that small producers tend to exhibit conservative attitudes because institutions and government policies that accompany new technical innovations too frequently serve the needs and vested interests of the large-scale and wealthy farmers. The same views, contradicted by this research were also expressed by Bhandari (1973), Havelock (1971), Leonard (1972a, 1972b 1973), Mbithi (1972), Moris (1977) and Mbugua et. al (1975a). Migot-Adholla (1984) noted that even where credit facilities may be extended to smallholder farmers, improvement in farm output may not be realized due to a combination of numerous factors. In the first place, smallholders are not fully exposed to extension services. Secondly, farm inputs tend to be inappropriate to farmers' level of husbandry and resource endowment. Thirdly, most farmers depend entirely on natural conditions for growth and yields of their crops. Fourthly,

marketing co-operatives and boards are designed to promote large-scale farmers at the expense of small-scale farmers. Finally, small-scale farmers are subjected to international quota systems and prices for which they have no control.

Understanding farmers' adoption or non-adoption of agricultural innovations becomes complex when numerous factors are operative. Misiko (1976) notes that the effectiveness of extension services largely depends on the degree and intensity of interaction with farmers, while de Wilde (1980) points to price incentives as a prime factor for change. For Klaus (1976) non-innovation is not due to lack of initiative by the producers but there is also the "balance of poverty" which compounds the situation. But Heyer (1975) found that some innovations are also disadvantageous. She notes that the switch to better priced maize in some areas of Kenya led to the abandonment of the more nutritious and drought-resistant sorghums and millets. Therefore, new ideas are not necessarily constructive, hence they may not automatically be adopted. Where such ideas may be adopted they are likely to lead to devastating effects. This is where the diffusion of ideas into a culture should be

seen as a subjective process. Not all the traits may be readily incorporated. Selection must, therefore, occur. This calls for an understanding of the indigenous knowledge and local perceptions of the community. According to Vail (1972), stimulus forces external to a culture can encourage smallholder agricultural transformation if there is proper planning and policy-making. The importance of local perceptions cannot be overruled since development is culture-specific. Thus, an understanding of present processes and decision behaviour in traditional agriculture is crucial in determining the relevant practicality and potential success of proposed changes and innovations in agriculture. It is imperative to understand a society's culture in terms of social relations, environmental difficulties, skills, and accumulated knowledge in order to determine the overall benefits of planned change. This framework and point of reference is generally agreed upon in wider circles (Barker, Oguntoyinbo and Richards, 1977; Brokensha and Riley, 1980; Ember and Ember, 1973; National Academy of Sciences, 1977; Norman, 1977; Mbithi, 1974; Silberfein, 1977). We should, therefore, not ignore traditional ideas as irrelevant or perceive them as

antithetical to modern systems of thought. This will enable a better understanding of farmers' behaviour and response with respect to their adoption of agricultural innovations.

In the final hypothesis, it was posited that the transformation of traditional agriculture is likely to be a function of changes in extended family relations. The results of data analysis, however, do not lend ample support to the hypothesis. It has been found that the cultivation of both coffee and sunflower is not influenced by marital arrangements. Secondly, the cultivation of both coffee and sugarcane is not influenced by communal (reciprocal) labour arrangements. Thirdly, present land tenure systems are not related to the cultivation of both coffee and sugarcane. These results show that although agricultural transformation in Webuye has taken place, the extended family and its characteristic features of corporate responsibility are still existent. Both monogamous and polygamous forms of marital arrangements are consistently not associated with agricultural change. Similarly, extended family relations in the form of communal labour and residence have no influence on farmers' innovative behaviour. Further, farmers' attitude

towards both group and individual ownership of land bears no relationship to their innovative behaviour.

The conclusion derived from this state of affairs is that agricultural change does not entail change in kinship structures. In addition the extended family is not an obstacle to agricultural change. According to Klaus (1976), strong kinship ties are impediments to change because they force an individual to adhere to the norms of tradition whereby innovations are seen as foreign ideas destructive to the smooth functioning of the extended family. Thus, he observes that an individual deeply integrated into an extended family has no subjective interest in extended production or the application of modern methods of production. From the present study, this assertion finds no support. Accordingly, this writer supports the idea that modernity and tradition are not opposed dimensions (Leslie, 1974; Ogiunwo, 1969; Rogers, 1969). The role of the extended family remains important in terms of division of labour, supply of skill and training and the accumulation of capital. Although the extended family has certain disadvantages, individuals have devised mechanisms by which the demands of the extended family are minimized while

at the same time exploiting its perceived advantages.

Recommendations

The findings of this study are directed to researchers, policy makers, planners and others who are concerned with the welfare of rural communities and are interested in raising the standard of living of rural communities.

Recommendations for further research

It is recommended that similar studies be carried out in the same community or elsewhere for purposes of comparison or replication. A wide range of procedures, propositions and measurements would expose better the interrelations of factors affecting agricultural change. The sample should be large enough to allow for valid conclusions.

It is also recommended that longitudinal studies pertaining to agricultural change in Webuye be carried out to off-set the limitations of the current study in order to identify the stages through which this change has undergone. The period of fieldwork, therefore, should be long enough for a detailed understanding of this process. For behavioural change in farmers, experimental methods of research are also recommended. Finally it is recommended that

multiple and more advanced methods of data collection and analysis be used to make the findings more reliable and valid. This way, researches in the rural areas will be more meaningful.

Recommendations for policy makers

For those charged with the responsibility of effecting rural change and development, it is recommended that innovations that are to be transmitted to farmers in Webuye should be those that are likely to help them meet most of their socio-economic needs. This is found to be the most crucial factor as far as agricultural change in Webuye is concerned. Therefore, farmers' specific needs in the socio-economic domain should be identified at first hand so that important innovations are transmitted in the order of their priority and appropriateness. The diffusion of any innovations will be faster if they are transmitted contingent upon farmers' indigenous perceptions and knowledge of their local environmental conditions.

The major obstacles to agricultural change should be identified and removed or counteracted. This will act as an incentive and will motivate farmers to adopt more innovations. Improved transport network, farm credit facilities, produce prices and co-operative services would drive farmers

towards this end. In Webuye Division, the transformation of traditional agriculture will move faster if the interaction between change agents and the farmers is greatly increased. Finally, attention should be directed to both the progressive and wealthier farmers, and the non-innovative ones. This will lessen farmers' differential response to agricultural innovations.

APPENDIX

FARMER QUESTIONNAIRE

For administration to farmers in Webuye Division,
Bungoma District. Please check as advised in each
case. Your responses are highly held confidential.

1. Name (optional)

2. Plot No.

3. Location:

Bokoli/Misikhu

Ndivisi

Webuye

4. Sex:

Male

Female

5. Age: Years.

6. Age category (if uncertain in No.5)

Under 25

45 - 49

25 - 34

50 - 54

35 - 44

55 and above

7. Number of years of schooling

8. Class reached

9. General level of education:

Primary University

Secondary

Middle College

Other (specify)

10. Please check when you started farming business:

1980s

1970s

1960s

1950s

Other (specify)

11. State your other occupation(s):

Salaried employment

Trading

Other (specify)

None

12. Marital status:

Single

Monogamist

Polygamist

Widowed

Divorced/separated

13. Number of people in your family

14. Approximate size of family (if uncertain in No.13 above):

- 1 member
- 2 - 4 members
- 5 - 9
- 10 - 14
- over 15 members

15. Do your children attend school?

- Yes
- No (go to No.18)

16. What type(s) of institution do they attend?
(Check as many as apply):

- Nursery school
- Primary school
- Secondary school
- College/University
- Other (specify)

17. How do you finance their education?

- own payment
- bursary fund
- fund-raising
- assisted by relatives/friends
- government sponsorship
- other (specify)

18. Size of farming land in hectares.....

19. Approximate size of farming land in hectares,
(if uncertain in No.18 above)

- below 2 (2)
- 2 - 4⁰ (3-4)
- 5 - 6⁵ (5-6)
- 7⁸ - 8²⁰ (7-8)
- 9¹ - 10⁵ (9-10)
- 10⁵ and above

20. In your opinion, is this land adequate?

- very much adequate
- somehow adequate
- somehow inadequate
- very much inadequate

21. How do you rate the fertility of the soil in this area?

- very fertile
- fertile
- fair
- infertile
- very infertile

22. In your own opinion, is rainfall in your area sufficient for crop production?

- Yes
- No

23. How do you rate rainfall reliability in the area?

- Very reliable
- Fairly reliable
- Cannot tell
- Unreliable
- Very unreliable

24. Which of these crops do you personally grow? (Check as many as apply):

- | | |
|---|--|
| <input type="checkbox"/> Maize | <input type="checkbox"/> Cassava |
| <input type="checkbox"/> Millet | <input type="checkbox"/> Indigenous vegetables |
| <input type="checkbox"/> Sorghum | <input type="checkbox"/> Groundnuts/simsim |
| <input type="checkbox"/> Sweet Potatoes | <input type="checkbox"/> Beans |
| <input type="checkbox"/> Irish Potatoes | <input type="checkbox"/> Bananas |

- | | |
|-----------------------------------|--|
| <input type="checkbox"/> Cabbages | <input type="checkbox"/> Onions |
| <input type="checkbox"/> Tomatoes | <input type="checkbox"/> Sugarcane |
| <input type="checkbox"/> Kales | <input type="checkbox"/> sunflower |
| <input type="checkbox"/> Oranges | <input type="checkbox"/> Other (specify) |
| <input type="checkbox"/> Coffee | |

For what purpose do you grow these crops? (Please check as may be applicable):

	<u>Home consumption</u>	<u>Sale</u>
Maize	<input type="checkbox"/>	<input type="checkbox"/>
Millet	<input type="checkbox"/>	<input type="checkbox"/>
Sorghum	<input type="checkbox"/>	<input type="checkbox"/>
Sweet Potatoes	<input type="checkbox"/>	<input type="checkbox"/>
Irish Potatoes	<input type="checkbox"/>	<input type="checkbox"/>
Cassava	<input type="checkbox"/>	<input type="checkbox"/>
Indigenous vegetables	<input type="checkbox"/>	<input type="checkbox"/>
Groundnutes/simsim	<input type="checkbox"/>	<input type="checkbox"/>
Beans	<input type="checkbox"/>	<input type="checkbox"/>
Cabbages	<input type="checkbox"/>	<input type="checkbox"/>
Onions	<input type="checkbox"/>	<input type="checkbox"/>
Tomatoes	<input type="checkbox"/>	<input type="checkbox"/>
Kales	<input type="checkbox"/>	<input type="checkbox"/>
Oranges	<input type="checkbox"/>	<input type="checkbox"/>
Coffee	<input type="checkbox"/>	<input type="checkbox"/>
Sugarcane	<input type="checkbox"/>	<input type="checkbox"/>

29. The need to purchase modern household items.

strongly agree

agree

no opinion

disagree

strongly disagree

31. The need to possess valuable assets (e.g. bicycles, livestock, radio).

strongly agree

agree

no opinion

disagree

strongly disagree

32. The need to diversify income.

strongly agree

agree

no opinion

disagree

strongly disagree

33. The need to reach a good market.

strongly agree

agree

no opinion

disagree

strongly disagree

34. The need to elevate social status.

strongly agree

agree

no opinion

disagree

strongly disagree

35. The need for the general well-being of the family.

strongly agree

agree

no opinion

disagree

strongly disagree

36. You have many dependants.

- strongly agree
- agree
- no opinion
- disagree
- strongly disagree

37. You have few dependants.

- strongly agree
- agree
- no opinion
- disagree
- strongly disagree

38. Which one of the following is the most desirable tool for ploughing the land?

- the ox-drawn plough
- the hoe
- the tractor

39. Which one is the least desirable?

- the ox-drawn plough
- the hoe
- the tractor

40. Which one do you personally use?

- the ox-drawn plough
- the hoe
- the tractor

41. Which one is used by most farmers in the area?

- the ox-drawn plough
- the hoe
- the tractor

42. Please check the one major food crop that is grown on your farm.

- Millet
- Sorghum
- Maize
- Banana
- Cassava
- Sweet potatoes
- Other (specify)

43. which one food crop is grown by most farmers in the area?

- Millet
- Sorghum
- Maize
- Banana
- Cassava
- Sweet potatoes
- Other (specify).....

44. Please check the one major cash crop that is grown on your farm.

- Sugarcane
- Coffee
- Sunflower
- Other (specify).....

45. Which one cash crop is grown by most farmers in the area?

- Sugarcane
- Coffee
- Sunflower
- Other (specify).....

46. If you ever grow maize which type of seed do you use?

- Hybrid
- Local (non-hybrid)

47. How do you rate the hybrid seed yield?

- Excellent
- Good
- Fair
- Poor
- Very poor

48. How do you rate the local seed yield?

- Excellent
- Good
- Fair
- Poor
- Very poor

49. What type of fertilizers do you use for planting?

- Composite manure
- Green manure
- Animal manure
- Chemical (DAP, NPK:20:20:0)
- Other (specify).....

1 - What type of fertilizers is generally used by most farmers in the area?

- Composite manure
- Green manure
- Animal manure
- Chemical fertilizers
- Other (specify).....

1 - Personally, how do you rate manure?

- Excellent
- Good
- Fair
- Poor
- Very poor

52 . Personally, how do you rate chemical fertilizers?

- Excellent
- Good
- Fair
- Poor
- Very poor

53. The prices for chemical fertilizers at present are good and therefore should be maintained. Do you approve of this view?

- strongly approve
- approve
- undecided
- disapprove
- strongly disapprove

4. In general, are you satisfied with the present prices for fertilizers?

- satisfied
- dissatisfied

5. How do you obtain the operational capital for your farm activities? (Check as many as apply)

- by way of loans
- sale of farm produce
- monthly salary
- other (specify).....

6. How difficult is it to obtain the operational capital? (Check one)

- Not difficult
- Slightly difficult
- Quite difficult

7. Are you satisfied with the way you obtain your operational income?

- satisfied
- dissatisfied

8. How do you obtain farm labour?(Check as many as apply).

- from hired labourers
- from family members
- from friends and relatives
- other (specify).....

59. Are you satisfied with the present labour availabilities?
- satisfied
- dissatisfied
60. Where do you sell your farm produce? (Check as many as apply).
- within the village
- at the local market centre
- in the nearest urban centre
- other (specify).....
61. Are you satisfied with the present market availabilities?
- satisfied
- dissatisfied
62. The prices for farm produce are good. Do you agree?
- strongly agree
- disagree
- undecided
- disagree
- strongly disagree
63. How is the produce transported to buying centres? (Check as many as apply)
- by animal sledge
- by ox-cart
- by bicycle
- by human portage
- by lorry
- other (specify).....

64. How do you rate road conditions in the area?
- Excellent
- Good
- Fair
- Poor
- Very poor
65. Are you satisfied with the present means of produce transportation?
- satisfied
- dissatisfied
66. As a farmer, are you usually in contact with agricultural extension workers?
- Yes
- No (go to No.70)
67. Do you usually visit them?
- Yes
- No
68. Do they usually visit you?
- Yes
- No
69. How often are you in contact?
- Very frequently
- Frequently
- Occasionally

70. Personally, is your contact with agricultural extension workers desirable?

- Highly desirable
- Desirable
- No opinion
- Undesirable
- Highly undesirable

71. Agricultural extension officers in this area are doing good work. Do you approve of this view?

- Strongly approve
- Approve
- Undecided
- Disapprove
- Strongly disapprove

72. Agricultural extension officers in this area are few. Do you agree?

- strongly agree
- agree
- no opinion
- disagree
- strongly disagree

73. Are you a member of any cooperative society?

- Yes
- No (go to No.75)

74. What key position do you hold in the society?

Chairman

Vice-Chairman

Secretary

Ordinary member

Other (specify).....

75. To be a progressive farmer, it is necessary for one to join a farmers' co-operative society. Do you support this view?

Strongly support

Support

Undecided

Don't support

Strongly don't support

76. Generally, what is your attitude towards farmers' co-operative societies and their service to farmers?

Dislike very much

Dislike

Undecided

Like

Like very much

77. It is desirable for farmers to grow many new varieties of food crops and abandon the traditional ones. Do you agree?

strongly agree

- agree
- no opinion
- disagree
- strongly disagree

78. It is necessary for farmers to grow both traditional and new varieties of food crops. Do you agree?

- strongly agree
- agree
- no opinion
- disagree
- strongly disagree

79. It is desirable for farmers to grow more food crops than cash crops. Do you approve of this view?

- strongly approve
- approve
- undecided
- disapprove
- strongly disapprove

80. It is necessary for farmers to grow more cash crops than food crops. Do you approve of this view?

- strongly approve
- approve
- undecided
- disapprove
- strongly disapprove

81. It is equally desirable for farmers to grow both food crops and cash crops. Do you agree?

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

82. Farmers do well when granted loans. Do you approve of this view?

- strongly approve
- approve
- undecided
- disapprove
- strongly disapprove

83. Do you ever go for loans to invest in farming?

- Yes
- No (go to No.86)

84. From which institution(s) do you obtain loans?
(Check as many as apply)

- Commercial Bank
- Farmers' Co-operative Society
- Agricultural Finance Corporation
- Local Money Lenders
- Other (specify).....

85. Are you satisfied with the services offered by the loaning institution?

satisfied

dissatisfied

86. Some farmers avoid loans because of high interest rates? Is this true?

Quite true

Somewhat true

Uncertain

Somewhat untrue

Quite untrue

87. Only rich farmers are given loans. Is this true?

Quite true

Somewhat true

Uncertain

Somewhat untrue

Quite untrue

88. Please check the appropriate method of storing grain after harvest.

use of the traditional granary

use of a net-wire store

the grain is stored in the house

Other (specify).....

89. In your own view which type of storage do you consider most suitable? (Check as many as apply)

Use of the traditional granary

- Use of a net-wire store
- the grain is stored in the house
- Other (specify).....

90. Which method do you personally use?

- Use of the traditional granary
- Use of a net-wire store
- the grain is stored in the house
- Other (specify).....

91. Suggest reasons for using the method chosen above
(No. 90).

1. -----
2. -----
3. -----
4. -----

92. Do you apply pesticides to preserve your grain?

- Yes
- No

93. Do you keep farming records?

- Yes
- No

94. Suggest reasons for keeping farm records .

1. -----
2. -----
3. -----
4. -----

In each of the following activities (Nos 95-98)
show in which ones you normally participate.

95. Farmers' Seminars.

Yes

No

96. Chief's Meetings.

Yes

No

97. Local agricultural demonstration programmes.

Yes

No

98. Farmers' training.

Yes

No

99. Please indicate how you obtained your piece of land.

through inheritance

bought individually

bought as a group (clan)

other (specify).....

100. Who controls land in the village?

individual owners

village headman

clan elders

the whole clan

families

other (specify)

.....

101. Do you have your own land title deed?

Yes

No

102. Do you visit your relatives?

Yes

No (go to No. 105)

103. How often do you visit your relatives?

Occasionally

Frequently

Very frequently

104. For what purpose do you visit your relatives?

(Check as many as apply)

personal friendship visits

attendance of clan meetings

attendance of initiation and other ceremonies

attendance of funerals

other (specify)

(go to No. 106)

105. Suggest reasons for not visiting your relatives.

1. -----

2. -----

3. -----

4. -----

106. Do you stay with some relatives in your home?

Yes

No (go to No. 108)

107. Please check the relatives you stay with (check as many as apply).

Brothers

Uncles

Sisters

Grandparents

Cousins

Nephews

Parents

Others (specify)

Aunts

.....

Nieces

In-laws

108. Suggest reasons for not staying with relatives.

1. -----

2. -----

3. -----

4. -----

109. It is better to plan, make decisions and manage your farm activities individually than with relatives. Do you approve of this view?

strongly disapprove

disapprove

no opinion

approve

strongly approve

10. How do you rate individual ownership of land?

- Very poor
- Poor
- Fair
- Good
- Excellent

11. How do you rate group (clan) ownership of land?

- Very poor
- Poor
- Fair
- Good
- Excellent

12. **Reliance on relatives** promotes progress. What is your level of agreement or disagreement?

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

113. **Reliance on relatives** hinders progress. What is your level of agreement or disagreement?

- strongly agree
- agree
- undecided
- disagree
- strongly disagree

114. Do you support a government proposal to introduce tea growing in the location?

- strongly support
- support
- undecided
- don't support
- strongly don't support

115. Suggest reasons for your support.

- 1. -----
- 2. -----
- 3. -----
- 4. -----

116. Suggest reasons for your indifference.

- 1. -----
- 2. -----
- 3. -----
- 4. -----

117. Generally, what is your attitude towards leaders in the location in their efforts to help farmers?

- Excellent
- Good
- Fair
- Poor
- Very poor

118. Finally, are you satisfied with what you produce on your farm?

Strongly satisfied

Satisfied

Undecided

Dissatisfied

Strongly dissatisfied.

Thank you for your invaluable information and response.

M.G. Muyekho

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