MODERNIZATION, RELATIVE INEQUALITY
AND FATALISM:
A Study of Poverty and Underdevelopment
in Rural Kenya

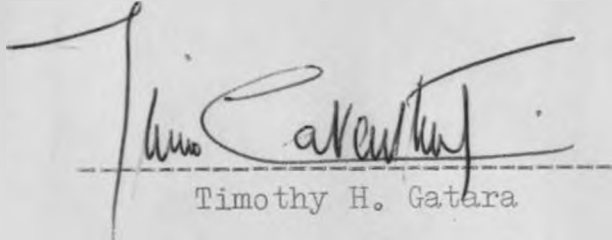## TIMOTHY H. GATARA

A Thesis submitted in fulfilment for award
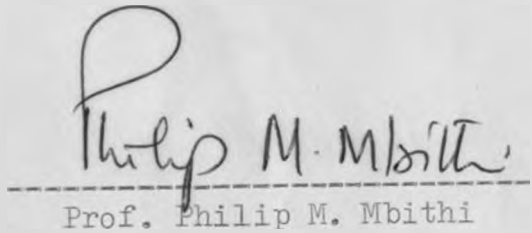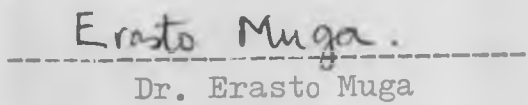of Degree of Master of Arts in the
University of Nairobi

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This Thesis is my original work and has not
been presented for degree in any other university.

Timothy H. Gatara

This Thesis has been submitted for examination
with our approval as University Supervisors.

Prof. Philip M. Mbithi

Dr. Erasto Muga

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read my proposals and, day to day gave moral support
to the undertaking. The successful completion of this
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ABSTRACT

This is a work about technological change
and its effects on Mbooni, a rural community.

It examines the factors behind this change,
as well as the consequences, both intended and
unintended, that accrue to the change.

The study is guided by two theoretical
perspectives, one that purports that inequalities
in a social system are consequent upon technological
change and the other that these inequalities determine
religiosity, fatalism and dependence in the same
social system.

These perspectives are clarified through
literature review that aims at showing how terms
used in these propositions have been defined by
authors in other studies, how they interrelate them
and how they operationalize them into empirical
measures.

To verify these two perspectives, the study
has set itself, several hypotheses. These hypotheses
are meant to provide a clue as to what are the
likely factors behind technological change and
whether technological change further influences some

or all of these factors.

All the factors used in all the hypotheses
are defined and an attempt made to make it clear to
the reader what is meant by a particular variable
and in what sense it is used in the study. This is
important, particularly when one bears in mind that
terms can have varied meanings when applied to
communities that socially and structurally differ.
There usually, is no functional equivalence of
such indicators.

Following this, an attempt is made to justify
this research undertaking. Among the reasons put
forward in support of the work is the fact that, small
farmers, with whom the study concerns itself seem to
comprise the majority of mankind for whom many
development programmes are planned and aimed. Search
for knowledge in this respect is hence justified.
It is also anticipated, in line with most studies,
that this work will contribute to the discipline
of Sociology other disciplines, social science research
and to the existing body of knowledge about small
farmers in Kenya's rural areas.

In this work, level of adoption of innovations
is taken as the dependent or key variable of the study;
some time is therefore spent looking at diffusion of

technological innovations in Mbooni paying particular
attention to the possibility of the adoption of
these innovations following a curve. It is shown that,
adoption behaviour in Mbooni follows a curve but not
a normal curve.

In chapter Two, efforts are devoted to the
site of study, trying to give an impression of what
it is like in terms of physical features, the distri-
bution of units in the area, sampling, data collection
and problems related to methodology,

With regard to the area, the prominence of
natural stratification into ecological zones is
highlighted, specifically noting diversification of
adaptation patterns following this stratification.

Data collection focuses on sampling
techniques, representativeness of the sample and the
problems common to such techniques in social science
research in Kenya's rural areas.

Chapter Three concentrates on findings
and data analysis.

This chapter, first presents the findings
on major variables for which observations were made.
These are then discussed in light of existing

statistical evidence and of the works done by other
scholars on the same factors.

Secondly, it presents correlation analysis
and testing of the hypotheses used in this study.
Chi-square measure of association and Gamma for
the strength of association are used. Wherever
necessary, an attempt is made to describe the measure
used and to explain why it is relevant where it is
applied.

Finally, a multivariate analysis, to
establish what factors dominate adoption levels in
Mbooni is carried out and the results shown in
tabular form.

One fact that should be noted with regard
to this chapter is the choice of technique of
farmer categorization in Mbooni. It utilizes the
Guttman scale at the expense of the normal curve
due to various weaknesses that have been shown
to plague the normal curve.

The final chapter comprises, conclusions
and recommendations.

In conclusion, it has been inferred that
adoption levels will be affected by a variety of

factors, a few of which dominate. It was also concluded
that adoption levels of farmers cannot be measured
using a normal curve. This is mainly due to the few
factors that tend to affect distribution of farmers
and make skewed this distribution.

As concerns educational levels and literacy,
it was shown that,formal education does not influence
adoption levels. It has in fact been shown that
high adoption levels could be achieved by individuals
who are completely without any kind of formal education.
Indeed, had formal education been a key determinant
of adoption levels, the levels of adoption evident
in Mbooni would not be there, since levels of formal
education are generally low!

As for literacy, it is not related to individual
levelsof adoption. It is therefore not a critical
factor in determination of adoption levels.

This conclusion should not however obscure
the factor that literacy as a factor in technological
change is only not to be over-emphasized but not that
it is unimportant to a farmer's life. In cases where
farmers can encode and decode information for themselves,
it has been shown that they can acquire information
which can influence their decisions and hence their
action.

It should not however escape our notice that important questions with regard to literacy are still to be posed and answered. The first is whether literates make use of their knowledge and the second whether the information they gather through reading is useful.

Degree of mass media exposure of an individual has been concluded to be an important pre-requisite of the process of technological change. This signifies the important role mass media is likely to play in the future in bringing change in rural areas of Kenya. This is particularly so of non-formal means of communication e.g. the baraza, that must continue to be central to change until such a time when sufficiently high levels of literacy will bring to the forefront printed media.

Inference has also been made in this work with regard to geographical mobility. It has been shown to be one of the factors behind technological change, though plagued by a few flaws. One of these is its inadequacy in assessing mental cosmopoliteness, where a farmer is capable of acquiring new ideas without necessarily being physically mobile. Secondly, it has also been concluded that it is not always the case that those ideas that one acquires through physical mobility are always useful or even relevantto his level of adoption.

Ecology has been shown to be one of the factors dominating levels of adoption, the other being income levels. This state of affairs arises from contrasting topographical variations of the zones studied, which further affect type of mechanization, crop type and ultimately incomes generated from each of these zones. It has for example been shown that not all farmers can grow coffee - only the farmers of the middle zone. This also means that not all farmers can derive an income from coffee.

Income is the number one factor determining adoption levels. This is not surprising since almost every innovation has become an additional expense to the rural farmer. Even in cases where the government starts by giving free samples, at one stage or another, a farmer got to be able to generate enough income from his farming activities to be fully independent of such samples.

This, therefore, means that those farmers who can afford certain innovations will continue leading others who cannot afford as far as adoption levels are concerned and inequality will continually be present since income derivation will favour only those who can afford.

The reach of the available extension force
in the rural areas is fairly balanced between the low
and high level adoption farmers. Two problems however
continue to plague this force.

First, the personnel resources available
are concentrated at levels where they are needed least.
For example, the most qualified personnel in the field
of agriculture is centred in district and national
headquarters, whereas their know-how is needed most
at the farmer level.

Secondly, the extension force that is in
day to day contact with the farmer is the most poorly
trained. They also suffer most limitations in other
forms of resources e.g. transportation, which tends
to make their work almost impossible, the topographical
state of Kenya's rural areas being what it is.

Religion and fatalism have been shown to
relate strongly to adoption levels. These two factors
are variables that influence adoption levels and are
further influenced by adoption levels. Adoption of
an innovation assists a farmer realize some of his
goals, those who do not adopt any innovation cannot
and must hence continue to pacify their motivation
by resorting to external control. On the other hand,
religion and fatalism may be used to justify a

favourable outcome of a crop.

Since there is, seemingly, more frustration
than success in the rural areas, it becomes important
to continue seeking for greater understanding of the
force of religion, fatalism, alcoholism, etc. and to
find out if these could be of any use in attempts
made to change the lives of the poor farmer.

Finally, an inference is made from the
findings of this study that adoption behaviour
continues to enhance inequality between farmers in
the rural areas. Those who adopt certain income
generating innovations early enough are for example
able to reap pioneer benefits, maintain the pace,
and hence keep the gap wide between themselves and
those who adopt a few innovations late, or even
adopt none at all.

In view of the foregoing inferences, recommen-
dations centred on the following key areas have been
made:-

(a)   Adoption of problem solving approaches in rural
        development where emphasis must be put on
        model building, testing and replication. This
        should involve both the social science researcher,
        the policy maker and the implementor.

(b)   Shifting emphasis from classification of
        farmers by use of the normal curve and
        continually seeking alternative approaches
        e.g. scaling where factors such as ranking,
        item visibility and stratification become
        obvious to the reader.

(c)   Examination of more factors to explain the
        process of technological change as well as
        more examination of those already researched.
        This will help understand how such factors
        alternate over time and which ones dominate
        adoption levels.

(d)   Carrying out of research that aims at eroding
        criticisms levelled at social science research.
        These appeal to social science research to
        cease to conduct surveys that only improve
        theory and to launch inquiries into factors
        that can later be manipulated to change a
        man's life.

(e)   Examining the potential of using religious
        groups for change. This recommendation draws
        to the attention of researchers the popular
        adherence of most people to some form of
        external control, and, hence, the possibility
        that exists to utilize the situation for change.

(f)   Using non-formal education and functional
        literacy to change the adoption behaviour
        of farmers in the rural areas.

This recommendation is made in light of the
evident hopelessness of the formal education system
in provision of even basic skills with which one
could make a living after parting with the system.
This should follow the problem solving approach
mentioned earlier.

(g)   Shifting emphasis from the 'progressive' to
        the small farmer, who the study has shown
        dominates the rural farming scene.

This is something that is already gaining
momentum at planning levels and at the farmer levels
in training and extension staff on the need to shift
efforts to the small farmer.

Through efforts made in this work, and briefly
described in this synopsis, an attempt has been made
to reach the goals set in it and to make recommendations
that dislocate the traditional research from its
theoretical locus, to model building, testing and

implementation, a process that will hopefully give
social scientists knowledge with which they will not
only improve theory but also change the life of the
subsistence farmer.

CHAPTER ONE

PROBLEM STATEMENT

A mounting wealth of literature on empirical studies exists to show that a majority of mankind today consists of peasants who use archaic methods and inefficient means of cultivation to derive existence from often harsh environments.

Also evidenced by literature is the fact that those concerned with improvement of the peasant have concentrated their efforts on introduction of new ideas among peasants so that as these ideas have diffused throughout their systems and more and more farmers have adopted them, the farmers have tended to change their farming techniques and ultimately their styles of life.

There is evidence that indicates that technological change is everywhere well intended; many people in both developed and developing nations want improved technology and higher levels of living. This is also the image to whose creation many empirical studies have contributed.

It is however the central thesis of this study that technological change has as one of its unintended consequences relative inequalities,

between groups of people, with the feeling of
relative poverty, dependence, fatalism and religiosity
as further consequences; also by hypothesis, the
above variables are major contributory factors in
underdevelopment among peasant populations in
the rural areas.

With regard to the first assertion, the
fact that the once egalitarian tribal societies
have changed is perhaps familiar. The differ-
entiation in life styles that cuts across the
entire rural communities is visible to any willing
observer.

In the words of Roling (1973):

> "Some farmers have wooden or stone
> houses with iron sheeted roofs. Others
> still live in round huts which to the
> unwary observer seem on fire when the
> smoke of cooking oozes through the
> thatch. Some women haul heavy drums
> of water up the ridge. Others, who,
> apparently do not have to do so
> witness the galvanized tanks for
> collecting and storing rain water in
> their farm yards. Parts of the road
> lead one past well fenced paddocks
> with fresian cows, but further on,
> one sees an old man in a world war
> II trench coat herding a small herd
> of sickly looking cows.....and so on
> and so forth". (1)

An observation such as the above makes one
wonder what has happened. Roling thinks it is the
effect of innovations, particularly agricultural,

that invoked change among a few members of
rural societies, who adopted these earliest,
while others adopted only a few and others none.

On the basis of earliness to adopt an
innovation, he shows that technological change in
Central Kenya has produced four categories of
farmers out of the once egalitarian society
that existed here; the progressives, early
adopters, late adopters and the laggards. The
extreme groups are particularly marked. Other
scholars i.e. Rogers (1969),[2] Learner (1964)[3]
have documented the same evidence though their
concern seems to be with the positive effects of
technological change, which they refer to as
modernization, rather than with its unintended
consequences e.g. social inequalities.

The second argument that purports
fatalism and dependence as critical consequences
of the process of technological change is also
documented in various studies.

In reference to the lagging farmer,
Roling (1973)[4] thinks they have among others, two
important alternatives in life:

One, they can resort to alcohol, religious behaviour, or remain staunchly fatalistic. In the sub-culture of peasantry propounded by Rogers (1973),[5] fatalism is one of its components. Religiosity as particularly characteristic of peasants is documented by among others, classical scholars such as Karl Marx[6] and Nietszche.[7] Marx said, "it is the opium of the masses".[8]

The second alternative open to the lagging farmer is to accept his different status, resign to the fact that he will always be poor compared with the progressive farmer and opt to work as a labourer on the latter's farm. One tends to become dependent.

Dependence has been defined as a "conditioning situation in which the economies of one group of countries are conditioned by the development and expansion of others. The conditioning situation determines the limits and possibilities of action and behaviour of men".[9]

In this study, dependence is examined at the individual level to allow measurement. At the individual level then, it is viewed as a conditioning situation in which the state of being of one group of people in a social system is conditioned by the progressiveness and expansion of the state of being of another group in the same social system.

Technological change relative inequality and its consequences on the Kenyan rural communities are the sole concern of this study. Within the concern, the aims of the study are set to comprise the following:-

First, the study aims at examining the factors behind the process of technological change. This is important since the factors so far put forward as the correlates of technological change are a result of studies done in other communities, and the pattern of relationships of these factors so derived, cannot be assumed to apply or be replicated in the same fashion in rural communities in Kenya.

This study aims at looking at the correlates of technological change in a Kenyan rural setting.

Secondly, the study will endeavour to show which among the factors related to adoption levels are more important than others. This is in view of the fact that most studies do

show that a multiplicity of factors usually affect
a given phenomenon in society, but do not show
which of these factors are likely to dominate
the phenomenon.

Finally, the study will pay special attention
to the technique of measuring adoption levels in
the rural areas. Often, it is assumed that a
farmer's "progressiveness degree may be easily
determined by direct application of statistical
rules that assume an equal distribution of
farmers, into the categories of innovators",
early adopters, early majority, late majority
and laggards'. This however may not necessarily
be the case in all studies of the rural farmer.

THEORY, LITERATURE REVIEW AND
CONCEPT CLARIFICATION

In this study, two theoretical perspectives or arguments are developed. These are:-

(i) Relative inequalities in a social system are consequent upon the process of technological change,

(ii) These inequalities determine:-

(a) Religiosity
(b) Fatalism, and
(c) Dependence in a social system

As is generally accepted by social scientists, defintion, measurement and establishment of causal laws in social sciences is wrought with problems and intricacies that have not allowed any scholar to decipher the behaviour of man, earth's most complex creature. This state of affairs does not necessarily reveal the intellectual incapacity of scholars but rather the complexities that belay phenomena that attempt to interpret the human society. Technological change, social inequality and fatalism are such phenomena that despite their fluid nature, scholars have attempted to define, measure and even interrelate in search of causal laws in human behaviour.

In view of this, literature review, definition and appraisal of concepts are carried out with the following aims in mind:-

(a)   Showing clearly how both sociologists and anthropologists define the terms.

(b)   Showing how they interrelate them within themselves and with other variables.

(c)   Showing how they operationalize their concepts into empirical measures.

(d)   Showing how their theories relate to this study and how the study relates to theirs.

One of the most popularly quoted authorities on peasant societies is Rogers, E.   In his work among peasants (1973), he defined modernization as "the process by which individuals change from a traditional way of life to a more complex technologically advanced and rapidly changing way of life".[10]

It is important to note from this definition the way the phrases traditional way of life and complex advanced technology are used as connotations of polar ends in the process of technological change.

In Rogers definition, he denies peasants
a technology by referring to their existence as just
traditional. It is therefore illogical for him to
talk of their complex technological advance, for how
could peasants reach an advanced stage of a state
they never initially had? ✓

While it is agreed here that technological
change is key to modernization, the study maintains
that the process of modernization must have an
original state of a certain degree of technological
advance. For this reason, the term technological
change would be used more than that of modernization
so that the above retort is kept alive throughout
the study.

Despite the above flaw, Rogers cautions us
to treat with full awareness misconceptions about
modernization.   These are:

(a)   Equalizing modernization with Europeani-
         zation or Westernization with the implication
         that the source of impetus for social change
         necessarily comes from Europe or Western
         nations. Instead Rogers views modernization
         as a synthesis of the old and the new, which
         therefore varies from environment to environ-
         ment. It is also his argument that

"innovations need not make the receiving
country a replica of the source country
nor should the new element comes from
it".[11]

(b)   All modernization is not good. According
       to Black (1966):

> "modernization must be viewed as a
> process that is simultaneously
> creative and destructive, providing
> new opportunities and prospects at a
> high price in human dislocation and
> suffering". (12)

(c)   It is finally noted that modernization is
       not unidimensional and cannot be measured
       by a single criterion or indices. It is a
       process involving many factors that one
       must measure to be able to say one is
       modern. Variables such as levels of
       living, literacy, education, political
       participation are for example assumed to
       relate to technological change, which is
       itself a multidimensional concept that calls
       for a multivariate approach to operationa-
       lize.

       Rogers, apart from defining the concept
of modernization sees it related to inequality due to

differentials in individual innovativeness and related
to fatalism due to the widening gap between individual
aspirations and achievement.

He cites innovativeness as a key variable
in determining individual modernization basing his
argument on the fact that individuals can be placed
on an innovativeness scale meaning that some will be
better off than others and therefore unequal.

He also argues that modernization can promote
fatalism where members of a social system are
encouraged to want more than they can have or get
and hence get frustrated by the difference between
aspirations and actualities. This makes them develop
a retreatist and fatalistic disposition to change.

To operationalize his theory, Rogers (1973)[13]
notes that modernization is not a unidimensional
concept and cannot be measured by a single criterion
or index it must be viewed as a process involving
the interaction of many factors so that more than one
variable must be measured in one's behaviour to place
him on a modernization continuum.

The major variables used operationally are:-

(a)   Literacy

(b)   Mass media exposure

(c)   Education

(d)   Cosmopoliteness

(d)   Income

(f)   Achievement motivation all of which are

        identifiable, measureable antecedents of

        innovativeness. All these possible

        explanatory factors of the process of

        modernization are negatively related to

        fatalism.

Learner (1964), has also carried out
empirical studies on the process of modernization.

According to him,

> "the process of modernization powerfully
> transforms individual ways of life. It is
> the move from the familiar and deeply
> personal life of a family farm in an
> isolated village to the strange imperso-
> nality of a job in a busy city crowded
> with unknown persons". (14)

Although framed differently, Learner's view
is conveying much the same idea as Rogers that the
process of modernization must involve transition from
one way of life, (traditional) to another (modern).

Learner also refers to the concept of "modernity" as "primarily a state of mind, expectation of progress, propensity to growth and readiness to adapt oneself to change....."[15]

This concept does not concern the study since it is known that technological change has occurred. It is however suggestive of the fact that the multi-variate nature of modernization must include as one of its indicators psychological factors e.g. achievement motivation.

With regard to Learner's comment on the process of modernization, he lacks clarity. He commits the same flaw as Rogers of not clearly indicating that traditional existence bears any level of technology at all. Secondly, his explanation does not mention technological change as a critical ingredient in the process of modernization. It is for example, hard to convince any serious scholar of the process, that a mere physical shift from one environment to another constitutes individual modernization or even technological change.

According to Learner, relationship between modernization, inequality, and retreatism is explained away by differential degrees of satisfaction between individuals. He defines satisfaction as "a ratio

of gets to wants", of achievements to aspirations".[16]
This ratio is operative where individuals are
undergoing the process of technological change.
Retreatism, conflict and dissatisfaction are viewed
as the end products of satisfaction differentials.

Learner uses three major variables to
operationalize the process of modernization; literacy,
mass media exposure, and empathy, all of which
relate positively to modernization. On the moderni-
zation continuum, he classifies respondents as
"traditionals, transitionals and moderns".[17]

Learner is also one of those authors of
modernization who apart from defining his concepts,
indicating how they interrelate and also how to
measure them, propounds a fairly specific theory
of development - the acculturation model.

According to Learner, increased urbanization,
rising literacy levels, raised media exposure and
therefore increased economic and political partici-
pation comprise the essential ingredients of
modernization model, that evolved in the West and
that "the same basic model reappears in virtually
all modernizing societies on all the continents
of the world....and also has relevance to todays
problems of the Mid-East transition.....".[18]

He goes on to say that:

> "for reconstruction of a modern
> society that will operate
> efficiently in the world today,
> the West is still a useful model". (19)

Sometimes the above approach has been referred to as the diffusionistic. The argument is that since development is viewed as diffusion of new ideas, underdevelopment is due to obstacles on the way of diffusion, e.g. low empathy, fatalism etc. Rather than remove these obstacles, the societies concerned must await diffusion of capital, technology and values in order to develop.

With regard to capital, it is the view of economists that the third world lacks capital to invest hence their continued underdevelopment.

Facts however do not say that more capital is flowing into e.g. Kenya,[20] than it is going out.

The case for technology is even more glaring. Evidence available shows that it usually diffused to hinterland to destroy what exists and hence it dominates the peasant economies.

As for values, the case is pointed that, they only transform individuals through social mobility but not societies.

In view of the above comments, it would seem that the acculturation model is a modernization model that points a finger at itself as being more responsible for underdevelopment rather than economic development.

Among other scholars who have concerned themselves rather indirectly with the process of modernization are Smelser, Rostow, Moore and Bendix and Einstadt.[21] In their analysis of industrialization, they discuss the following factors as crucial in the process of modernization:

(i)   The process by which social units evolve
        for the separate performance of work set of
        functions - modernization.

(ii)   The concept of "take off" by which moderni-
        zation gains momentum.

(iii)   Industrialization as a non-economic aspect
        of modernization.

Smelser, to take one of them as an example, does not discuss change at the individual level but instead he discusses economic development, which he defines as "growth of output per head of population".[22] The relevance of his discussion to clarification of the

process of modernization lies in his focus on
aspects of modernization accompanying development.
These are:-

(i)   The change from simple and traditionalized
        techniques to application of scientific
        knowledge - sophistication in technology.

(ii)   Evolution from subsistence to commercial
        production of agricultural goods.

(iii)   Transition from use of human and animal
        powers to power driven machines working
        under armies of men.

(iv)   The move from the farm and village to
        the urban centres.

Related to these factors are the following structural
changes within society that are consequent upon the
foregoing changes:-

(i)   Structural differentiation or the
        establishment of more specialized and
        more autonomous social units, as relates
        to family, economy, religion and
        stratification.

(ii)   Integration that changes its pattern
        as the old social order is made
        obsolete by the process of differentiation
        i.e. state, law and political groups.

(iii)   Social disturbances, e.g. mass hysteria,
        outbursts of violence and political
        movement which reflects the uneven march
        of differentiation and integration.

        This process, according to Smelser, provides
the basis under which modernization occurs.

        It is typical of the mentioned authorities
that they do not concern themselves with individual
social change but they handle the problem of develop-
ment at large. They however contribute to the idea
of technological change by indicating a similar
transition of men from one set of social setting
to another, as indicated by other authorities.

        A more specific modernization model closely
related to the above school of thought is the gap
or index approach. propounded by Rostow[23] and
amplified by Talcot Parsons.[24]

        This model attempts to use statistics and
mathematical models to argue that the development of

stagnated nations equals the figures for the
developed less those of developing. It assumes that
underdevelopment is an original state which may be
characterized by indices of traditionalism and
therefore development consists of abandoning these
characteristics and adopting those of the developed
world.

In patterned variable model, Parsons argues
that the developed nations are characterized by
universalism, achievement, role specificity, affecti-
vity and self orientation as opposed to those
prevalent in the developing nations i.e. particularism,
ascription, role diffuseness, effective neutrality
and collectivity orientation. For the third world
to develop, it must drop its qualities and adopt
those of the developed nations.

The issue here then becomes who in the developed
world is not particularistic, diffuse in roles, i.e.
jack of all trades, ascriptive etc.; where also is the
evidence that whatever form of development is in
question in the third world cannot occur within the
framework of variables claimed to characterize them.

According to Rostow[24] nations must move through
certain stages of growth before they reach self-
sustained growth and hence development. He argues that

it is possible to identify all societies in their
economic dimensions,. as lying within five categories;
these are traditional societies, the pre-condition for
take-off, the take-off, the drive to maturity and
the age of high mass consumption.

A traditional society is the one whose structure
is developed within limited production functions
based on pre-Newtonian science and technology, and
on pre-Newtonian attitude towards the physical world.
The second stage of growth embraces societies in the
process of transition, that is the period when the
pre-conditions for take off are developed, for it
takes time to transform a traditional society in the
ways necessary for it to exploit the fruits of modern
science, to fend diminishing benefits, returns, and
thus to enjoy the choices opened by the choice of
compound interest.....the stage of pre-conditions
raises not endogenously but from external intrusion
by more advanced societies. We come now to the
great watershed to the life of modern societies, the
third stage in this sequence, the take-off. The
take-off is the interval when the old blocks and
resistances to steady growth are finally overcome.
The forces making for economic progress, which yielded
limited bursts and enclave of modern ability expand
and come to dominate the society. Growth becomes a
normal condition. Compound interest becomes built

as it were in its habits and institutional structure.
The take-off is defined as acquiring all three of
the following conditions:-

(i)   A rise in the rate of productive
        investment from say 5 per cent to over
        100 per cent of national income.

(ii)   The development of one or more manu-
        facturing sectors with high rate of
        growth.

(iii)   The existence or quick emergence of
        political social and institutional
        framework which exploits the impulses
        to expansion.

There are two major criticisms levelled against this
approach; by assuming that the present nations of the
third world are in the first stage, he denies them a
history, since according to him no stage preceeded
that of the present state of underdevelopment.

        Secondly, he does not say how to move from
one stage to another. These mainly are the reasons
why this model must be taken with a pinch of salt.

It is in view of these criticisms that
Frank Gunder[25] finds these models empirically
invalid, theoretically inadequate and policywise
ineffective. Collectively looking at these
models he retorts:

> "the sociology of development
> currently being produced in the
> developed countries especially
> the United States for export
> to and use in the underdeveloped
> countries is on critical examination,
> empirically invalid, when confronted
> with reality, theoretically invalid
> in terms of its own classical
> social scientific standards and
> policywise ineffective for promoting
> the development of the underdeveloped
> countries". (26)

Authors reviewed thus far are considered
key to the study since they have met all the
criteria set for literature review and also
propounded very specific development models that
help make transparent the theories of this study.

The following authors are reviewed because
they shed light to greater understanding of the
concepts of modernization, inequality, fatalism,
religiosity and dependence but do not propound
an all round development model.

Marion J. Levy is one who believes that a
definition of modernization and the structure of
societies uses aspects of modernization that
derive from sources of power and the nature of
tools used by members of a given society.
In Marion's words:-

"my definition of modernization
hinges on the uses of inanimate
sources of power and the use of
tools to multiply the effect of
effort. I conceive these two
elements as the basis of a
continuum".

He goes on to say that:-

"a society will be considered less
or more modernized to the extent
that its members use inanimate sources
of power and or use tools to multi-
ply the effects of their effort". (27)

Neither of these elements is either totally
absent from or exclusively present in any society.

Marion therefore conceives modernization in
terms of the ratio of inanimate to animate sources
of power i.e.

$$M \ = \ \frac{I}{A} \quad \text{(Inanimate)}$$

The larger the fraction therefore the more the

modernization and the lesser the fraction the
lesser the modernization.

It is important to note that Marion defines
inanimate sources of power as "any sources of power
that are not produced from human or other animal
energy and animate as any physical device that is
ordinarily seperable from the body of an individual
who applies it and that it is used to accomplish
what he could not accomplish at all or not so
well without it".[28]

With reference to the process of moderni-
zation, Marion says that:-

> "failure to envisage possibilities
> of improvement probably explains
> more or many alleged spiritual
> qualities which tend to characterize
> people unwilling to pay for their
> improvement. He therefore sees a
> relationship between modernization
> and fatalism". (29)

The use of inanimate sources of power is
indicative of sophistication in technology, a fact
that puts Marion in a contributory position to the
earlier definitions of modernization.

Certain characteristics must be manifest
in a man to be referred to as modern.

This is the notion of Inkeles. According to
him, the following are the characteristics identifiable
in a modern man:-[30]

(i)   His readiness for new ideas and openess
        to innovation and change; here, he mainly
        refers to a state of mind; something
        psychological. This parallels Learner's
        concept of modernity.

(ii)   He also considers a man more modern
        if one has disposition to hold opinions
        over a large number of problems that
        arise within his environment and outside
        it. One is also more modern if his
        opinion realm is more democratic, i.e.
        one shows recognition of opinion
        diversity around him.

(iii)   One is futuristic.

(iv)   One has an orientation towards planning
        as a way of life.

(v)   Efficiency, one believes in mastery
        over his environment.

(vi)   Calculability: one has more confidence
        that his world is calculable.

(vii)   Dignity: one is aware of others and
         therefore has respect for them.

(viii)   Faith in science and technology.

(ix)   One has faith in distributive justice;
         that one gets acoording to his
         contribution.

By observation, some of these characteristics are
certainly evident in both "traditional" and modern
man alike. Some of them however e.g. faith in
science and technology, calculability are indicators
of technological change.

        The next key concept of this study is
relative inequality. Issues in social inequality
have throughout time provided some of the most
persistent and widely debated controversies.
Inequality in society implies differentials in the
basics of life i.e. food, shelter, security, etc.

        As far back as 18th century,
Jean Jacque Rousseau[31] wrote:

> "I conceive that there are two
> kinds of inequality among human
> species; one which I call natural
> or physical because it is established
> by nature, and consists in a
> difference in age, health, bodily
> strength and the qualities of mind or
> social, and another which may be
> called moral or political inequality,
> because it depends on a kind of
> convention, and is established or
> at least authorized by the consent of
> men. This latter consists of different
> privileges which some men enjoy to
> the prejudice of others; such as that
> of being more rich, more honoured, more
> powerful or even in a position to exert
> obedience". (32)

This view, particularly the assertion that inequality is a creation of man stands in sharp contrast with current social thought at the time. Typical of this view is St. Augustine who said of the poor that:-

> "in as much as they are deservedly
> and justly miserable, they are in
> harmony with the natural order of
> things". (33)

Enriching this school of thought is Hubert Spencer who says that:-

"the poverty of the incapable, the
distress that comes upon the impudent,
the starvation of the idle and the
shouldering aside of the weak by the
strong, which leaves others in shallows
and in miseries are the decrees of
large, for seeing benevolence....men
who are so unsympathetic that they
cannot let the struggle for existence
bring on the unworthy the sufferings
consequent on their incapacity or mis-
conduct are so unsympathetic that they
cannot deliberately make the struggle
for existence harder for the working
poor and inflict on them and their
children artificial evils in addition
to the natural evils they have to
bear". (34)

These are contrasting views on the same

issue. The study however holds the view that it is

the process of technological change that gives

rise to relative inequality which seems to support

Rousseau's age old postulate that inequality is

man made.

This view is also supported by another of

the earlier writers, Henry George who wrote with

reference to inequality and industrialization:-

"unpleasant as it may be to admit it,
it is at last becoming evident that
the enormous increase in productive
power which has marked the present
century is still going on with
accelerating ratio, has no tendency
to extirpate poverty or to lighten
the burden for those compelled to
toil. It simply widens the gulf
between Dives and Lazarus and makes
the struggle for existence more
intense. The march of invention
has clothed mankind with powers.......

which a century ago the boldest
imagination could not have dreamed.
But in factories where labour saving
machinery has reached its most
wonderful development, little children
at work; wherever the new forces are
anything like fully utilized, large
classes are maintained by charity
or like on the verge of recourse to
it, amid the greatest accumulation of
wealth, men die of starvation and
puny infants suckle dry breasts; while
everywhere the greed of gain, the worship
of wealth, shows the force of the fear
of want. The promised land flies before
us like the mirage. The fruits of the
tree of knowledge turn as we grasp
them, apples of Sodom that crumble at
the touch". (35)

Also with regard to inequality, three major
interpretations of it have been put forward. These
are:-

(i)   It is basically a matter of economics.

(ii)   It is caused by differential prestige.

(iii)   It is basically a question of who has power.

The first is held by Karl Marx,[36] the second by
Warner[37] and the last by Gerhard Lenski.[38]

According to Bottomore's interpretation of
Karl Marx, social inequality is a direct function of
human communities' interaction with its physical
environment:-

"Society is a problem solving
mechanism essentially a division
of labour that evolves in order to
gain mastery over nature. The
technology and accompanying social
organization that are the source of
livelihood for the society undergo
change, say from agrarian to industrial
and rectification occurs; those who
control the new means of production
are in a better position than those
with vested interests in an outdated
mode of production to have social
perspective and thus the insight to
run things for their own self interest.
As the new mode of production is super-
seded, members of the new established
ruling class are likely to fall prey
to false consciousness, to delude
themselves with social fictions and to
loose political power as their economic
position crudes. Marx saw social change
as a process of technological revolutions
in which each new means of production
restructures social relations but each
new social order involves exploitation
and domination by a favoured class. He
suggested elimination of control of the
means of production by a few (restrati-
fication)". (39)

With regard to the second interpretation,
prestige implies economic and political inequality and
is an essential basis for the latter.[40] Talcot Parsons[41]
develops this view further by postulating that prestige
is the basic dimension of inequality because it is
closely linked to social integration.

Finally, those in power are said to
crystallize and create differentiation between groups.
This is in view of the fact that a few wield power in
society, and by subjecting others to obedience, they
are unequal.

According to Valentine in his discussion
of poverty, the idea of poverty is said to be a
comparative concept that refers to relative equality.
"The essence of poverty is relative deprivation".[42]
The implication here is that one group of people
(the poor) in a social hierarchy is deprived in
comparison with another i.e. the affluent. Usually,
this definition is arrived at by considering material
wealth of individuals.

The other scholar who holds a similar view
is Roling (1973) who refers to relative poverty as
the "inability to participate in the highest level
of civilization available in a social system".[43]
What Roling is suggesting here is that it is possible
for two social systems to co-exist or at least to
come into contact being at the same time at different
levels of change. A chance hence arises for one of
them (the less advanced) to contrast itself with
the other (the more advanced) giving rise to chance
for people in the former to experience a state of
relative deprivation.

In a recent study, Monteck Ahluwalia Singh
adds to the above thinking by saying that:-

> "the conventional approach to
> income inequality is to define
> the problem in purely relative
> terms". (44)

To conclude this section on literature, authors reviewed indicate that:-

(i)   Inequality has two dimensions: a natural
        one and a conventional one (man made) –
        (Jean Jacque Rousseau).

(ii)   It is justified if its victims are justly
        and deservedly miserable – (St. Augustine).

(iii)   It is indicative of the good to come upon
        the poor and that it is unsympathetic to
        be sympathetic to the distressed – (H. Spencer).

(iv)   It is a product of industrialization –
        (Henry George).

(v)   It is basically a matter of economics i.e.
        it comes about as a result of man's relation
        with both his physical environment and
        with one another – (Karl Marx).

(vi)   It is caused by differential prestige and
        power concentration – (Lenski, Gerhard,
        Parsons).

(vii)   That is is purely a relative issue -
        (Valentine and Singh) and that its
        important indication is the inability
        of one group of people to participate
        in the highest level of civilization
        available in social system - (Roling).

Amidst these views, the theory of the study is
added that inequality is a consequence of the process
of technological change. The task then remains to
elaborate how inequality comes about.

        Central to the idea of inequality is the
concept of innovation. The argument here is that
it is as a result of adoption of innovations that
some individuals, on whatever scale, are more
progressive than others. The disparities that may
occur between them, e.g. in terms of riches should
find explanation in the innovation.

        An innovation is defined as "an idea perceived
as new by members of a social system".[45] As will
become clear later, the idea of innovativeness is a
key variable in the process of technological change.
By suggesting such a link, the issue then becomes
how innovativeness gives rise to inequality.

One of the major reasons given by scholars
to explain why innovation could cause inequality is
that innovations or new ideas are never adopted at
the same time by members of a social system. This
state of affairs implies that some members benefit
from an innovation longer than others. Precisely,
the adoption of an innovation follows a growth curve
(Rogers and Shoemaker, 1971).[46]

According to Roling and Ascroft (1973)[47]
with regard to cash crops as innovations in Kenya,
the early adopters come to the market at a time when
the prices for the product are high and therefore
reap a pioneer benefit, while late adopters just
glutt the market. Those who have not adopted at
all may find themselves barred from adopting because
quotas have been established to maintain the price;
this is the case with Kenya coffee today. Incomes
may also decrease due to price fluctuations accruing
to over-production. Small differences between
neighbours based on differences in adoption behaviour
may have grave consequences on the basis of inequality.

Secondly, it will matter how many innovations
one has adopted particularly if they are income
generating. Some people have adopted many innovations
e.g. agricultural, others a few while others have
adopted nothing or are still in the process of

adoption. It is important to note that the process
of adoption entails passage from first knowledge of
an innovation, to a decision to either adopt or
reject it, and confirmation about decision. While
as the progressive farmer may be said to be
innovative through such a process, the less
progressive is a laggard and technologically less
advanced. This implies inequality.

The question however still remains why
this behaviour?

Firstly, one would expect the early adopters
to have come into contact with western life styles
earlier and therefore experienced relative poverty
which motivated them to change while others were
still in contact with traditional life.

Secondly, psychological reasons have been
put forward to explain this type of behaviour.
Prominent among these is Maclelland's postulate of
achievement motivation (1961).[48] He argues that
this is the motivating force behind individual
social change. He has however been criticized
that achievement motivation describes the result
of success and hence predicts further success.

Thirdly, technological change continues to perpetuate itself so that the progressives tend to benefit more from government services. It therefore helps those in the lead to maintain the lead, hence inequality.

In order to establish the link between inequality and its consequences, the question what avenues are open to the relatively poor or unequal compared to others need be answered.

According to Roling, Ascroft and Chege (1973),[49] the following avenues are open:-

(i)   They may resign to the difference between them and the progressives, accept their state of being and seek pacification in religion, fatalism, alcohol or any other form of unrealistic behaviour.

(ii)   They may try to escape the constraints facing them in the rural areas by seeking wage employment in towns, unfortunately, the same people may be the least qualified, and thus have a disadvantage in struggle for scarce jobs. They face a limiting situation.

(iii)   They may try to improve their lot by
        adopting innovations.

(iv)   Finally, they may accept their different
        status, resign to the progressives and
        become casual labourers to the latter to
        obtain some cash to support their small
        subsistence enterprises. They tend
        to become dependent.

        The first, second and fourth possibilities
are the major concern of the investigation.
Precisely, fatalism, religiosity and dependence
are major consequences of inequality.

        Dependence conditions people and defines
their possibilities of action.

        This concept has been defined as "a
conditioning situation in which the economies of
one group of countries are conditioned by the
development and expansion of others".[50] In attempts
made in the past to establish a subculture of the
peasantry, it has been shown that one of its
components is dependence e.g. Rogers (1973).[51]

        Due to what Rogers refers to as a long
"history of exploitation", the peasant generally

portrays total hostility towards those above
him or in authority, i.e. government agencies;
further confounding this hostility is the
peasants' dependence on the authorities for the
solution of problems confronting them. The
perception of self-help among peasants is low, and
hence dependence from without their systems is
high. "Help me philosophy" is much more manifest
among the peasants than self-help.

Thus dependence is explained away by
disparities accompanying technological change,
which tends to limit possibilities of action among
the peasants.

In view of this evidence, the notion held
throughout this study is that dependence is
consequent upon inequality in societies. Thus the
process of development in dependent societies does
not reflect the needs of that society but rather
the needs of the dominant society, whichever it is.

Further, "the conditioning situation
determines the limits and possibilities of action
and behaviour of men".[52] This is a historical
situation which shapes a certain structure of the
world economy such that it favours some countries
to the detriment of others and limits their
development possibilities.

At the individual level, dependence may be
defined as a conditioning situation in which the
state of being of one group of people in a social
system is conditioned by the progressiveness and
expansion of the state of being of another group
in the same social system.

Dependence has also been referred to as
"a conditioning process creating and, or rein-
forcing internal structure in the dominated
society necessary to the maintenance of domination".[53]

The major concern of this study at this
juncture therefore is to answer the question, what
aspects in society limit the behaviour of men and
to what degree, e.g. in terms of income, educational
levels, etc.

In a recent study on education and dependence,
Rodrigos (1971)[54] uses education to demonstrate
how it has been a limiting factor in social mobility,
arguing against the currently held notion that
education is a prime factor in social mobility and
development.

He further argues that the function of
education in development is based on its value
as a channel for social mobility, and therefore as

an efficient mechanism for egalitarianism at least
in terms of opportunity. But in this function,
education is viewed as supporting underdevelopment
given its relationship with other factors
conditioning underdevelopment. With reference to
the Columbian society, he observes that historically,
education has contributed to the present under-
development and further acted as an obstacle to the
social mobility of a great majority of the population.

As a barrier to social mobility, the flaw in
education lies in its efficiency in eliminating
large populations of those who attend school so that
only a small fraction finally acquire high enough
education to enable them to enjoy the benefits
accruing to high academic qualifications.

In his study, Rodrigos followed a sample of
1,000 children who were supposed to start grade One
school in Columbia and finally cameout with the
following classification,[55] which clearly shows the
efficiency of the education system as a barrier
to social mobility.

He identified a group of absolute illiterates
comprising 23.0 per cent of the total number of
children who were supposed to enter grade One

school in 1968. Of those who enrolled in grade
One, 41.3 per cent only continued for one or two
years. This group is referred to as functional
illiterates. A group comprising 23.8 per cent
complete primary school education and constitute
what he calls a group of workers without profession.
Also out of the one thousand a group of workers
professionally not qualified comprising 5.9 per
cent of the sample is identifiable. The next
classification is a group of high school students
trained for higher education but without specific
training to undertake gainful employment; it
comprises 3.4 per cent of the original figure.
Then, there is a group of university students who
do not finish second year, and who do not receive
specific training to undertake a profession, they
constitute a growing intellectual proletariat and
number 3.9 per cent of the total sample. Finally,
a group with academic professional training which
includes only 0.7 per cent of the sample.

These figures are self explanatory, so long
as it is clear that only 0.7 per cent of a
population that gets into the formal education
system ride the ladder, to finally reap the benefits
that academic qualifications bring with them.

Historically, then, if the function of
education through time has been elimination of large
portions of populations of nations from social
mobility and from participation in development,
then it has contributed to the formation of an
underdeveloped society, as is the case with the
Columbian society.

Further discussion will be centred on the
variable formal education when the findings for
Mbooni, the figures for Kenya and the case for
Columbia are examined together.

Adequate literature on the concept of
religiosity exists to show that a majority of
mankind is religious. There is also evidence
to show that, religiosity is consequent upon
poverty or inequality.

Evidence also exists to show that a large
population of mankind is fatalistic. Fatalism
has also been shown to emanate from uncertainties
in life, poverty and relative inequality.

Karl Marx is one of the giant contributors
to the phenomenon of religion. On the concept he
writes:-

"the basis of irreligious criticism is
that man makes religion, religion does
not make man. Religion is the self
consciousness and self-feeling of man
who has not yet found himself or has
already lost himself again. But man is
no abstract being squatting outside the
world. Man is the world of man, the
state, the society. This state, the
society produces religion a reversed
world consciousness, because they are
a reversed world consciousness.
Religion is the general theory of that
world, its encyclopaedic compendium, its
logic, in a popular form, its spiritua-
listic point d'bonner, its enthusiasm,
its moral sanction, its solemn completion,
its universal ground for consolation
and justification. It is the fantastic
realization of the human essence because
human essence has no reality. The
struggle against religion is therefore
the fight against the world of which the
world is the spiritual aroma. Religious
distress is at the same time expressive
of real distress. Religion is the sign
of the oppressed creature, the heart of
the heartless world, just as it is the
spirit of the spiritless situation. It
is the opium of the masses". (56)

Precisely, Marx is saying that religion
originates from man but not every man. Since it is
the opium of the masses, it is the product of non-
mass population - the bourgeoisie of modernizing
elite in any society. It is also Marx's notion that
they use it to pacify the continuing motivation of
the deprived of this world, which is the material
world of the masses. Marx suggests where to look
for an answer - the social milieu; the physical
environment of men and his state of being between
the two.

From the above argument, there is an indication that religion arises from this inequality.

The other scholar who has looked into the concept of religion is Friedrich Nietzsche[57] who views religion as a product of the members of the lower class in a social hierarchy. He talks of the doctrine of resentment where the low stratum in a society resents the well to do upper class and being powerless to do anything to improve their lot or status resort to religion as the alternative, as a way to attain temporary contentment.

O'dea sees the role of religion as that of assisting man adjust to the three brute facts of life: "contingency, powerlessness and scarcity".[58]

Perhaps the most daring definition is given by Roling purporting that "religion is the negative of civilization".[59] He arrives at this conclusion by arguing that whereas civilizations involve themselves in manipulating man's environment in order to acquire what is perceived as well being, religion has the element of lack of strategy. It only promises similar comfort in another world but does not concern itself with creating one here on earth.

In brief, the study will concern itself
with religiosity as a social phenomenon which will
be taken so particularly where the society is
hierarchically structured so that religion becomes
an important factor in a group which may be
deprived. The study though giving consideration
to other social groups will mainly focus on the
relatively poor or deprived i.e. the less advanced
technologically etc. Within this context an attempt
will be made to give religion a more elaborate
meaning.

The discussion of religion so far has
dwelt on its origin more than it has on the
definition. The greater problem with the concept
of religiosity however, is its definition. Some
authors who have dealt with this problem have even
concluded that attempting to define religiosity
is a futile exercise.

According to Fraser,

"to define religion, to say what it
is, is not possible at the start of a
presentation....definition can be
attempted if at all, only at the
conclusion of a study. The essence
of religion is not even our concern,
as we make it our task to study the
conditions and effects of a particular
type of social behaviour...............

.....The external causes of religious
behaviour are so diverse that an
understanding of this behaviour can
only be achieved from the viewpoint of
subjective experiences, ideas and
purposes of the individual concern,
in short from the viewpoint of the
religious behaviour's meaning". (60)

The implications of this assertion are that

definition can only follow empirical enquiry; but

enquiry about what? Also that religious behaviour

cannot be referred to by any scholar who does not

define it.

.Definitions of religion seem to spring

from two main sources:-

(a)   They have been proposed by those whose
        conception of a social system emphasizes
        the need to be externally controlled by
        some overriding loyalty to a set of
        beliefs.

(b)   From sociologists concerned with more
        detailed circumscribed problems i.e. the
        study of religious organizations.

The same schools have tended to distinguish

between functional and substractive definitions.

Functional definitions emphasize the functions

of a phenomenon to explain it while substractive

relates more to experience.

Under the umbrella of functional definitions
are the following:-

(a)   An approach that defines religion in terms
        of its ultimate problems. The assumption
        here is that all individuals in society have
        problems.

(b)   The assumption that holds that religion is
        the highest level of culture (Parsons,
        Bellah),[61] the argument here being that all
        individuals are controlled by norms of a
        social system which in turn is controlled
        by a cultural system of belief.

(c)   For Luckman, "everything human is religious";
        he views religion as "the capacity for
        human beings to transcend their biological
        nature through the continuation of objective
        morally building and all embracing universe
        of meaning.

To add to these views, the stand taken by
this study is that religion in society is consequent
upon social inequalities.

In conclusion, the views of the authorities quoted are:-

(i)   That religion is the opium of the masses, it is used to bottle up their creative energy; it is a product of the dominating upper class. It is used by the upper class to pacify the creative energy of the masses and also that it is a tool for domination of the masses by the bourgeoisie - (Marx).

(ii)   That it is a mechanism to help man adopt to three brute facts of life; contingency, powerlessness and scarcity - (O'dea).

(iii)   That it is the negative of civilizations - (Roling).

Fatalism has been defined as "the degree to which an individual perceives a lack of ability to control his future".[65] Fatalistic individuals believe that events of their life are determined by external forces beyond their control.

Although this concept cannot be equated to religiosity, it can be argued that it is a central tenet of religious movements e.g. in Africa. This

is for example the view held by Hunt (1957), who
notes that:

"religious beliefs prominently held
throughout the less developed world
are essentially fatalistic........". (64)

From this assertion, it may be noted that
whereas everybody cannot be religious according to
criteria used, everybody can be fatalistic and
have or not have religion. One may not pray, go to
church etc. but one will be fatalistic.

For this reason, the measure for fatalism
will be kept separate and distinct from those of
religiosity. Here, a fatalism scale will be
constructed in accordance with the three sub-dimensions
of fatalism, identified by Niehoff and Anderson in
1966. These are explained in detail under the
definition of fatalism.

Although the study does not intend to venture
into the problem of assessment of the concept of
underdevelopment, it is one of its aims to indicate
that dependence, fatalism and the process of
technological change as a whole are major contri-
butory factors to its perpetuation. A few factors
are therefore brought to light with regard to the
concept.

According to Bernstein, H. (1973):[65]

"the concept of underdevelopment is
usually defined in relation to develop-
ment as a form of conceptualization by
default expressed in such vague terms
as backwardness, stagnation and traditiona-
lism. In conventional terms. development
means the process of developing while
underdevelopment is perceived in a static
fashion as a state. Underdevelopment
is not considered as a possibility.

With regard to this situation, Bernstein writes:

"the analysis of underdevelopment must
focus on the changes societies have
undergone and particularly the nature
of their integration with externally
generated forces. It must have a
dependent state of exploitation". (66)

Walter Rodney (1973)[67] holds the view that
underdevelopment is purely a comparative concept.
for example it is possible to compare the economic
conditions of a country at one period of time and
tell if it has developed; it is also possible to
compare the economies of any two countries or
group of countries.

As for this study, it aims at contributing
to the understanding of this concept and therefore
contributing to development since the problems of
development are rooted in underdevelopment.

Finally, this general body of knowledge has
been applied to problems of both development and
underdevelopment at one time or another. In view of
the continued underdevelopment of nations, in which
this knowledge has been applied, the study also aims
at verifying its theories and ultimately suggesting
a testable model meant to add to the present to
revolutionise the lives of Kenyan rural population.

In the section that follows, hypotheses that
will verify the theories of the study are discussed.

RESEARCH HYPOTHESES

In social science research, theory and
theoretical abstractions, leave concepts at a level
they cannot be measured. To bring these concepts
to an operational status, hypotheses are necessary.

Hypotheses are unproved propositions that
help connect variables together and assist in guiding
research in the field. They are usually tentative
explanations of phenomena which are insufficient in
evidence and hence in themselves not so conclusive.

Throughout this study, independent and dependent variables will from time to time be referred to. Independent variables will refer to phenomena that are likely to be causal, i.e. explain the dependent variable. The dependent variable will refer to the phenomena that we wish to explain.

As it might be noticed, the dependent variables will be closely linked to the concept of technological change, while the independent to those of inequality, religiosity and fatalism.

The following are the research hypotheses of the study with both the independent and the dependent variables included. Definitions of these variables follow:-

(i)   The higher the individual level of income, the higher is his adoption level.

(ii)   The higher the individual degree of geographical mobility, the higher is his level of adoption.

(iii) The greater the extent of contact with extension agent, the higher the level of adoption

(iv)   The higher the individual level of literacy,
         the higher the level of adoption.

(v)   The greater the extent of exposure to mass
         media, the higher the level of adoption.

(vi)   The higher the individual level of formal
         education, the higher the level of adoption.

(vii)   High levels of living are related to high
         level of innovation adoption.

(viii)   Ecological zones influence levels of adoption.

(ix)   Religiosity influences adoption behaviour
         and could also be influenced by adoption
         behaviour.

(x)   Fatalism affects adoption levels and vice
         versa.

(xi)   A few factors dominate adoption levels in
         Mbooni.

         In works done in other countries, some
findings have been recorded, in relation to some of
the hypotheses that are being tested by this study.

Rogers, E. (1973),[68] in his Modernization
Among Peasants, reports on the correlation between
mass media exposure, education and literacy to
innovativeness. In fact, he argues that they are
pre-requisites to the process of modernization.

With regard to literacy, he argues that, it
is certainly:

> "one of the key antecedent concepts
> from which numerous modernization
> consequences flow. It enables a villager
> to gain direct exposure to the print
> media. Literacy seems to unlock certain
> mental abilities (such as symbol mani-
> pulation and the ability to think counter-
> factually) that may in turn lead to
> modernization. Further literacy allows
> the receiver, to control his rate of
> message inputs and to retrieve past
> messages from print media". (69)

He also reports that mass media is positively
related to the process of modernization. In the
Columbian study, he found a 0.819 correlation
coefficient with house innovativeness.[70]

In his Mid-Eastern studies, Learner, (1959),
found that there was a positive correlation between
being a modern and mass media exposure as opposed to
traditionals' negative correlation to mass media
exposure (see table 1).

Table 1: Media Contact for Moderns, Traditionals
and Transitionals

Media	Media Contact		
	Moderns (%)	Traditionals (%)	Transitionals (%)
Newspaper	54.0	8.0	46.0
Radio	39.0	10.0	26.0
Word of Mouth	6.0	78.0	26.0
No News	1.0	4.0	2.0
Total	100.0	100.0	100.0

Roling, (1973)[71] in Special Rural Development
Project in Tetu Division of Central Kenya, found that
extension service, media exposure and material wealth
were all distributed in favour of the progressive
farmers. He attributed this skewed distribution to
the effect of innovation diffusion and also individual
innovativeness. In the same works, he argues that
the laggards will either migrate to urban areas in
search of employment, stay in the rural areas and
work for the progressives as dependents or seek
pacification in alcoholism or religion of any form
or any type of fatalistic behaviour.

In another study carried out in Dagoretti
on Poverty and Religiosity,[72] a negative correlation
was found between individual level of living and
religiosity.

A sample of 132 respondents was studied: 40.0 per cent of whom turned out to have high level of living and also of low religiosity, as compared with 11.8 per cent of those in the low level of living category. Fifty per cent of those in the low level of living category had high religiosity degree, as compared with 46.8 per cent of those in the high level of living class. For average degree of religiosity, the figures for both the high and low level of living groups were 20.0 and 18.1 per cent respectively.

Argyle, M.,[73] in his work on Religious Behaviour reports on the correlation between socio-economic status, education and involvement with the church. His findings were a result of extensive surveys in Britain. For comparative purposes, he quotes some examples from U.S.A. The following are some extracts from his work:

Table 2:   Education and Weekly Church Attendance

	%
College	51.0
High School	47.0
Grade School	.0

The above statistics show the percentage that attend church weekly by education.

From this table, Argyle goes on to conclude that the more schooling one has had, the more religiously active one becomes. This contradicts one of the hypothesis of the study.

He also reports changes during college as far as beliefs are concerned. He specifically uses belief in immortality as follows:

Table 3:   Belief and Year in College

	Year in College			
	1	2 (percentage)	3	4
Belief in Immortality	80	70	60	70

These figures show a sharp drop in religious activity during the first one or two years in college, followed by revival in interest during the last two years. Striking contrast is possible here in East African universities.

This same author also reports on the relationship between social class in Britain and various indicators of involvement. The following are his findings:-

Table 4:   Religion and Social Class in Britain

	Weekly Attendance (church) (%)	Favourable Attitude Towards Religion (%)
Upper and Middle Class	19.4	20.9
Lower Middle	16.3	18.0
Working	13.4	21.9

Table 5:   Religion and Social Class

	Claimed Affiliation (%)	Prays Frequently (%)
Upper	94.0	58.0
Upper Middle	90.0	53.0
Lower Middle	91.0	45.0
Working	91.0	46.0

Here, he shows correlation between four
indicators of religious involvement and social class.
There is again a tendency for the working class to
be less active on most criteria.

As can be seen, he does not break social class
into its component variables, but it can be assumed
that these were used to arrive at the definition of
social class.

The following example from U.S.A. is used
for comparative purposes. Occupation is used as
the independent variable.

Table 6:   Religion and Social Class in U.S.A.

	Claimed Affiliation (%)	Weekly Attendance to Church (%)
Business and Professional	83.0	48.0
White Collar	82.0	50.0
Manual Workers	71.0	44.0

These are studies carried out in technologically
advanced cultures. They seem to contradict the
hypotheses of this study which are being tested in
a developing area. In this respect it will be the
duty of this study to explain away the differences.

Rogers (1973)[74] in his Columbian study found
out that fatalism was negatively related to all the
variables of technological change. He also found
out that while the process of modernization may give
rise to fatalism, fatalism further acts as a barrier
to modernization. In the argument, the study holds
the view that it is a major contributory factor to
underdevelopment.

In a study carried out in Columbia on
Education and Dependence (Rodrigos, 1973), [75] the
author found out that, education acts as a limiting
factor that hinders upward individual mobility and
omits 88 per cent of the population from active
decision-making in the country.

THE INDEPENDENT VARIABLES: DEFINITIONS

Definition of concepts is key, not only to
social scientists, but to the entire domain of
academic pursuits.

While nobody will say with any degree of
certainty what particular phenomenon is or is not,
considerable efforts have been made throughout the
disciplines to define concepts with as great a
precision and approximation of reality as is
intellectually possible.

In some instances, some authorities e.g.
Max Weber have considered attempts to define concepts
in humanities as futile. In reference to religion,
for example, he argues,

"to define religion, to say what
it is is not possible at the start
of a presentation.....definition can be
attempted if at all, only at the
conclusion of a study. The essence
of religion is not even our concern as
we make it our task to study the
conditions and effects of a particular
type of social behaviour. The external
causes of religion are so diverse that
an understanding of this behaviour
can only be achieved from the viewpoint
of subjective experiences, ideas and
purposes of the individual's concern -
in short, from the viewpoint of reli-
giour behaviours meaning". (76)

Despite such views and intricacies, it has
become the rule of thumb for every scholar to give
a label of meaning to phenomenal indicators one
uses in any academic undertaking. This condition
holds for this study.

In the pages that follow, an attempt is made
to define independent variables used in this study.
A brief discussion on each variable is given so
as to make them as clear as possible.

Education

The definition given to education for
convenience of this study is very simple. It is the
number of years spent in school receiving formal
education.

This is a very simple definition of a very complex phenomenon. It should not therefore be assumed that the interest taken by this study in this concept is simple, for its implications for an individual and the society at large are far reaching and complex.

The view held by this study with regard to education is that it is a major contributory factor to dependence and hence to underdevelopment in the rural areas of Kenya.

Rodrigos P. Sandova, in his study on Education and Dependence argues that education in Columbia is represented as supporting the present structure of Columbian underdevelopment, given its consequences and its interrelationship with other factors conditioning underdevelopment.

In other words, historically,

"the structure of the Columbian educational system has contributed to the formation of an underdeveloped society and has served as an obstacle to the social mobility of a great majority of the population". (77)

He argues against current literature on the function of education in society which holds that:

(i)   Education is either a cause or a necessary
        condition for economic development.

(ii)   It is a long term investment.

(iii)   It is a measure of the level of living and
        progress.

(iv)   Education is a measure of modernization.

(v)   Education is a cause of success in
        professional activities and a decisive
        factor of social mobility.

In the study, education is viewed as one of
the conditioning factors that limit the possibilities
of action for a majority of people in a society, and
therefore makes them dependent and consequently
underdeveloped.

In a closer criticism of the concept of
formal education, Frere, P. (1972)[78] argues that:

> "education is suffering from
> narration sickness".

He goes on to point out that the outstanding
character of narrative education where, the victims
are filled with contents of one's narration, is the

sonority of words, not their transforming power.
In his research, he sees the role of education as
that of depositing, in which the depositories are
students and the teacher the depositor.

The process, Frere refers to as the banking
concept of education, in which the scope of action
allowed to the students extends only as far as
receiving, filing and storing the deposits:

> "but in the final analysis, it is
> men themselves who are filed away
> through lack of creativity, trans-
> formation and knowledge in this
> (at best) misguided system. In this
> predicament, men cannot be truly
> human".

To crown it all, Frere sees the function of education
as that of minimizing the students creative power and
to stimulate the credibility of oppressors who
neither wish the world revealed nor to see it trans-
formed.

Frere sees the alternative to "banking
education" as the problem facing education where men
develop their power to perceive critically the way
they exist in the world in which they find themselves.

These two authorities are key to this study.
The problem of dependence is believed to have roots

in education; dependence is further a major deter-
minant of underdevelopment. If this study is to
come up with a model that is meant to minimize under-
development, it must not only reveal the role education
plays in evolution of dependent rural communities
but must also suggest a model that manipulates
education with the aim of causing alterations in
underdevelopment.

Of course one of the positive things that can
be said about education is that it is informative.
This in formal education varies with the number of
years spent in school. In the words of Stuart Mills:

> "the power of education is boundless.
> There is not one natural inclination
> that it is not strong enough to cause
> and if needful, to destroy by disuse". (79)

The study is of course taking into consideration this
positive aspect of education. The question of
greater importance here however is information
about and for what?

Income

This is our next important variable. It is
defined in this study as monies accruing to:

(i)   Farming activities

(ii)   Non-farm activities

(iii)   Employment

Income is obviously a central concept where relative inequality is concerned.

According to the ILO[80] report for example, £. 40 per annum is the lowest figure quoted for wage employment in the rural areas whereas 200/- per month in the urban areas sets the boundary below which one is referred to as the working poor.

In redistribution with growth, Monteck Singh (1974)[81] sees income inequality as measurable through relative terms only. He argues that a familiar technique for this purpose is to measure inequality by the extent to which the income share of groups of individuals or households differs from population share. By using this technique, he categorizes households into the top 20 per cent, middle 40 per cent and lower 40 per cent. Most developing nations show greater inequality and fall either in lower or middle 40 per cent.

Occupation

Occupation in this study will be used to mean any kind of economic activity from which an individual derives livelihood.

In the findings of ILO[82] report, 80 per cent of the rural households in Kenya have settled land and hence a chance of self-employment. The report also notes that 15 per cent of the rural people are in regular wage employment while 5 per cent are in casual employment.

Occupation however is more important in the study as a measure of inequality than of everything else.

According to Davis and Moore:

"some occupations are more important to a society than others". (83)

meaning that people doing certain jobs are more important than others doing certain other jobs.

This, though being a hard claim to justify, has not hindered these authors to develop a theory of social stratification and to argue that wealth and social stratification are inevitable in any one society. It is the method of getting various jobs

done. This is done by distributing various
differential amounts of prestige particularly in
modern complex industrial societies. These two
argue that in order to continue as an ongoing system,
an advanced society characterised by division of
labour in which are special tasks, must distribute
its members in social positions and induce them to
fill these positions and to perform duties attached
to them.

In such societies, there are some tasks which
are fundamentally more important than others, and
some that require special training and talent, such
as engineering or medicine. These talents are rare
and are found more abundantly in some individuals
than in others. Consequently, there must be some
way of inducing the more talented to fill their
positions e.g. intellectual, entrepreneurial,
military, etc. by giving them more rewards. Ultimately,
differentials in rewards will arise since only the
talented can perform these tasks. Rewards are in
the form of material and prestige. Inevitably
therefore, there will be some form of social stratifi-
cation since differential possession of certain things
e.g. wealth, will mark a certain section of society
as a class.

Of course there are critiques of such arguments, but there is little doubt that occupation in this sense forms part of factors that underlie social inequalities.

One of the best examples quoted where occupation matters most is that of the Indian caste system. Here, people are classified in terms of prestige and honour attached to their jobs or occupations.

Thus in the Hindu society, the priests Brahmins) are most important, followed by warriors (Ksatrya), peasants (Vaisya) and the untouchables (Sudra) in that order.

Although the degree of inequality is not mentioned, it would be anticipated that the Brahmins would fall in the top ranks by whatever criteria and the untouchables at the bottom.

In terms of religiosity and fatalism, one would expect greater search for pacification among the Sudra than Brahmins, or in the case of the study, among the low income earners than among the professionals.

On the other hand, the Brahmins are the custodians of religion in the Hindu society. By hypothesis, they should also be the poorest in society. This is true in the sense that they are not supposed to be men of property, but men of religious belief and preservers of societal values.

Level of Living

Individual or family level of living has been defined as "the degree to which the basic needs of nutrition, clothing and health are met".[84]

On the other hand, there is the standard of living which is taken to mean the set of outcomes to which one has learned to aspire. It is the criteria by which he evaluates his everyday outcomes which constitute his level of living.

In contrast with the level of living, it seems that standard of living represents one's desires, while levels of living the actualities that exist. These definitions are adopted for this study.

In the study, the concept will be measured by the possession of such material wealth as brick house, tin roof, household equipment and the like.

In a study carried out in Dagoretti in 1973,[85] on Poverty and Religion, 132 respondents were studied. Of these 132 respondents, 24.3 per cent were categorized as having a low level of living, 16.9 per cent were average and 28.5 per cent had high level of living.

The importance of standards and levels of living to the study lies in the fact that failure to close the gap that might exist between the two may lead one to search for pacification in either fatalism or religiosity etc. It will also be used to more clearly show its limiting effect on people's possibility of action, therefore inculcating dependence.

Literacy

Literacy here is defined as the ability to read and write in any one language.

Rogers defines literacy as:

"the degree to which an individual possesses mastery over symbols in their written form or is able to encode or decode written messages - to read and write". (86)

Literacy will be measured by asking respondents if they can read and write. A more accurate way has

been requesting the respondents to actually read a sentence and finding out how many words they can read. This method will also be attempted here depending on the circumstances in the field.

If in the final analysis, some strategic particulars to which the findings of the research could apply are to be suggested, the language in which to communicate to people efficiently and economically will have to be known. This is the utility of knowing who is literate and who is not.

Mass Media Exposure

Mass media exposure in this study is taken to mean access to:-

(a)   Radio

(b)   Newspapers

(c)   Word of mouth

(d)   Barazas

(e)   Magazines, etc.

In studies carried out in other countries e.g. Chile, 1964; Turkey, 1964[87] Learner used exposure to newspaper, magazines, films, radio and television to assess individual degree of mass media exposure. Measures in this study are more discriminatory, since

it is not expected, for example, that a majority of people in the rural areas have a television. Hence the use of indicators such as barazas and word of mouth.

Cosmopoliteness (Geographical Mobility)

Individual degree of cosmopoliteness has been defined as "the degree to which an individual is oriented outside his immediate social system".[88] This is as opposed to individuals who confine themselves to their immediate environments (localite). This is the meaning attached to the variable in this study.

Measures usually applied to assess cosmo-politeness fall into two categories:-

(i)   Attitudinal: where the respondent's
        attitudes towards an outward view are
        assessed.

(ii)   Behavioural indications: in which the
        respondent is expected to reflect contact
        with sources outside his system, e.g.
        trips to urban areas.

The latter will be used in this study for towns nearest to the area of study and for a major city i.e. Nairobi.

In their work on Columbia, Svenning and
Rogers (1973), found out that socio-economic
variables were highly correlated to cosmopoliteness
and hence modernization.

Cosmopoliteness has much the same effect
on innovativeness as mass media exposure and will be
used in conjunction with others to account for the
multivariate nature of the process of technological
change.

Empathy

Empathy has been defined as "the ability of
an individual to project himself into the role of
another person".[89]   This is the definition considered
in this study.

According to Berlo (1960),[90] there are two
approaches to the concept of empathy, those of
reference and role taking theory.

Reference theory postulates that an individual
is capable of observing his own behaviour and thus
relate it symbolically with his inner psychological
state of others unless he himself experienced those.

Role taking theory was propounded by George Herbert Mead (1934)[91] who argued that in order for one to take the role of others, one must develop an abstract composite picture of others. One must build mentally a generalized other that provides him with expectations of how he should behave and how others behave. In his view, the self concept does not develop in a person before communication with others.

Both theories must be equally important in the development of empathy. One probably searches himself before learning others and hence developing empathy.

Peasants are usually associated with low empathy; they are thus denied the reality of the above theories that were developed to apply to man in general. The study however anticipates high degrees of empathy among the rural population, which itself must have been triggered by diffusion of certain innovations.

Empathy will be measured by a five statement scale as shown in the schedule.

Aspirations

Aspirations refer to preferred standards of living in the future.

In this study, both occupational and educational aspirations of parents are measured for their children. One of the hypotheses of technological change relates low degrees of aspirations with peasants - the study holds otherwise.

Fatalism

Fatalism is defined as "the degree to which an individual perceives a lack of ability to control his future".[92]

To measure fatalism, an attitude like fatalism scale will be constructed in accordance with some three sub-dimensions of fatalism identified by Niehoff and Anderson (1966).[93] The first one refers to theological beliefs and magical notions which provide the individual with a fatalistic escape from insecurities of life. The second refers to individual comprehension of precariousness in life but perceives the unavailability of means to offset this precariousness, and the third stems from the current trend in development where individuals have experienced absolute poverty and do not believe they can improve their lot.

A ten item scale will be constructed and administered to all 250 respondents.

In his Columbian study (1969), Rogers discovered that fatalism was negatively related to all the variables of modernization. He also found out that while the process of modernization may give rise to fatalism, fatalism further acts as a barrier to modernization.

In the argument, the study holds the view that fatalism is a major contributory factor to underdevelopment.

Religiosity

Religiosity will be used here to refer to individual search for pacification as indicated by one's commitment to any one faith or denomination.

Commitment will be assessed by the following indicators:-

(i)   Frequency of prayer per day

(ii)   Orthodoxy

(iii)   Frequency of denominational attendance, etc.

Religiosity while a product of social inequalities, as discussed earlier, is an important

factor, which could be manipulated to affect
alterations in social inequalities.

THE DEPENDENT VARIABLE - LEVEL OF ADOPTION OF
INNOVATIONS

Individual level of adoption of innovations
is used synonymously with level of technological
change. It is defined as the extent to which an
individual has adopted certain specified in ovations
and for what length of time. Using these innovations,
an individual can be placed on a given level of
adoption and not another.

In a study done among Columbian subsistence
farmers, their degree of innovativeness is defined
as the "degree to which an individual has been
relatively earlier to adopt innovations than other
members of his social system".

This definition is intended to measure
technological advance in a community, but its approach
differs from the one used in the study. In this
study, a scale is used to assign farmers to adoption
levels. In the other one a normal curve is used.
In the chapter that follows, it is shown why a scale
is used instead of a normal curve.

Level of adoption of innovations has been
chosen as a crucial factor in assessment of
technological change for the following reasons:-

(i)   It clearly demonstrates that the process
        of technological change gives rise to
        inequalities.

(ii)   It gives a clear indication of the extent
        to which technological change has occurred.

(iii)   It shows the extent to which an individual
        has accepted a more technologically advanced
        style of life.

Guttman scaling has been used to assess
individual level of adoption. This is in place of
the progressiveness index that has a tendency to
utilize the normal curve, under circumstances where
normal curves are unlikely to apply. The Guttman
Scale is discussed in detail under the topic of
measures.

PROBLEM JUSTIFICATION

The number of projects that have been set
up to tackle social problems and have failed, is
endless. In this failure, the culprits have
always been two: the peasant and the planner. Each
can always blame the failure on the other but our
concern is with the peasant whose reputation for
being suspicious and resistant to change is,
presumably, common place.

> "The peasant comprises the
> majority of mankind". (Shanin, 1966)[94]

This is one of the reasons why many scholars
are interested in the peasant and hence this study.
But this is only part of the reason.

The complexity with which the peasant lives
his life is even of greater interest to both
scholars and planners, than any other of his
attributes. Past and contemporary social scientists
have expedited a lot of energy in trying to
"undecipher the intricate behaviour of man's most
misunderstood category.

Marx, one of the greater scholars of last
century branded the peasants "the undecipherable
hieroglyphic to the understanding of the civilized".[95]

Rogers said that they are fatalistic, familistic,
limited in aspiration, dependent and hostile towards
the government....have low empathy, etc.[96]

According to Shanin (1966)[97] day by day, the
peasants make the economists sigh, the politicians
sweat, and the strategists swear defeating their plans
and policies all over the world, Moscow and Washington,
Peking and Delhi.

This is the same populace that the study is
examining. It would therefore by justified if at
all it adds to the current understanding and inter-
pretation of peasants, and also in suggesting
strategies, that can improve their lot. Most studies
in the academic world have had their contribution
to their relevant discipline and to knowledge in
general as their strongest points for justification.
The position is not any different in social sciences.
The question however is whether research in social
sciences has contributed to theory, (discipline) and
at the same time generated knowledge that bears
heuristic device. There are two important factors
for consideration here. One has to do with the current
trend in social science and the other with the
changing nature of the discipline of sociology.

A common mistake pointed at social science
researchers is that they have, in their undertakings
laboured to reach conclusions about society instead
of finding methods for changing it. This is an age
old criticism since in reference to philosophers
Marx argued that:

> "they have only interpreted the
> world in various ways....but the
> point however is to change it". (98)

There is evidence in both masters and
doctoral theses that confirm the above assertion.
The furtherest any such research has gone is to
reach a certain conclusion about society but not
to go ahead and suggest to the practitioner how
one can utilize the findings of such undertakings.

Certainly one of the justifications of this
study is that it will contribute to theory that can
be used to influence the outcome of any development
project.

Since this is social science research, it is
only fair to note some of the criticisms levelled
against its contemporary methodology.

Secondly, it is the conviction of this study
that it will be a contribution, not only to the
discipline of Sociology, but to other disciplines and
to research in general.

There are three important arguments here. One has
to do with the nature of contribution to the discipline;
the other with the mono-disciplinary nature of social
science research, and the last with the nature of contri-
bution to social science research.

Of late, there has been a lot of concern among
leading scholars over the continued use of sociological
concepts evolved in developed countries and applied to
the problems of developing world.

In a recent study in Latin America, the view has
been expressed that from sociologists' perspective, any
analysis in underdevelopment must be differentiated from
analysis noted in developed countries. According to
Rodrigos P. Sandoval (1973):

> "for each underdeveloped society, there
> is an underdeveloped sociology and for
> each dependent society, a dependent
> sociology". (99)

This study is concerned with this view and anticipates
to contribute to it.

There is also a second view that concerns the
study with regard to its contribution to the discipline
of sociology.

In his work on dependence and underdevelopment
in the third world, Frank A. Gunder, (1972) argues that:

> "models of development being developed
> in the developed nations for use in the
> third world are empirically invalid when
> confronted with reality, inadequate in
> terms of their own social scientific
> standards and policywise ineffective for
> pursuing their supposed intentions for
> promoting the development of under-
> developed nations". (100)

This study is justified if it has as one of its
intentions, verification of this assertion.

One of the criticisms often levelled against
social science research is that it is mono rather
than multi-disciplinary in its approach to pressing
problems of society. This view seems valid in light
of the fact that it is theoretically common place
that most social problems call for multi rather than
mono disciplinary approach.

This short coming in research is clearly put
by Frankenberg (1967) when he says that:

> "while economists took the sociology
> out of political economy, sociologists
> took out the economy". (101)

G. Geertz (1963) puts it even more bluntly:

> "an adequate understanding of the new
> countries of the third world demands that
> one pursue scientific quarry across any
> fenced off field into which it may·
> wonder". (102)

Yet this is hardly the case.

Lipset (1969) summarizes the situation by commenting that:

> "the need for an interdisciplinary
> approach is mildly recognized. It is
> obvious that any effort to treat
> development in economy, polity and
> society as separate processes simply
> makes little sense". (103)

Without setting the expectations too high that this research is sufficiently multidisciplinary, it is intended to amplify the above condition of social science as far as it is operationally possible.

Another criticism about research that concerns the study is that in social science research too much time is spent measuring variables that are not manipulable. The central argument here is that enough manipulable variables are not measured to allow us to say that if you do X, Y will happen. Also in social science, this happens to be the problem between theory and empiricism. Disgusted by the grand theorist approach adopted by anthropologists, Mills (1959) argued:

"grand theorists are so deeply involved
in unintelligibility, that I fear we must
really ask is grand theory merely a
confused verbiage or is there after all
also something there?.....not much!" (104)

The above situation leads the study to the
fact that social science research is not experimental
and ends up recommending that what is happening should
continue happening.

In one of the migration studies (1974)[105]
presented to the Department of Sociology, a recommen-
dation is arrived at that re-examine the growth
centres....to discover if they are meeting their
goals in checking rural urban migration....which is
what is happening. It also recommends that industrial
decentralization should be speeded up and more jobs
created in the rural areas.

A further point that concerns this study is
that most social science research is carried out by
individuals to serve the purpose of improving their
status in the academic world, to most members of
the academic world, this point is irrefutable and
may be assumed to be true of every academician.

In every one of the theses examined, there is
a clear confirmation in writing that this thesis
"is my original work and also that it is presented

in partial fulfilment for the award of whatever honour".

The next criticism has to do with the contribution of social science research and this study to development.

It may be noted that most of the studies carried out in the third world, in social science, are based on problems, deriving from models, theories and ideas of western scholars, rather than deriving from pressing social problems. There is so much evidence in the same works that studies done here must as a matter of validity, relate to existing body of literature which happens to be carried out by western scholars and therefore replicas rather than critical appraisals of the needs of the discipline and those of the society.

This situation that emerges out of this in the academic world is that academicians, imbued in their pursuits for personal rewards carry these models in their heads for long and often fail to concern themselves with issues of essence e.g. how do I reduce the crime rate in Mathare Valley. Others carry out surveys that are hard to justify considering the pressing problems of society so that they end up studying such issues as "choosing a mate", or "Do Kenya women marry up", etc.

Faced with this problem, every social science must not only try to satisfy as much as possible the above criticisms, but must also attempt to answer two basic questions:-

(a)   Should the aim of any social science research be <u>to gain k owledge that improves theory or</u>,

(b)   <u>To gain knowledge that can affect the outcome of a project</u>.

As pointed out by Frank A. Gunder (1969),[106] the third world social scientists must start getting weary of western models of development such as those of Maclelland, Parsons, Hagen, etc., which are theoretically inadequate, empirically invalid, and policywise ineffective, when confronted with problems of developing nations. This state of affairs sets on researchers' shoulders a new burden; that of <u>developing own testable models</u>.

This study is concerned with development of problem solving research and therefore development of replicable models that can tackle the problems of rural areas. Such an example will be given after the findings are presented and after considering what use can be made of them.

Finally, it is hoped here that the study will open up new areas for research particularly in view of the great need for new approach in a new sociology of underdevelopment and dependence etc. It should be noted here that social scientists have aimed at reaching conclusions about societies, instead of methods for changing them. This, as noted earlier, is an age old criticism since with reference to philosophers Marx argued that:

> "they have only interpreted the
> world in various ways, but the
> point however is to change it". (107)

DIFFUSION OF TECHNOLOGICAL INNOVATIONS
IN MBOONI

The central elements of diffusion of new ideas have been shown to be:-

(a)   An innovation

(b)   Its communication

(c)   Channels

(d)   Time

(e)   A social system

An innovation has been defined as "an idea practiced, or an idea perceived to be new by an individual".[108] This definition depends on an individual's perception of an idea and it is unaffected

by the time lapse between its invention or discovery
and its introduction to an individual. Every idea
through time has been an innovation; examples in
agriculture are the plough, terracing, spraying, etc.

Communication is the process by which
messages are transmitted from source to receiver.
It refers to the transfer of new ideas to individuals
with a view to manipulating certain behaviour.
among them, e.g. the process of making hybrid maize
known to the farmer, so that after adopting favourable
disposition to the idea, one may prefer to cultivate
it, to another type. Channel simply refers to the
means through which an idea is communicated e.g.
radio, newspaper media, "baraza", word of mouth, etc.

With regard to the fourth element in diffusion,
it has been shown in various communication studies
that adoption of new ideas follows a normal curve
and that for an individual to adopt a new idea, one
goes through certain steps.

The latter has been referred to as the
"innovation decision process". It has been defined
as "the mental process through which an individual
passes from first knowledge of an innovation to a
decision to adopt or reject, and to confirmation
of this decision".[109]

Five stages have been established in this process:-

(a)   Awareness
(b)   Interest in the idea
(c)   Evaluation
(d)   Trial (small scale)
(e)   Adoption or rejection

Rogers and Shoemaker (1971) have however summarized this process into four stages: "knowledge, persuasion, decision and confirmation".[110]

The first stage refers to the point in time that the individual learns about the new idea and comes to understand what it is all about. The second refers to the formation of either favourable or unfavourable attitude towards the innovation; when one engages in activities that will lead to either rejection or confirmation, he is in the third stage, which leads to the fourth and final stage where an individual seeks reinforcement for the decision he has made.

The second dimension of the time factor refers to the rate of adoption.

This is based on the fact that innovations are not adopted at the same time by members of a social system. This means that at every stage of

its diffusion, individuals will tend to categorize
into groups depending on how long one has been
practicing the innovation.

Using the normal distribution, four categories
of adopters have been identified; innovators, early
adopters, early majority, late majority and laggards
(see curve).

The Normal Curve: Distribution for Perfect Adoption
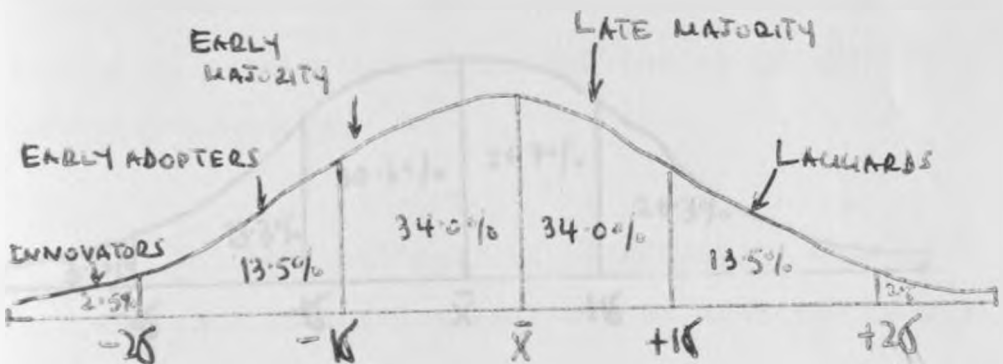
This categorization follows the application
of the normal parameters of a normal distribution
the mean ($\bar{X}$) and the standard deviation (δ). Thus
the innovators are beyond two standard deviations to
the left (-) of the average ($\bar{X}$); early adopters are
within two stand deviations while the early majority
are within one stand deviation, to the left (-) of
the population average.

This is of course a perfect distribution of
respondents and only very rarely is such a case
experienced. Other curves however approximate
this one with the implication that the closer it is
to the perfect, the more accurate it is.

In a study done in Columbia for example,
the following curve was obtained and compared with
the theoretical case.
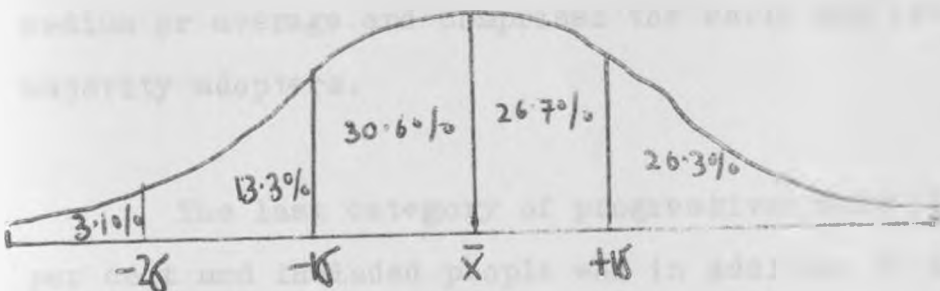
In Mbooni, studies were carried out on the
diffusion of technological innovations. These
included crop and animal husbandry innovations, home
innovations and farm mechanization innovations.

In an attempt to categorize the farmers
into their adopter categories with regard to animal
husbandry practices, the following classifications
were obtained.

A small group of farmers, who had nothing
or who had only adopted small livestock, vaccination
and who had reported diseases. This group comprised
39.8 per cent of the total number of farmers. There
was a medium cluster, comprising 28.6 per cent of
the total number of farmers, who had adopted in
addition to the above three, establishment of lays,
fodder feeding, using barner grass, attending field
demonstration using A.I, fencing, grazing regime,
culling, using conservation of feeds, keeping grade
cows, dehorning, stall feeding, giving salt lick and
keeping Zebu cattle. This group was referred to as
medium or average and comprised the early and late
majority adopters.

The last category of progressives made 31.6
per cent and included people who in addition to all
the above items also adopted dairy installation,
steaming, grazing, paddocking, keeping records and
using conservation feeds.

The following is the adopter curve for animal
husbandry innovations in Mbooni.
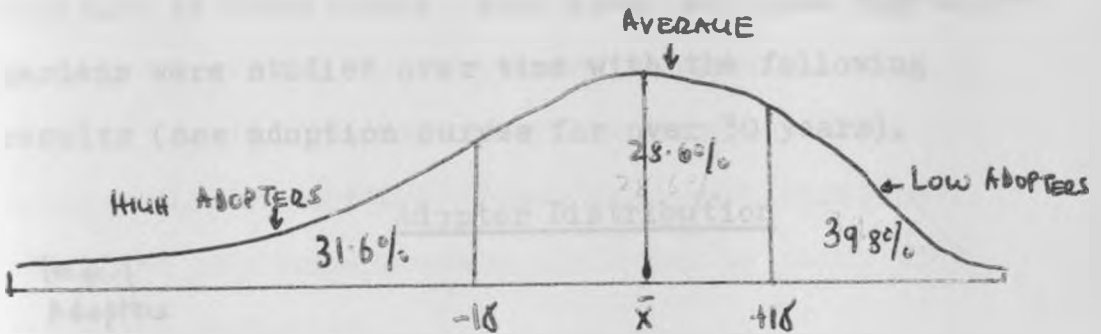
In another study in Tetu Division of Central
Kenya, Roling (1973)[111] found out that his respondents
could be categorized into four adopter groups.
(See curve).
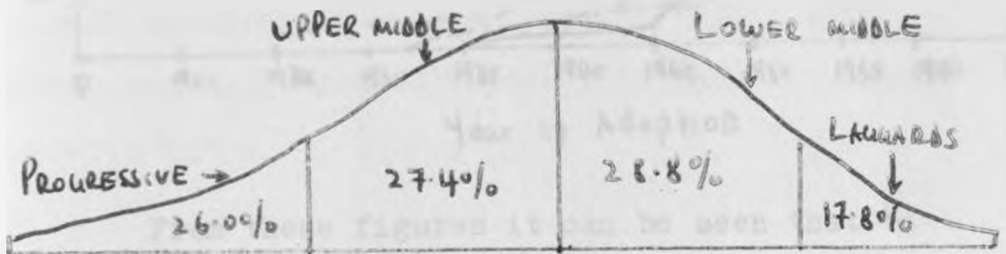
Rate of adoption of innovation, e.g. innovation
history is also an important factor in diffusion of
new ideas.

In the Columbian study, diffusion and
adoption of fertilizers, weed spray and home vegetables
gardens were studied over time with the following
results (see adoption curves for over 30 years).

Adopter Distribution
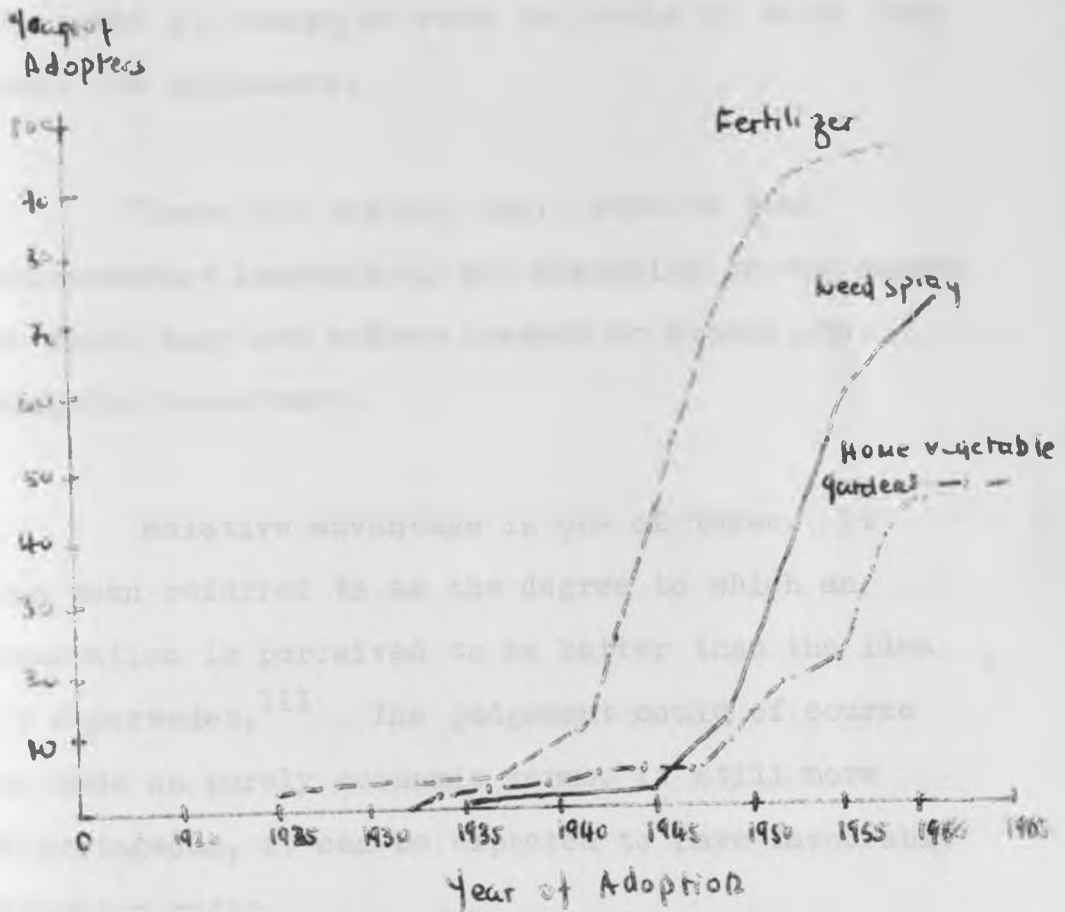
From these figures it can be seen that to
reach 10 per cent adoption, the innovation fertilizer
took 25 years; in another 10 years, it reached 75
per cent adoption. Ninety per cent adoption occurred
after 40 years. Probably 100 per cent adoption
would have required half a century. Weed spray took
15 years to reach 1 per cent adoption. In another
15 years, it only reached 43 per cent adoption after

which the rate stalled.

Theoretically, there are reasons for this
kind of adoption rates. They may have something
to do with the adopters themselves, the innovation,
the agent of change, or even the means by which they
reach the audiences.

There are certain basic aspects that
characterize innovation, and depending on the degree
to which they are either present or absent, the
adoption rates vary.

Relative advantage is one of these. It
has been referred to as the degree to which an
innovation is perceived to be better than the idea
it supersedes.[111] The judgement could of course
be made on purely economic terms. If still more
advantageous, it can be expected to have favourable
adoption rates.

The next characteristic is compatibility.
This is the degree to which an innovation is perceived
to be consistent with existing values, past
experiences, and needs of the receivers.[112]

This, particularly in economic research, is
the most overlooked feature of innovations and

contributes much to failure of development projects.
Local examples will be given later, but an example
of an incompatible innovation is the use of the pill
where religious beliefs do not allow any other method
of contraception from the natural one (rhythm).

> "Complexity is the degree to which
> an innovation is perceived as difficult
> to understand and use". (113)

Most family planning innovations are difficult because
they may require of the user to understand reproduction
cycle biology etc.

Trialability is the degree to which an
innovation may be experienced with on a limited scale.[114]
The argument here is that trialability involves less
risk for the one who is adopting the innovation.
Katumani maize is an example, which farmers accepted
after growing only for a short time and discovering
it could mature within 90 days.

Observability refers to the degree to which
results of an innovation are visible to others. For
example, the adoption of the grade animal could,
to a large extent, depend on the demonstration effect
of others on a potential adopter. Those who can see
the relative benefits, e.g. in terms of both quantity
and quality of milk, when compared with traditional

stock, may be influenced by this factor to adopt
the grade animal.

In Mbooni, these factors may be said to have
operated but in interaction with critical others
that were noted in studies there.

First, there was government sanction to
carry out certain innovations whether they were
advantageous, compatible, simple, or not. This
sanction affected such innovations as vaccination and
dipping of cattle.

The innovation of cattle dipping, for example
took 10 years to reach 10 per cent adoption, after
which only 5 years were required for it to spiral
to 40 per cent adpption rate. The innovation may
also be said to have acquired self momentum after
1974 due to self-help efforts that rapidly increased
the number of cattle dips in the area (see illus-
tration).

The next factor is the transition between
the newer and the traditional practices. The
compatibility aspect may be said to have operated
here. Artificial insemination for example, took some
15 years to reach 10 per cent adoption, and even at
full adoption, 10 years later, only 35 per cent of

the population had adopted it. Without ignoring
other factors that are accountable, it is important
to mention here that, artificial insemination was in
direct contradiction to the traditional bull even to
date. Attending, field demonstrations, another
innovation, has taken nearly 40 years to reach 10
per cent adoption and another 10 years to reach a
full adoption rate of 30 per cent (see curves).

Adoption Curves for Three Innovations
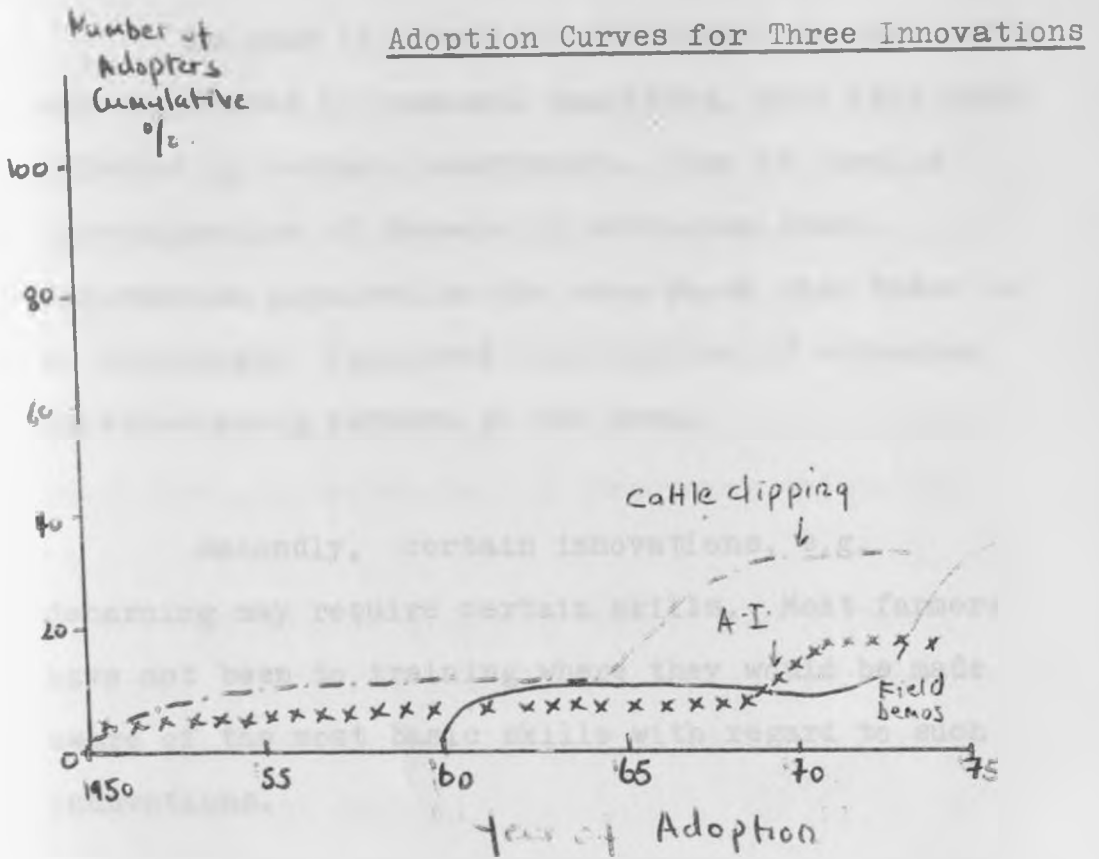
The economic factor is the third aspect.
Adoption of certain innovations is dictated by the
presence of pre-requisites. Keeping of grade cows
for example, requires certain pre-requisites and is
viewed as having many disadvantages compared with

rearing traditional stock of animals. In fact it
is with respect to this type of innovation that the
three characteristics of innovations may be said
to apply. Right from the beginning, the grade animal
has disadvantages, that comprise incompatibility
delicate handling as a requirement, a factor that
makes the innovation a particularly difficult innovation.

In case of practices encouraged by government
and reinforced by communal sanctions, they have been
affected by certain constraints. One of them is
discrimination of farmers by extension staff.
Information acquired in the area shows that there is
an alarmingly lop-sided distribution of extension
services among farmers in the area.

Secondly, certain innovations, e.g.
dehorning may require certain skills. Most farmers
have not been to training where they would be made
aware of the most basic skills with regard to such
innovations.

Finally, farmer attitude to innovations.
Although the aim here is not to blame the farmer
that he is resistant to change, it should be borne
in mind that practices traditionally adopted still
persist e.g. keeping of Zebu cattle, and it has taken
rather vigorous campaigns to convince the farmers

that the grade cow has greater advantage over Zebu,
without making him believe at the same time that
his breed is inferior.

Of the other factors that might have
affected diffusion and adoption of innovations is
communication channels.

Communication is "the process by which
messages are transferred from source to receiver".[115]
If therefore this process is not adequate, one
can imagine the distortion that is likely to benefit
both the messages (new idea) and its adoption.

In general, communication media most commonly
known are printed media e.g. newspaper and radio.

In Mbooni, 63.2 per cent of the people
never or rarely see a daily newspaper. For important
paper like the Mkulima, only 7.4 per cent of the
farmers see it daily.

However in rural situations, there are other
means by which messages can reach receivers. For
example, 42.6 per cent of the farmers get their
information through barazas, 20 per cent agricultural
demonstrations. The critical issue here is that the
distribution of these chances are loop-sided in favour

of progressive farmers with the implication that a
majority of small farmers are not open to such
opportunities, e.g. 1.6 per cent of the poor farmers
get their information through crop demonstrations as
compared to 7.4 per cent for the rich farmers; 9.3
per cent of the rich farmers get their information
through agricultural shows; this figure is nearly
twice that of the poor farmers (5.7 per cent).

With regard to the communication factor
therefore, it does seem that a lot of work has to be
done to improve one of diffusion's most important
aspect.

Closely associated with communication process
are the visual aids. These are meant to facilitate
greater understanding of an idea and not to complicate
it further or even worse, to create or give to the
receiver the wrong impression.

In communication and extension work in
Africa, the story of the tsetse fly is often quoted
to show the distorted effect that can occur among
receivers if a visual aid is not chosen and utilized
with care.[116] For purposes of explaining to the
farmers the dangers of tsetse fly, an instructor
brought with him a model of a tsetse fly, about half

a metre or so in length. After the lecture, he met
with the following comment from a member of his
audience:

> "It may be so true what you say
> about this disease on cattle but
> it cannot concern us because the
> flies are not so <u>big in our
> district</u>".

The agent is the next important factor that
affects diffusion and adoption of innovations. A
change agent is "a professional who influences
innovation decisions in a direction deemed desirable
by a change agency".[117]

With regard to change agents and diffusion
of innovations, two aspects are critical; <u>homophily</u>
and <u>heterophily</u>.

In diffision literature, homophily is
referred to as the degree to which pairs of indivi-
duals who interact are similar in certain attributes,
such as beliefs, values, education, social status, etc.

This is where the whole extension phallacy
occurs, for both the receiver and the change agent
are not similar in such attributes otherwise, none
can lead the other. The change agent is often
heterophilous i.e. one is much more technically

competent than his clients.

In Kenya the least qualified extensionist
is the Junior Agricultural Assistant and has 8 years
of formal education. Others are beyond this level
and are more technically qualified than the
Junior Agricultural Officer.

Since the choice is between technical know-
how (which is needed) and homophily, which is an
important factor in social change, the element of
greater importance in the face of this dilemma is
empathy, the degree to which the change agent attempts
to be like those he is trying to change.

In Mbooni it cannot be said to what extent
these factors have operated in the diffusion of
agricultural innovations. In the first place, there
has been too many other factors that have been in
operation e.g. government, and secondly very little
research has been carried out to assess individual
effect of these factors. But since logic seems to
pinpoint to empathy as the relevant variable that we
can manipulate to bring about desired alterations in
the community, the critical question for this study
becomes, how can we change the rate of empathy among
extension workers in Kenyan rural areas?

Finally, crop husbandry innovations. Factors
influencing adoption of animal husbandry innovations
may be said to have operated as much for crop husbandry
innovations. With regard to tomato crop for example,
prunning seems to have taken 10 years to reach 10 per
cent adoption and another 15 years to reach 50 per
cent adoption (see illustration).

Prunning Tomato
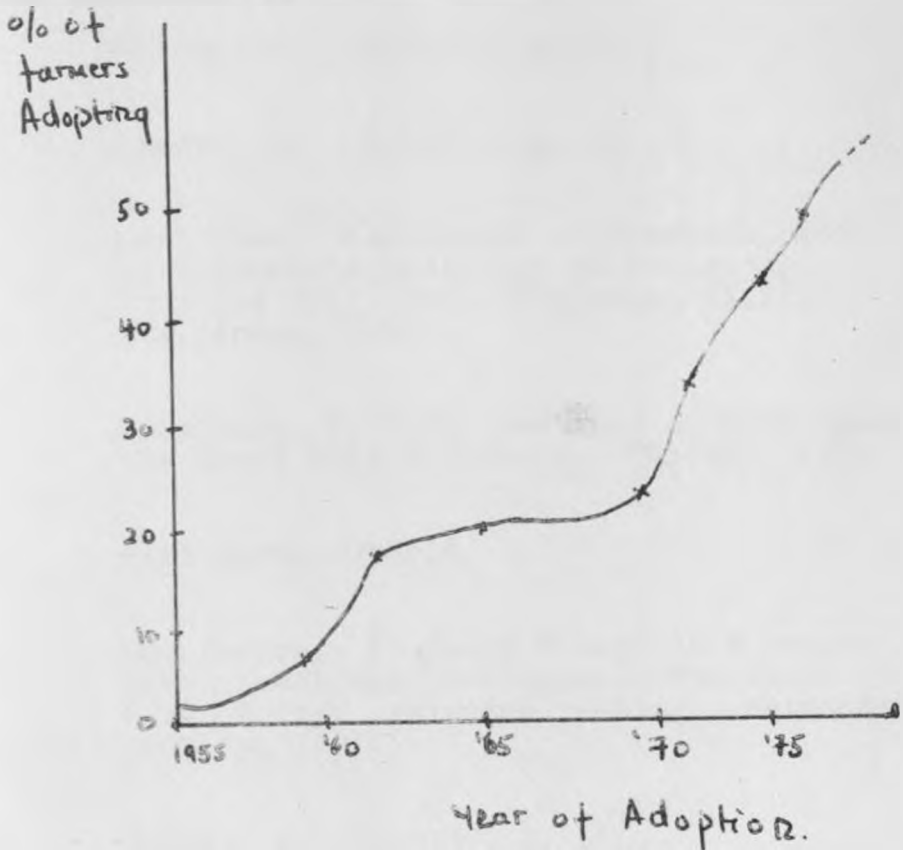
In general, there is a strong tie between
traditional food growing practices and newer ways;
there is also persistence of target items emphasized
by extensionists through government sanctions e.g.

water conservation that took only 25 years to reach
90 per cent adoption in Mbooni.

For crops, innovations have to aim at new cash
crops that increase income, new practices that increase
yields for small additional costs, new practices
that reduce crop losses for small additional costs
and instruction in skills that tend to increase
labour productivity on the farm.

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106.   Gunder, A.F. op.cit.

107.   Marx, K. In Robert C. Tucker, op.cit., p. 109.

108.   Rogers and Shoemaker, op.cit., p. 19.

109.   Ibid., p. 25.

110.   Ibid., p. 25.

111.   Ibid., p. 22.

112.   Ibid., p. 22.

113.   Ibid., p. 22

114.   Ibid., p. 23.

115.   Ibid., p. 23.

116.   Adrea Fuglesang,   Applied Communication in
        Developing Countries, Dag Hammarskjold Foundation,
        1973, p. 13.

117.   Rogers and Shoemaker, op.cit., p. 35.

CHAPTER TWO

METHODOLOGY

INTRODUCTION

In this section, the site for study is
discussed, paying particular attention to the
relevance of its physical and social characteristics
to key methodological issues of this undertaking.

The argument is developed on the basis of
five factors: units of study, their distribution,
site description, sampling and data collection.

The unit of study in this work is the
household. The household is used interchangeably
with nuclear family.

UNITS OF STUDY

In sociological analysis, selection of a unit
for study is a familiar but perplexing problem. This
being a sociological venture, it is no exception.
There are various reasons for this state of affairs.

First, remarkable variations within ethnic
groups exist so that it is impossible to study any
one trait of a people in all authenticity.

Secondly, it is impossible to establish
boundaries for any one phenomenon that one chooses
to study. As Mbithi (1974) notes:

"The harambee movement for example
transends ethnic and geographical
boundaries and yet, the engine
of its momentum is to be found
within specific ethnic boundaries". (1)

Thirdly, the process of social change will
overtake any scholar who studies one mode of a social
phenomenon and hopes it will be the same a year after.

According to Mbithi (1974):

"Social change processes in East
Africa have in fact made a mockery
of text book analyses of the 1920
and 1930's of the social structure
of East African Societies, and their
socio-economic, socio-political
processes". (2)

It has also been noted that sociological
analyses that tend to universally assign certain
attributes to rural dwellers so as to make socio-
logical analysis easier have all been frustrated by
the simple fact that a rural dweller is capable of
taking many roles all at the same time. One could
be "a farmer, a manager, a tax payer" etc. so that
it is impossible to choose any one of these as the
unit of study without at the same time experiencing
analytical problems.

Finally, any one unit for study that one
chooses is likely to vary greatly in terms of
location and distribution. There is also no
guarantee that it will be found in the form that
the researcher may expect. One cannot for example
assume that the head of every rural household is
a male.

In view of these problems associated with
selection of a unit for study, the household is
here selected as the unit for study for a number of
reasons.

In the first place, it saves us the trouble
of having to undergo the frustrations of going round
the above problems. It limits our analysis to the
family, helps define any one phenomenon within the
context of the family and allows us to study the
family in its present state.

Secondly, we are confined to the family,
a unit that has for a long time been documented as
a central unit for analysis in sociological under-
takings. It is also a universal phenomenon, a
factor that aids generalization as well as comparison
across ethnic boundaries.

Thirdly, it constitutes a fair representation
of nearly all the phenomena that we may wish to
study in the rural areas. In the words of Mbithi (1974)
for example:

> "each householder is seen as a
> responsive and adaptive actor
> attempting to cope with his
> teaming world; a member of a
> complex environment with
> conflicting demands e.g. the
> need to pay taxes, send children
> to school, buy seeds, pay self-
> help dues, insulate the household
> against witchcraft etc. The house-
> holder lives in a community with
> complex group systems such as
> lineage groups, age-sex groups
> with their variable taboos;
> religious and ritual groups
> which when mixed with membership
> in modern co-operatives, political
> parties, farmer training courses
> make very strange bed fellows". (3)

The choice of the household for study also
distinguishes the study from classical analysts i.e.
Toennies (1956), Durkheim (1953) which took the entire
community as the unit of analysis and therefore fell
victim to such flaws as generalization, inaccurate
characterization of certain traits to the rural
folk as opposed to urban dwellers, and the assumption
that rural communities are homogeneous in their
basic elements.

Finally, the above distinction also lines
up the choice of the unit for study with contemporary

approaches which unfortunately are known to suffer
certain weaknesses to their own detriment. These
studies are such as those of McClelland (1961),
Everett Hagen (1962) and Oscar Lewis (1959).

Among one of their great flaws they have is
to choose the individual as the unit of analysis
and thereafter commit the fallacy of equating
one's will to the true nature of communities. It
is also clear from this approach that their choice
is plagued by terminology with western origin
that undoubtedly biases their arguments against other
cultures. Alongside this, they violate one of the
basic foundations of serious sociology by evading
positive science and imbuing their minds in value
judgement.

In this light, the choice of the household
as the unit of study compliments that of contemporary
rural sociology analysts concerned with social change
and policy effectiveness of strategies for improving
the rural communities.

Before looking at the distribution of these
units, Mbooni, the chosen site for study is described.

SITE DESCRIPTION

Mbooni is one of the eleven locations
of Eastern Division, Machakos District. It is
situated 30 kilometres from Machakos Town, which
is approximately 60 kilometres from Nairobi (see
map). The area comprises hills and lowlands lying
between 1,200 and 1,400 metres above sea level.
This attitude locates Machakos District in the zone
with temperatures ranging between $64^{\circ}F$ in July
and $80^{\circ}F$ in January. The area receives a rainfall
of between 245 and 508 mm. per annum in the lowlands
and between 672 and 1270 mm. per annum in the
hills.

Machakos District lies within cambretacious,
acacia vegetation zone with scarce cover of
vegetation, comprising bush, scrub and acacia species
of plants. Evapotranspiration is also high so that
much of the moisture received in the not so reliable
rainy season is lost. Ecologically, the area is
divided into four distinct zones (see cross section).

(i)   The Lower Zone

(ii)   The Rocky or the Springline Zone

(iii) The Middle Zone

(iv)   The Upper Zone

MAP OF MBOONI

N

MACHAKOS

Nani

Kalawani

TAWA
MARKET

Itetani

Kalawani Market

Mavindu

Yandue

Mbanya

Nzeveni

Nzaini Market

Mutitu

Uthiuni

Kyuu

Kikima Market

Utangwa

Mbumbuni
Market

Uvuu

KEY

Utanga
Market

Kitundu
Market

☐— Marketa

Boundaries

Kitundu

Ngai

Roads
(Government)
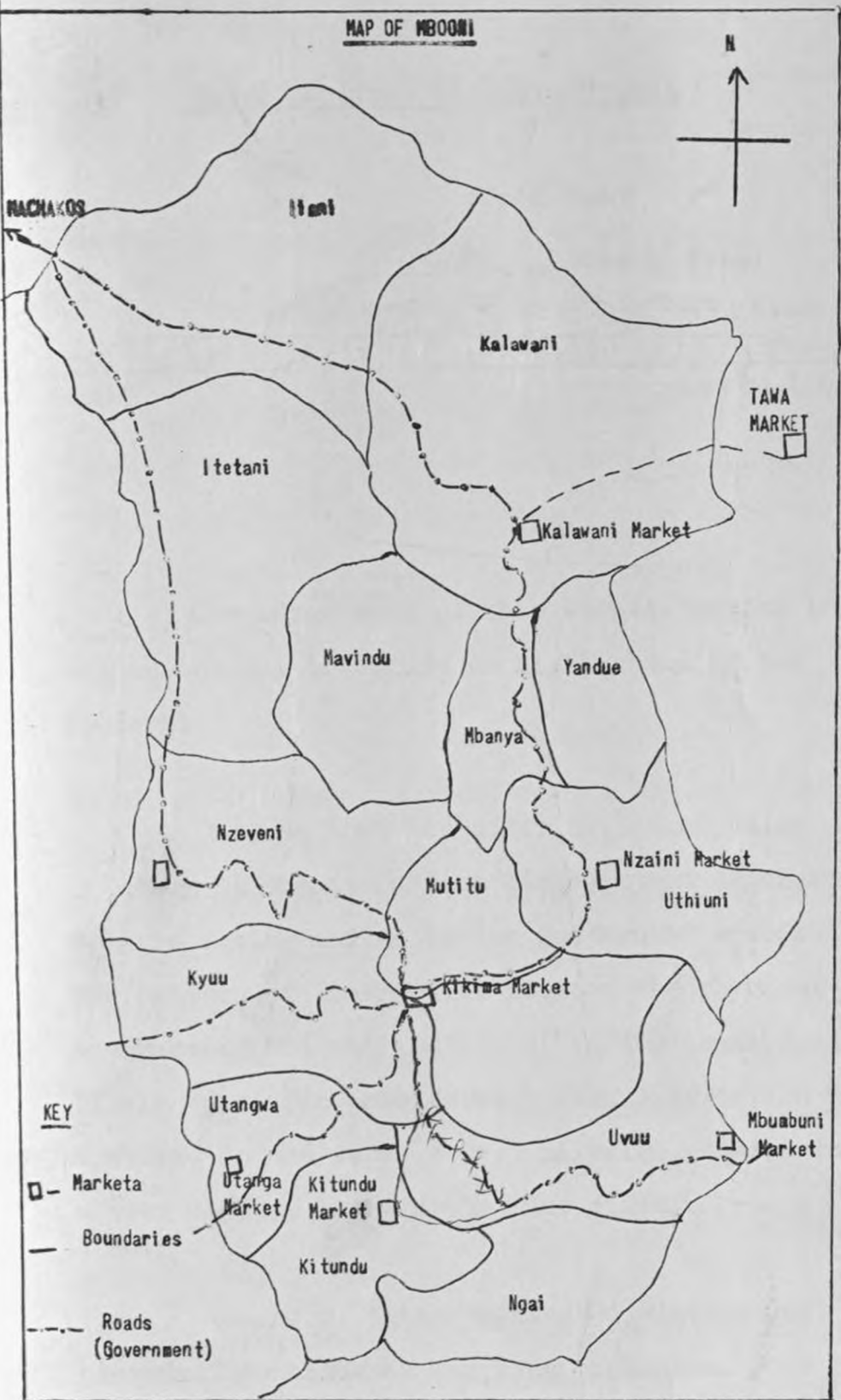
Cross Section: Machakos-Mbooni
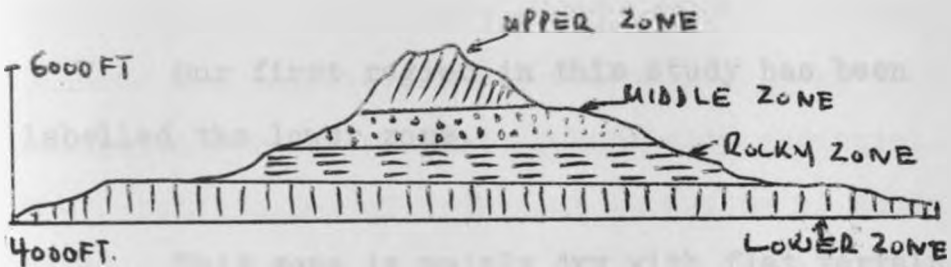
The importance of this stratification to
methodological procedure is highlighted by two
factors.

One, is that the distribution of units
of study in Mbooni is to a large extent determined
by this zoning and so is the pattern of social life.
The pattern of interaction between the physical
environment and the individual in the lower zone is
likely to differ considerably from interaction between
the same in the upper zone. Likewise, social inter-
action between individuals must differ.

Secondly, these physical divisions must
necessarily influence sampling procedure. The
problem to be tackled here is that of picking
a sample that represents the Mbooni community across

the zone boundaries and at the same time bring out
the unique features in each zone without the risk
of choosing a biased sample.

Our first region in this study has been
labelled the lower zone.

This zone is mainly dry with flat terrain
undulated in places and cris-crossed by wide open
valleys, filled with sand (gravel) and mainly flooded
after torrential rains. The soils in this zone
are red loamy with considerable ratio of sand
content. Crops grown in this zone are cotton,
tomatoes, banana (dwarf), pawpaws, maize and french
beans. The area is generally good for most types of
fruits with tomatoes the best suited. Traditional
stock of cattle are reared with heavy overgrazing
prevalent in some areas.

Other economic activities involve brick-
making and sand heaping for sale to the contractors.

Water is very scarce in this region
particularly in the absence of rains. Most of it
derives from the adjacent springline zone and
gravitates to the region below through narrow
channels, some of which are permanent while others
are perennial.

The rocky or the springline zone is the next
from the bottom of the hill. It is mainly rocky,
punctuated by small patches of cultivable areas
growing sugar cane, arrow roots, sweet potatoes,
bananas and cassava. These are mainly grown on
subsistence basis but not economically essential.
The crucial asset of this zone is its water content.
Most of the water used even in the lower and middle
zones is trapped here and emerges at points to reach
the other areas through springs formed by rock
interlocking.

The middle or the Kikuyu grass zone is the
next region. This is mainly the coffee zone
with sufficient rainfall to support other crops such
as bananas, pawpaws, tomatoes, cassava, arrow roots,
beans and potatoes. Most of the irrigation done in
the area is carried out here through use of channels
and terracing.

The upper or the high bracken zone locates
at 6000 ft. above sea level and receives sufficient
rainfall to grow wattle (for tanning), tomatoes
and most other vegetable crops, e.g. onions, cabbages
(drum and sugar loaf). Coffee is also grown here.
Climatic conditions here also favour keeping of
cattle of both grade and exotic breeds and dairying

is a major activity of the area. Although rainfall
is sufficient per annum the nature of terrain necessi-
tates irrigation which is done by means of channels.

This then is the site within which our units
locate together with activities that take place in
specific zones. The region is generally a small
farmer area, with a majority of household heads
owning less than 5 acres of land.

DISTRIBUTION OF UNITS

The population of the area as at 1969 was
42,000[4] people mainly concentrated in the potential
upper zone. The density of the area is 2.2 per
sq. kilometre though higher density could be expected
in the upper zone due to its capacity to contain
more inhabitants relative to other zones i.e. the
rocky zone. By composition, women comprise 52 per
cent of the population, men and children the rest.
This gives a sex ratio of 115 for Mbooni.

Taking every head of a household, it is
found that there are over 6,000 potential respondents
in the area. It therefore becomes obvious that all
of them cannot be interviewed. A small number on
which to collect information must hence be selected.
This small number must be carefully selected so that

it is representative of the entire population of
farmers in Mbooni. Sampling is the method of selecting
such a number so that it meets its purpose. Faulty
sampling may nullify the results of one's findings

SAMPLING

Sampling in Mbooni was carried out on the
basis of two factors:-

(a)   The ecological zones, already discussed.
(b)   The total number of households in the area.

Since this area is naturally sub-divided
into the zones described, the first condition for
the sample to meet is to be representative of the
zones. The only way to represent all zones in the
sample is to include all of them in the study. This
way they would be taken as natural strata within which
people have settled and adapted differently in
accordance with strains peculiar to each zone.
At this stage stratified sampling is applied.

All the sublocations of the area were
listed and five were randomly selected out of this
list. Only 3 zones were required to represent the
major zones but over-sampling was done in order
to cover the rocky zone and to balance the size

and population. Out of eleven sublocations,
Kalawani, Nzaini, Utangwa, Mutitu/Kitundu and
Kyuu/Nzeveni were selected as the areas to be
studied.

The areas chosen can be considered to be
representative of the rest since they were all
randomly picked out of all the possible areas.

Secondly, the ones picked comprise nearly
50 per cent of all the areas put together, and
hence the probability that they will be representative
of the others is also high.

All zones were also included in sampling
and an area randomly picked to represent each zone.

One advantage with this type of sampling
is that respondents are found within specific
strata and can be economically reached and studied.

The next step in sampling involved getting
a listing of farmers in the area so that a sampling
framework from which to draw a sample could be formed.
Lack of sampling framework is a common shortcoming
of random sampling in the rural areas. To sample
randomly, therefore, one must create one.

To create a sampling framework, all the household heads in the area were listed. From there, the sample size was dictated by the sampling fraction. Since the study aimed at reaching 250 farmers, in all zones, 1/24 was our sampling fraction. A random number between 1 and 24 was chosen (in this case 21) and every 21st, 42nd and nth farmer selected to reach the required sample of 250 people.

Here, it may be seen that by creating a sampling framework, respondents were put in a form of sequence. This makes the method of systematic sampling relevant to Mbooni case as described above.

The great advantage with this method is the technical ease with which it can be administered while its disadvantage is its cyclical sequence in repetition. This problem in Mbooni was avoided by use of the other forms of sampling as mentioned. These included stratified sampling of zones, so that it was quite impossible to repeatedly choose respondents from one zone without including the others. Secondly, cluster sampling was applied i.e. by selecting sub-locations so that respondents were unlikely to be members of the same sublocations but of randomly picked sublocations that represented the zones.

The second advantage of this method is that
it gives the researcher chance to pick proportionate
samples in each stratum thus avoiding the chances of
disproportionate samples influencing the findings.
Homogeneity within stratum is also assumed under
this method, a factor that further improves the
efficiency of this technique.

Characteristics that pertain to each
stratum and which make it different from others
have already been discussed in the earlier sections
of the chapter and include such factors as economy,
communication, population and topography, etc.

DATA COLLECTION

The method of survey analysis was used in
collection of data in Mbooni. Other than this,
participant observation was used in the initial stages
of the study where an attempt was being made to
understand certain aspects of Mbooni community as a
pre-requisite to questionnaire construction.

According to Marrison, S.:

"The social survey is a co-operative
undertaking which applies scientific
method to the study and treatment of
current related social problems and
conditions having definite geographic
limits and bearings plus such a
spreading of its facts, conclusions
and recommendations as we make them as
far as possible the common knowledge
of the community and a force for
co-ordinated nation". (5)

Selvin says:

"It is a set of procedures for
collection and analysis of standardized
data concerning actors (units) in
natural settings who are systematically
selected to represent a pre-determined
universe (sample of population) and in
which the range of values of variables
utilized is not subject to experimental
controls of manipulation by a researcher". (6)

Both, the great pioneers of survey analysis

argue that there are three fundamental characteristics

of survey analysis.

First, it has a clear cut definition and

precise measurement as opposed to confused

impressions and opinions lacking substantiations.

Secondly, it has the power of description

which penetrates below the surface and catches the

imagination of the reader by the sensitiveness and

the sureness of its touch, it is a human narrative

not merely a directory to the contents of a district.

Finally, it pays particular attention to
intelligent relations of conditions and their
underlying causes. So that things are not left as
they are, according to the same authors, the community
experiences more sharply than before its sense of
responsibility and sees more clearly what steps
are necessary for reform.

In Mbooni, data were collected through use
of a questionnaire. After following the sampling
procedures described, the questionnaire was
administered to each of the 250 respondents by the
author, with the help of trained research assistants.
The survey, though meeting the conditions mentioned
above, faced problems typical of social research
and more so of the method itself. These are discussed
below.

First, there are obvious problems having
to do with identifying the populations. In Kenya,
comprehensive studies of rural populations have not
been done to facilitate formulation of testable
hypotheses based on existing knowledge about
the rural communities. The problem is relevant to
the study since much of the information obtained about
Mbooni was from government extension officers as
well as from a short participant observation survey
prior to the commencement of the study.

Secondly, there is the problem of locating
the respondents. No maps are available and commu-
nication is inhibited by the mountainous nature
of the region.

Farmers also tend to work at their own pace
and have their own perception and use of time; hence
it is very difficult to locate a respondent where
one is wanted and at a given time.

Non-response is another problem. The major
problem is not so much the refusal of respondents to
answer questions as it is the lack of confidence in
the answers they give. The respondents' feeling
that they cannot give "correct answers" had to be
dispensed with in rapport creation.

Finally, the language problem. The question-
naires are usually constructed in English and
have to be put to the respondent in vernacular.
This tends to distort certain realities and leads
to undesirable response on the part of the interviewer.
In Mbooni for example, the questionnaire was in
English but the interviewers had to translate into
Kamba, sometimes very difficult technical terms
that had no parallel in Kamba i.e. dehorning.

The technique of secondary analysis may be used in one or more instances in the study, where certain sections may deserve more than just a quotation from another work. The significant factor about this approach is that a second person looking at someone else's data may see it in completely new light and hence give a contrasting explanation to phenomenon in question. The method also strengthens a finding, that is, statistical one on the basis of what other researchers have found out.

In conclusion, this chapter has examined the units of study in Mbooni, their distribution, site description, sampling and the methods of data collection. Porblems experienced in this respect, and which bear on this study have also been mentioned.

In the chapter that follows, the actual findings about the Mbooni community are presented and discussed. These will be accompanied by a discussion of relevant statistical measures as well as correlation analysis to establish relations between phenomenon and to attempt an explanation.

Footnotes to Chapter Two

1.   Mbithi, P.M., Rural Sociology and Rural
        Development. East African Publishing
        House, 1974, Nairobi, p. 24.

2.   _____, op.cit., p. 9.

3.   _____, op.cit., p. 12.

4.   Morgan, W.T., East Africa: Its Peoples
        and Resources. D.A. Hawkins and East
        African Literature Bureau, Nairobi, 1962.

CHAPTER THREE

FINDINGS AND DATA ANALYSIS

INTRODUCTION: STRUCTURE AND CHAPTER

This chapter is presented in two parts. In part one, the findings on the major variables for which observations were made are presented. Findings on each of these variables are presented in a tabular form and discussed paying particular attention to works by other scholars who may have studied the same variables and to whatever other statistical evidence exists.

In part two, correlation analysis and testing of the hypotheses of the study is carried out. Testing is done by use of X^2 (chi-square) measure for association and γ (Gamma) measure for strength of association. Wherever necessary the relevant statistical measure is discussed and an attempt made to justify its use for a given situation. This is also the section where possible explanations of association between variables are attempted. Multivariate analysis to establish what factors dominate adoption levels is also attempted.

CHOICE OF SCALING TECHNIQUE - ROGER'S NORMAL CURVE

In Roger's analysis of "modernization among peasants", an assumption is made that peasants could be put on a modernization continuum and categorized into progressives and laggards. A further assumption is made that this categorization conforms to a normal distribution that can be represented by a normal curve. This is an important assumption since his dependent variable is based on it.

In his analysis, he uses the properties of a normal distribution and classifies his respondents into innovators, early adopters, early majority, late majority and laggards. (see curve)
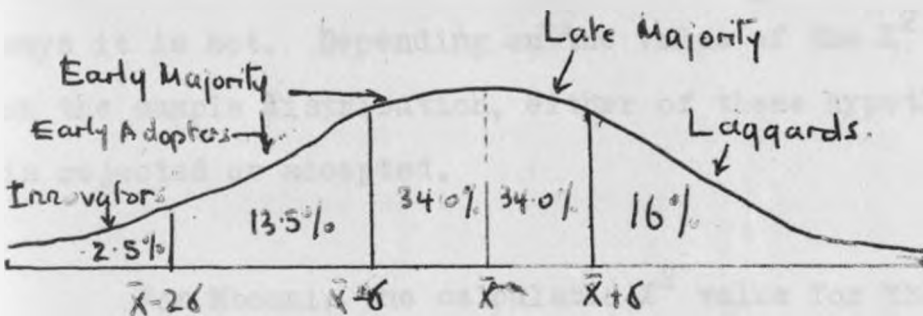
This form of analysis has two shortcomings: one is that it is not symmetrical since three adopter categories appear to the left of the mean and only two to the right.

Secondly, the distribution must be affected
by incomplete adoption which means that adopter
categories that follow a normal curve are not
exhaustive.

In statistics, a normal distribution is
said to apply when a large number of factors, none
of which dominate, affect such a distribution.
This could be said to be the case with Roger's
distribution, but not with Mbooni distribution.

To decide whether a distribution is normal
or not, one can apply the test for normality.

Under this test, two hypotheses are set up.
One, (H_O) that purports study sample is drawn from
a normal distribution, and the other, (H_A), that
says it is not. Depending on the value of the X^2
on the sample distribution, either of these hypotheses
is rejected or accepted.

For Mbooni, the calculated X^2 value for the
sample studied was 44.5 far more than the observed
X^2 value of 9.488 at 0.5 level of significance.
Therefore, the sample for this study was not drawn
from a normal distribution.

This state of affairs then implies two things:
one that instead of having many factors, none of
which predominates, affecting our distribution, we have
a few factors that predominate. Secondly, it cannot
be assumed that a normal curve can be used to categorize
farmers in Mbooni according to their degree of
innovativeness as Rogers did in Columbia. This means
that a method must be sought to group the farmers
and to show what factors affect such grouping and
which of these predominate.

GUTTMAN SCALING AND LEVEL OF ADOPTION OF TECHNOLOGICAL INNOVATIONS

Guttman scaling falls under the umbrella of
scalogram analysis and is defined as "the general
deterministic procedure for determining whether or
not the responses of subjects to items form a scale".

To demonstrate its utility, the following
matrix is explained as an illustration.

In this example, the indicators of innovative-
ness (items) e.g. spoons, forks, basins, etc. appear
as columns and respondents as rows.

Respondents	Indicators (Items)				
	1	2	3	4	5
A	x	x	x	x	x
B	-	x	x	x	-
C	x	x	x	-	-
D	x	x	-	-	-
E	x	-	-	(x)	-

In the matrix, we have five indicators (items) and five respondents. Any positive response (i.e. respondent has an item) is shown by an (x) while a negative (-) indicates absence of item for that particular respondent. An important property of the Guttman scale is its manifestation of a cummulative order. This means that the respondents with five items is assumed to have the first four as well. Also the presence of 3 items means items 1 and 2 are present, but not that 5 will also be present. It may it may not. The presence of an item without other immediate items constitute an error. In our example items 1 and 4 constitute errors. These errors are regarded as departures from perfect scale types in their perfect form, for a given number of indicators. In order then to ascertain that one scale is as near to perfection as possible, and hence useful, its departure from the perfect has to be measured. This is given by the coefficients of scalability and reproducability.

The Coefficient of Scalability = $\dfrac{1 - \text{Errors}}{\substack{\text{Smaller number} \\ \text{of non-modals}}}$

Non-modals refer to the list common of either
the positives or negatives on rows and columns. The
accepted value of the coefficient is any figure beyond
0.65.

The coefficient of reproducability does not
differ from the above only that it is much more
rigorous and more reliable since its computation
involves all calculations of reproducability values
for each item and the final coefficient is an
average of individual item values. It also has 0.90
as the lower limit below which the coefficient is not
valid.

The coefficient of reproducability =

$1 - \dfrac{\text{Total number of errors}}{\text{Items} \quad \text{x} \quad \text{Respondents}}$

If then the proportion of errors is small, the
responses of a given respondent can be reproduced
given his position on the scale (scale step). This
conveniently demonstrates the presence of a simple
ranking order.

In Guttman scaling, several other problems apart from that of measuring the error, have to be dealt with if the scale is to be valid.

The first of these is the ordering of items and respondents to make a scale. Here we have to dwell on strong criteria to convince ourselves that both the items and respondents selected (sample) theoretically derive from a universe or pool that has in common the attribute of the dependent variable. Arranging the items and respondents to make a scale is a matter for technicality, after this problem is taken care of.

Secondly, one has to devise a method of improving the reliability of a scale. This can be done by increasing the reproducability or scalability value by minimizing error frequency or by eliminating items that do not fit in the universe and which might carry a large number of errors.

In its complete form then, a Guttman scale must meet the following criteria:-

(i)   Dichotomous items must not be less than 10.
       For multicategory items, a smaller number might
       suffice. Dichotomous here refers to binominal
       data i.e. having or not having an attribute.

(ii)   Only a few, if any items, should have more than
       80 per cent of the subjects in their most popular
       category. If this is allowed to happen, the
       reproducability values will be dragged away
       from normal and will be spuriously high.

(iii) The pattern of errors should be random. This
       means that no large numbers of subjects should
       be found who all have the same number of
       non-scale patterns.

(iv)   Individual items should have a reproducability
       coefficient of not less than 0.85. This
       increases the probability of ending up with
       a higher reproducability coefficient for the
       whole scale.

(v)   No item should have more error than non-error.
       If this is noticed, it would be wise to
       eliminate the item and therefore the errors
       it carries with it.

In this study, a group of 23 items representing crop husbandry activities are subjected to Guttman scaling in an attempt to rank order the farmers. Only 18 items were scalable.

The results are shown in the following scale showing what items are commonest and therefore practiced most and which ones are rarest and adopted by only a few farmers.

Scale Step	Activity	Error	Percentage
1	Early planting	14	80.1
2	Weeding	8	73.5
3	Water conservation	7	70.5
4	Spacing	6	69.1
5	Application of manure	15	66.9
6	Crop rotation	12	63.2
7	Crop grading	15	61.0
8	Using approved seed	15	58.0
9	Soil levelling	18	55.1
10	Seed dressing	14	54.4
11	Thinning	19	51.4
12	Staking)	9	
	Spraying)	10	
	Watering)		
13	Prunning	18	47.0
14	Fertilizer application	15	44.8
15	Dusting	18	38.9
16	Using casual labour	13	32.3
17	Shading	10	25.7
18	Prunning discased plants	10	19.1

Coefficient of scalability = 0.65

Reproducability coefficient = 0.93

According to this rank ordering, the farmers may be grouped into the following categories:-

The first one comprises those farmers who have adopted early planting, weeding, water conservation or nothing at all.

This group may be said to have low levels of adoption. It may be noted that the activities adopted by this group are those that are traditionally known and practiced and they do not indicate that they have adopted any activity that is technologically more complex than this. This group makes up 21.0 per cent of all farmers in Mbooni.

The second group of farmers comprising 69.8 per cent of farmers in Mbooni, consists of those individuals who have in addition to the above activities adopted the following items that tend to show a considerable shift towards mechanization of crop practices:

(1)   Crop grading
(2)   Using approved seed
(3)   Soil levelling
(4)   Seed dressing
(5)   Mulching and thinning

The third group comprising 10.2 per cent is
the only one that has adopted the following items
in addition to all others and may be said to have
a high level of adoption. This group shows, clearly,
a shift towards more sophistication of crop
husbandry technology.

(1)   Staking

(2)   Spraying

(3)   Watering

(4)   Prunning (diseased plants)

(5)   Using fertilizer

(6)   Dusting

(7)   Using casual labour

(8)   Shading

(9)   Burning diseased plants

FACTORS INFLUENCING ADOPTION

Using the Guttman scale has allowed the study
to categorize Mbooni farmers by level of adoption
of innovation into three groups (see table).

Table 7: Categorization of Farmers by Position
on Scale

Level of Adoption	Percentage
High	10.2
Average	69.8
Low	21.0
Total	100.0
Base	250

By obvervation of the scale, particularly noting
the order of activities, certain factors may be argued
to have affected the sequence of adoption and hence
the above categorization.

The first of these must be the farmers'
decision to grow either food or cash crops. The
argument is that certain activities e.g. prunning,
spraying go with cash crops and hence a farmer who
choses not to grow these does not have to prune or
spray. Likewise, growing of food crops necessarily
confines a farmer to only minimal activities e.g.
cultivation. There is a tendency of course for
activities to intermingle as more and more farmers
practice mixed farming.

The second factor has to do with adoption of
features normally included in what is generally
known as 'agricultural development'. These include:-

(i)   New cash crops that increase a farmers income.

(ii)   New practices that increase yields for small
       additional costs.

(iii) New practices that reduce crop losses for
       small additional costs.

(iv)   Instruction in skills that tend to increase
       labour productivity.

Apart from these features that can be deduced
from the scale, there must be other factors that
have contributed to the grouping of farmers in Mbooni
as shown by level of adoption.

Are these factors farmers' incomes, their
education, land size, influence of change agent,
ecology or exposure to print media? Which of these
are critical?

In the section that follows, findings on the
major factors for which observations were made are
presented, discussed and later correlated to levels
of adoption of practices in Mbooni in an attempt to
answer the above questions.

FINDINGS ON MAJOR VARIABLES

Income Levels

Income, apart from being one of the more profound measures of social inequalities is also one of the factors that could be hypothesised to have affected adoption behaviour in Mbooni.

Figures from Mbooni study for distribution of incomes show that, a majority of people (80.0) per cent realize upto 2,400 shillings per annum. Only a small number (7.1 per cent) earn beyond 4,800 shillings per annum (see table).

Table 8: Distribution by Amount of Money Realized (Shillings per annum)

Amount (shs.p.a.)	Percentage
0 - 2,400	80.1
2,401 - 3,600	6.7
3,601 - 4,800	1.5
4,800	7.1
Missing data	4.3
Total	99.7
Base	252

Average income works up to 1,700 shillings per annum as compared with Shs. 2,400 the estimated national average for the working poor.

In Tetu Division of Central Kenya, Roling
(1973)[7] found that a majority of farmers are
low income earners.

According to Monteck S. Ahluwalia and
Chenery Horris (1974)[8], Kenya's national average
income is U.S. $ 136 - K.shs. 1,088 per annum;
but this figure is highly inflated as shown by the
rural mean income i.e. for Mbooni.

With respect to this factor however, Kenya
shows high income disparities. Ten per cent of its
income goes to the lowest 40 per cent of the population,
22 per cent to the middle and 68 per cent to the top
20 per cent.

Low inequality countries are defined as those
whose income share for the lowest 40 per cent of its
population is 17 per cent or more, of the GNP, moderate
inequality nations are those whose lowest 40 per cent
receive between 12 and 17 per cent of the GNP, while
high inequality countries are those whose lowest
40 per cent of the population receive less than 12
per cent of the income share.

Chad with a GNP of U.S. $ 78 leads the countries
studied in low inequality. Her lowest 40 per cent

obtains 18 per cent of total income, medium 40 per
cent, 39 per cent and the highest 20 per cent 43 per
cent of GNP. At the time of publication, Uganda was
in this category though the situation may have changed.
Tanzania fell within the moderate inequality countries.

It is the belief of Monteck S. Ahluwalia (1974)
an economist, that:

> "much of the poverty problem in
> developing countries is a reflection
> of low levels of per capita income...". (9)

This can hardly be the case because even with
high income per capital distribution is skewed to
favour only a few members of a population as shown
above.

Secondly, it would also seem a logical
deduction that foreign aid oould be pumped into a
nation to raise its per capita and hence reduce
poverty level, but evidence shows that this does
not always happen.

In this study, it is hypothesised that
while income levels might affect level of adoption
of technological practices, adoption behaviour
will in the long run tend to determine income
distribution in a community and hence equality.
This inequality that is likely to arise from the

later possibility may not necessarily derive from
an individual's initial capital but on the income
benefits that accrue to adopted practices and for
how long. In any case for Kenya, certain innovations
were government sanctioned and fairly cheap e.g.
growing of free Katumani seed or terracing. They
might be costly in terms of opportunity cost
but not cash income.

Literacy

Literacy statistics for Mbooni show that
36.9 per cent of the population can read and write
vernacular; 23.3 per cent and 12.3 per cent can also
read and write Swahili and English respectively
(see table).

Table 9: Distribution by Ability to Read and Write

	Percentage
Read and write vernacular	36.9
Read and write Swahili	23.3
Read and write English	12.3
None	24.6
Others	2.7
Total	100.0
Base	390

However 24.6 per cent cannot read vernacular.
Although this figure does not seem awfully high, the
important factor is that it might be characteristic
of the low level of adoption group of farmers.

Roling (1973)[10] in his findings in Tetu
Division of Central Kenya, shows the progressive
farmers are also the literate ones with only 1/4
illiterates of the entire Tetu population. He also
notes that nearly 3/5 of the laggards are illiterate;
25.0 per cent of the progressives are literate
in English while 14.0 per cent of the literate
laggards are.

International statistics on literacy patterns
show that as at 1950, 44.3 per cent of the entire
world population was illiterate.[9] Twenty years
later, the figure had dropped to 34.2 per cent.
This figure should not however conceal the fact that
although the adult literacy figures have arisen,
illiteracy has continued to rise. (see graph)

Increase in Illiterates and Literates
UNESCO, 1970

POPULATION
MILLIONS OF
PEOPLE

2003

1504

1,134

879

820

783

700   735

1950   1960   1970   1980   1990

YEAR
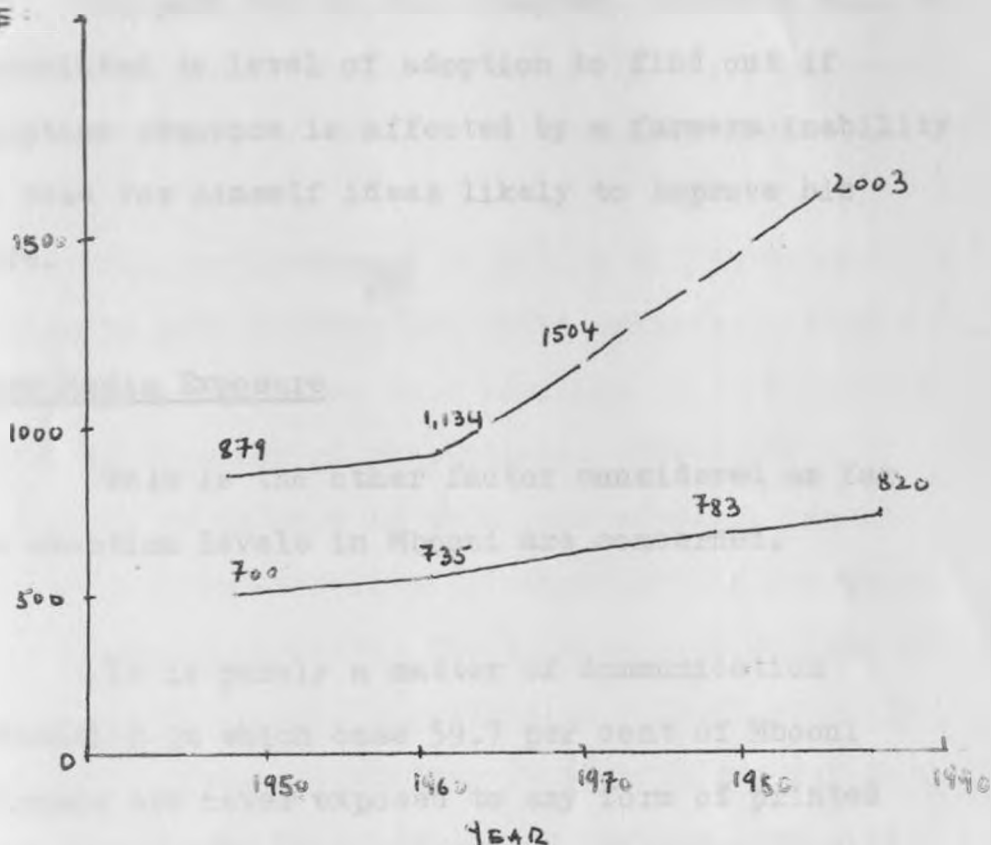
Africa has an illiteracy rate of 26.0 per cent;
Kenya's is slightly higher than this at 34.0 per
cent.

In Mbooni, the important factor seems to be
functional literacy which proves that it has something
to do with economic benefits for the people. Since
a majority of people are small farmers, literacy
should of necessity have a content of functional
literacy as relates to improvement of farming
techniques.

In part two of this Chapter, literacy will be correlated to level of adoption to find out if adoption sequence is affected by a farmers inability to read for himself ideas likely to improve his life.

Mass Media Exposure

This is the other factor considered as far as adoption levels in Mbooni are concerned.

It is purely a matter of communication extension in which case 59.7 per cent of Mbooni farmers are never exposed to any form of printed media while others are only exposed rarely, i.e. 22.3 per cent are exposed only once a week. Even for an important newspaper like Mkulima, a majority never see it. (see table)

Table 10: Distribution by Frequency of Exposure to Printed Media Per Week

Frequency	Percentage
Never	59.7
Once	22.3
Thrice	8.1
Daily	5.6
Missing data	4.0
Total	99.7
Base	246

Radio media reaches 38.4 per cent of the
population often, while the majority (61.6 per cent)
never or rarely get access to the radio media.

The preponderance of people who never get
access to both printed and radio media is a factor
to watch out for when this variable is correlated to
level of adoption of innovations. The concern of
the study is to show if this poor exposure has got
anything to do with level of adoption of innovations
in a group of farmers. The study will also examine
the problems related to extension communication in
the rural areas and whether these problems may in
fact be as much accountable for varying levels of
adoption as does the effect of mass media exposure.

Cosmopoliteness Degree:(Geographical Mobility

As concerns degree of cosmopoliteness, figures
show that 43.7 per cent of the farmers visit Machakos
town very often as compared with 24.2 per cent who
rarely frequent Machakos town. (see table)

Table 11:   Distribution by Frequency of Visits to
Town Per Annum

Frequency	Percentage
Very often	43.7
Often	30.7
Rarely	25.4
Total	99.8
Base	231

From these figures, it seems only a small number
of members of Mbooni community are physically cosmopolite
to low degrees. What the above figures do not show is
what category of Mbooni farmers is most cosmopolite
and which one is least so.

In other studies e.g. Rogers (1973) cosmopoliteness
is usually not a characteristic of peasants. This is
not known at this stage as far as Mbooni is concerned.
This will be put to test in the portions of the
chapter that follow. The case for degree of cosmo-
politeness influencing level of adoption of innovations
in Mbooni will also be examined.

Levels of Living

According to levels of living, 15.4 per cent
of Mbooni residents were classified as having high
level of living, 46.0 per cent in the upper middle
classification, 13.8 per cent lower middle and 24.6
per cent in the low level category. (see table).

Table 12:   Levels of Living: Distribution by
                    Position on Scale Step

Level	Percentage
High	15.4
Upper middle	46.0
Lower middle	13.8
Low	24.6
Total	99.8
Base	252

Level of living has been defined as "the degree
to which an individual or family basic needs of
nutrition, housing and clothing are met".[11]

It is usually measured by using such material
possessions as a brick house, tin roof, household
equipment and the like. In Mbooni about 31 items were
subjected to Guttman scaling to produce the above
results.

The importance of level of living to the adoption behaviour lies in showing if level of adoption affects levels of living, and whether levels of living affect adoption behaviour. These cases will be tested for in Section II of this Chapter.

Occupation Type

Occupational distribution in Mbooni shows that a large proportion (33.4 per cent) of the population are housewife peasant farmers; 18.3 per cent are casual labourers and 11.5 per cent petty traders. (see table).

Table 13:   Distribution by Type of Occupation

Category	Percentage
Housewife/peasant farmer	33.4
Trader	11.5
Shopkeeper	6.7
Clerks	2.7
Labourer	4.7
Skilled Artisan	6.3
Teacher	2.3
Government officers	1.5
Casual labourer/petty trader	18.5
None/Missing data	11.9
Total	99.3
Base	251

In a study carried out in a peri-urban area
(1974)[12] it was found out that the group referred
to as professionals constituted 22.2 per cent of the
population, technicians 4.2 per cent, manual workers
11.7 per cent and housewife peasant farmers 28.7
per cent. These figures tend to show specialization
rather than professional diffuseness but this does
not restrict occupational specificity to urban
dwellers.

According to Mbithi (1974)[13] a rural dweller
can be an enterprise manager, where one makes
decisions on how best to apply resources to secure
optimum returns. This criterion and several others
are not only determined by economic factors but also
aspects like food taboos, etc. Division of labour
between sexes is also determined by similar taboos.
Of course the farmer in the rural areas should not
be thought of in terms of strictly scientific
management since one's holding is only small. It
should also be noted who of the two, the man or the
woman, manages on the farm in the rural areas.

A farmer is also viewed as a member of the
social system with influences being exerted on him
by the entire community. The community may, for
example, appropriate some of the farmer's resources
for collective activities e.g. "harambee" projects.

Also, the farmer is an ecological agent e.g.
as a postoralist or a settled cultivator and exacts
control on the physical environment while the environ-
ment impinges on him in turn.

The ILO Report on Employment, Incomes and
Equality in Kenya, notes the following points
concerning rural occupations.

First, over 90 per cent of the rural population
earn their living on land. This could be the case
for Mbooni when one considers that parts of it are
agriculturally rich farmlands. However it is
important to note the arid nature of the area and the
adversities that this population faces e.g. weather,
to eke out any sort of subsistence from the soil.

In Dagoretti study, the above factor could
hardly obtain. Although 28.8 per cent of the
people are ranked as peasant farmers, which constitutes
the largest single occupational group in the area,
it is only a quarter as compared with 90 per cent
for the entire country. This may be explained by
the fact that this is a peri-urban area and it is
expected that the rest of the population is engaged
in other occupations that accrue to an area that is
becoming urbanized.

Secondly 15 per cent of the entire rural population is engaged in regular wage earning while 5 per cent find casual work. These figures are 21.1 per cent and 18.3 per cent respectively for Mbooni. In Dagoretti, these figures are 23.4 and 4.2 per cent respectively. These mainly comprise technicians, craftsmen and manual workers. In Mbooni, they comprise teachers, labourers, government officers and clerks. The nearness of Dagoretti to town may account for much of the differences in occupational categories, while in Mbooni it is almost impossible to say if any professional group exists by random sample surveys.

Whereas the category professional, 22.2 per cent of Dagoretti population fall here, it is not identifiable in Mbooni. In Dagoretti for example it is noted that those in this categorization are those who have attained a certain level of education and have learned certain skills that have allowed them to join professional ranks. This group is small in number due to various reasons.

First, education has been made available to only a few who at one time paid the price of conversion to the Christian faith. It has not been assessed to what extent this could be true for Mbooni but it may be assumed to have happened as it happened

in many other areas of Kenya's rural areas. A
majority who refused were identified with traditionalism
and acquired no formal education. With emphasis on
training Africans for manual work to provide labour
and also the general need to meet the newly acquired
aspirations, more and more people turned to employed
labour. Migration has of course had its effects on
structuring the occupational categories in the rural
areas; in certain cases, the women who comprised
2.3 million of the 4.4 million adults in Kenya's
rural areas became the household heads.

The strategy for improving the rural farmer
involves increasing his farm productivity and hence
his income. So it recognizes the importance of
farming as a critical rural occupation. Other
occupations are also important so long as they are
independent of formal education as a prerequisite.
But occupation continues to be a limiting factor
in the rural economy because it is according to what
one has that one gets and there is no time therefore
that the farmer who has less will get more from
a cooperative. If farming as a major occupational
category is to benefit the community, more and more
returns from innovations must be made accountable to
them than is currently the case.

Level of Education

Education figures for Mbooni show that 36.8
per cent of the people have had no formal education
A majority, 54.8 per cent have had seven years of
formal education. The highest level of formal
education in the area is Form VI with only 0.4 per
cent of the population having reached this level.
(see table)

Table 14:   Formal Education: Distribution by
                        Level Attained

Level	Percentage
No school	36.8
Upto std. 3	21.6
Upto std. 4	21.6
Upto std. 7	11.6
Form II	4.0
O level	0.4
A level	0.4
University	0.0
Missing data	3.6
Total	100.0
Base	250

In a study done in Dagoretti, a peri-urban
area in 1974[14] it was found out that 25.8 per cent
of the population had no formal education, while
50.1 per cent had seven years of education

and the rest 24.2 per cent of the population had more
than Form II level.

The observations of the ILO Report 1972[15]
are that 45 per cent of the entire Kenya population
has no schooling or at least do not get into the
formal system of education at all. This figure for
Mbooni is 36.8 per cent and differs only slightly
from the national figure.

Further, the ILO report observes that the
present system of education in the country provides
50 per cent of the population with seven years of
education. For Mbooni, this figure stands at 54.8
per cent and differs, though not significantly from
the national figure. ILO report also categorizes
15 per cent of the country's population as having
Form IV and above level of education. In Mbooni
the highest level attained by only 0.4 per cent of
its population is Form VI.

There is more to these statistics than meet
the eye.

On further examination of Kenya's education
figures, of the thousands of children enrolled in
standard One i.e. 1.5 million in 1970, only 28 per
cent enter the secondary school system of education;

14 per cent in government aided schools, which have many advantages over unaided schools, and 14 per cent in Harambee schools. The rest are repeaters employed or unemployed etc. in "Harambee" schools. Most of the pupils i.e. 75 per cent drop out after two years.

Four years later, about 45 per cent of those who complete school continue with education. This figure is only 10 per cent the original figure that started school at standard one. After two years there is the A-level examination for further selection to higher education. Since the University admits only a small fraction, the rest further undergo further distribution into unemployment.

According to the ILO report,

> "in Kenya today, the school system
> provides 40 per cent of the young
> generation with 7 years of basic
> academic teaching, preparing them for
> a problematic entry into secondary
> academic institutions. However, only
> about 15 per cent manage to continue
> their formal education career, <u>leaving
> 85 per cent of the young people of the
> country to find their way towards
> developing their skills and knowledge
> for employment</u> through other agencies
> for education and training".

This situation is not unusual for most other educational system like Kenya's.

In a study done in Columbia in 1968,[16]
on education and the status quo, it was found out
that of the 1,000 school age children i.e. over
7 years of age, 230 of them never go to school;
770 therefore enrol for grade 1 level; of the 770
enrolled, 505 begin second grade, 357 begin third
grade, 263 fourth grade and 216 finish fifth grade.

Of those 216 who finish grade primary school,
119 enroll in first year secondary school, 86 in
the second, 74 in the third, 60 in the fourth year,
40 in the fifth year and 37 finish the sixth year
of secondary education.

Of these 37 who finish secondary school, 35
begin university studies, 15 arrive at third year
college and 11 finish university.

Commenting on these figures, the author
points out that:

> "these figures indicate the internal
> efficiency of the educational system
> to discriminate according to grade and
> schooling;

he therefore argues that:

> "....if the attainment of the objectives
> of schooling according to levels were
> measured in terms of school retention,
> the investment in education would be a
> poor investment". (17)

The author goes further to show that if the
figures mentioned were applied to the population in
question to determine the effect of the system on
the community the following groups would be identified.

A group of absolute illiterates that include
23.0 per cent of the people, a group of functional
illiterates with one or two years of schooling which
includes 41.3 per cent, a group of workers without
profession with complete primary school education
which includes 23.8 per cent, a group of workers
professionally not qualified which includes 59.0
per cent, a group of high school students trained
for higher education but without specific training
to undertake gainful employment, which includes
34.0 per cent, and a group of university students
who do not finish second year, who did not
receive specific training for a profession consti-
tuting a growing intellectual proletariat and who
amount to 19.0 per cent; finally a group with
academic training which includes 7.0 per cent.[18]

If this model is applied to the Kenyan
situation, it is seen that the country has a large
number of its people without formal education
and who are also illiterate. Every year it manages
to create 85 per cent of primary school leavers,
without any skills and who are left on their own

to learn how to live; 55 per cent of secondary school
leavers with academic qualifications that do not
allow them to develop and exploit their skills
according to the set standards.[19]

In the Columbian study, 63.4 per cent of the
population are referred to as absolute illiterates and
consist of a   regressive factor in economic growth
in terms of cost benefit analysis, they cost more
than they produce.

The third group (23.8 per cent) participate
in change but have more necessities than possibilities
for satisfying them; they are eager consumers by
imitation.

The final group with some secondary or
university education is in a position to bring about
changes and influence decision making.

In Kenya, a majority of people in the rural
areas either have no education or have upto seven
years of education. The case for Mbooni for example
is 36.8 per cent with no education and 54.8 per cent
with seven years of formal education, making a combined
total of 91.6 per cent of people who are usually
referred to as the peasants or the rural masses.

Since the ills of an education system are
felt by a majority of people in the country, most
of whom live in the rural areas, the problems of
education system are the problems of the rural
people, for apart from being by-passed by the
opportunities that educational mobility brings
with it i.e. high incomes,they suffer most from
the inequalities that emanate from it.

One such factor for example, is inequalities
between provinces.

According to the ILO report (1972), Central
Province had 24.3 per cent of national primary
school enrolment in 1969 compared with 0.3 per
cent for North Eastern and 6 per cent for Coast
Province.[20]

The second factor showing inequality is the
examination success. The ILO report shows that in
1971 in former European and Asian schools in Nairobi,
there were higher examination results than in the
poorer schools in the same district. This is accounted
for by the distribution of trained teachers to
schools with the implication that those most qualified
are mostly concentrated in the formerly white schools.

The above point is repeated with regard to
secondary education where 24.4 per cent of students
enrolled in secondary school come from Central
Province, 9.1 per cent from Coast and 0.01 per cent
from North Eastern.

The other factor is portrayed by the type of
school one attends. The 1970 figures for Certificate
of Education successes show that 63.5 per cent of
candidates from aided schools obtained the Certifi-
cate as compared with 29.6 per cent from unaided
schools who obtained the certificate.[21]

Similar inequalities are also manifest in
distribution of higher education secondary schools
i.e. Central Province has 15, Coast 5, Eastern
Province 7, Nairobi 12, Rift Valley 4, Western 8,
Nyanza 8 and North Eastern none. The inequalities
are likely to be amplified by the recently established
Colleges of Science and Technology.

In addition to these factors, some areas also
suffer from natural disasters. In Machakos District
in 1971, there was reported a high rate of dropout
from school due to drought.

In a later chapter it will be shown that
education alongside other factors, e.g. income,
occupation type, levels of living act as conditioning
factors in social mobility and relates negatively to
individual degree of innovativeness. It manages to
create a dependent population in the rural areas,
with very limited access to opportunities in life.

According to Rodrigos, P. Sandova (1971)
with regard to rural masses, who are accused of being
all sorts of things, i.e. resistant to change,

> "it is not a personal problem but
> a structural situation created by
> the economic situation in general
> and the educational system in
> particular, both of which have
> excluded large marginal groups from
> educational opportunities. Lower
> class inertia does not seem to exist;
> if it existed the cause would not
> be ignorance but a system that has
> fostered widespread illiteracy.
> Thus, the educational system as it
> currently exists is a regressive
> factor in development". (22)

One of the aims of the study is to show that
education and other factors supposed to be the key
forces behind technological change only act as
contrary forces and are in the long run responsible
for the low level of technological change in the
rural areas.

Secondly, it is not possible at this stage
to suggest an alternative to the conditions discussed
with regard to education for this remains one of
the aims of the study. It is however appropriate
to note the assertions of educationists like
Obia Olewale who have continued to plead the case
for African educational systems in many international
forums.

According to Obia Olewale (1972) with
reference to Guinean traditional educational system,

> "each village had its own education
> system. The subject matter was life
> and how to live it. The teachers
> were experts and the pass rates were
> high: there were very few drop outs:
> our teachers could explain everything,
> there were no mysteries that they could
> not explain to their pupils; they knew
> the name of everything; they knew the
> name of every tree and plant; they
> could explain every natural phenomenon,
> they knew the myths and the legends and
> taboos. It was a perfect system for
> a static society". (23)

From this rhetort, it may be argued for our
case, that education, should be made relevant to life
in the rural areas and how to live it. If it is
at national level, it should be about life in the
country and how to live it.

For Mbooni like in many other rural areas
of Kenya, there are a few other factors that could
help account for educational levels. These are
rooted in the historical background of education
in the country in general.

First, the attitude of the indigenous
population towards the educators, particularly
the missionaries. This was hostile so long as
it did not incorporate within its curriculum the
traditions and values of the soicety concerned.

Secondly, the attitude of the educator
towards the African. Only a basic education for the
African was required and in fact one was not
encouraged to go beyond a certain level. (Major
examinations were taken at standards four and
seven). Most people could not make these exami-
nations and hence the tendency to find large
numbers of people in Kenyan rural areas with seven
years of education. It has also been noted that the
few who managed these examinations and had a chance
for higher education did not have fair opportunity
in sciences so that their chances of entry into
professional ranks were minimized.

Later on, the "status inversion" that was to
occur affected only a small minority in higher

education brackets in Kenya's rural areas. Also,
when the traditionals realized the importance of
education, they faced problems i.e. censorship of
independent schools. This situation made it easier
for the convertees to acquire for themselves higher
education and later that of their children, than
it did for the traditionals. In most Kenyan rural
areas today, there is eager search for formal
education as evidenced by the number of "harambee"
secondary schools that have been established.

In Mbooni, it is unlikely that formal education
will seriously affect level of adoption in view of
the levels of education reported in the area.

The likely case however is the one that
purports effect of levels of adoption on formal
education in the future. These possibilities are
tested.

Fatalism

Distribution by degree of fatalism in Mbooni
shows that a majority of people (80.2 per cent) are
average in degree of fatalism. However, only a very
small percentage (6.0 per cent) fall within low
fatalism category, while 13.9 per cent are in the
high degree category (see table).

Table 15: Degree of Fatalism: Distribution Position
on the Scale

Level	Percentage
High	13.9
Average	80.2
Low	6.0
Total	100.0
Base	252

   Fatalism has been associated with low degrees
of individual innovativeness e.g. by Rogers (1973)[24]
The argument here is that as people become more and
more innovative they are able to face most of the
adversities of life and hence tend to become less
fatalistic. It is not yet known if this is the case
in Mbooni; it is one of the issues that will be
subjected to statistical tests.

   It may however be added that while it is said
that fatalism is an original state characterizing
peasants, the study would like to argue that it can
also come about as a result of inequalities and
frustrations that accompany attainment of higher levels
of innovation adoption.

To measure fatalism, the Likert Scale for
attitude measurement was used. There are many varied
types of Likert Scales e.g. paired comparison,
equal appearing interval, successive intervals and
enumerated ratings.[25] The last is the method applied
here.

In this study, 10 items were used on 250
respondents. Then a score of between 1 and 4 was
given for responses of agree strongly, agree,
disagree strongly, disagree. Those individuals in
the upper quartile who score the highest in all
statements have their means taken and likewise for
those in the lower quartile. The difference between
their means is taken for all the statements. Those
statements with the highest means are the ones valid
for attitude measurement.

In this case, respondents A-E are taken as an
example.

Respondent	Score	Statements			
		1	2	3	4
A	16	4	4	4	4
B	11	2	4	3	2
C	11	1	4	4	2
D	8	4	1	1	2
E	7	1	3	2	1
Of 5 highest		12	16	14	11
Of 5 lowest		10	14	11	11
Difference		2	2	2	0
D/5 ($\bar{X}$)		0.4	0.4	0.4	0.0

The average score of 5 highest for each statement
is taken and also average of 5 lowest. Their differ-
ences are also computed and their means taken. In
our example, statements 1, 2 and 3 have the highest
means and hence would be used in the final assessment
of respondent fatalism degree.

The mean score for all respondents given by
$\bar{X} = \dfrac{X}{12}$ is taken and used as a point of departure
for the chosen statements (of high internal consistency
picked as above). Those individuals who score more
than 1 standard deviation below the mean have low
degree of fatalism and those between the limits -
1 standard deviation and + 1 standard deviation have
average attitude towards whatever attribute. This is
how the frequencies shown in fatalism table for Mbooni
have been obtained.

For religiosity, three variables are considered;
frequency of prayer per day, orthodoxy, and frequency
of church attendance.

Unlike individual degree of fatalism,
individual degree of religiosity measured by any one
of these variables is hypothesised to relate
negatively to such measures of inequality as income
and levels of living.

It is also expected that disparities produced
by adoption behaviour, low incomes, low levels of
living will relate strongly to a people's degree of
religiosity.

Although such hypotheses have been tested and
confirmed elsewhere, the situation is not known for
Mbooni. It is the task of the following section of
the chapter to discover if the mentioned variables
relate and why.

So far in this section, the major issues
for testing have been discussed; the major variables
for which observations were made have also been
examined, in the light of the findings of the study
and existing literature.

In Part Two, correlation analysis is carried
out in an attempt to test the various hypotheses of
the study and to show what factors are more important
than others in determining innovation adoption levels
in Mbooni. Explanations between associations are
also attempted.

PART TWO

INTRODUCTION

In this section of the study, the following
three things are carried out:

First, an explanation of the relevant measures
and statistics used in conducting tests for the
hypotheses of the study will be given.

Secondly, each hypothesis will be tested on its
own, correlating its independent variable to the
dependent. Tests of association will be applied as
well as testing for the strength of this association
if it exists.

Thirdly, observations will be made for each
table and explanations attempted as to why associations
between variables exists or does not, why it is weak

or strong and how this relates to findings of other
scholars who may have conducted similar tests using
these variables.

Finally, a multivariate analysis for several
independent variables and levels of adoption in
Mbooni will be attempted, to show the relative strength
of each of these variables in determining level of
innovation adoption and therefore indicating which
factors dominate adoption levels.

The study has used three measures of association.
The chi-square (X^2), gamma (γ) and multivariate
analysis.

THE CHI-SQUARE (X^2)

In statistics, the chi-square is used to fulfil
the following two purposes.

One, to establish if a given distribution is
normal i.e. test the normality of a U-shaped curve;
and secondly to establish if a non-spurious association
exists between any two variables.

In the former, a curve representing a distri-
bution is considered normal if the observed X^2 is
higher than the calculated X^2 and vice-versa.

In the latter a chi-square establishes an
association between any two variables and also if that
association is significant at a given level of risk.

If for example one of the hypotheses of the
study asserts that there is an association between
a people's level of literacy and their level of
adoption of innovations, two issues could be put to
test by using x^2.

The null hypothesis (H_o) which claims an
association, and an alternative hypothesis (H_A)
which refutes this claim.

If through statistical treatment a calculated
x^2 of 15.376 at a significance level of 0.05 (5 per
cent) and 6 degrees of freedom (df), is obtained, then
the null hypothesis of association is accepted and
H_A of independence rejected, the reason being that
the calculated x^2 is greater than the observed x^2
at the given significance level. The results are
given as follows:

$$X^2(Cal) = 15.376 \quad X^2(obs.) = 12.592 \text{ (6 df,}$$
$$0.05$$

A chi-square only tells us that an association
between variables is significant, but does not tell

us if it is weak or strong, positive or negative. The
condition is met by the gamma measure of association.

THE GAMMA

Gamma measure applies in any size table and
tells us how much more we are likely to get like order
(agreement) or concordant pairs than unlike order or
discordant pairs in relations between variables shown
in a table. To illustrate the point, the following
hypothetical table is used.

Table 16:   Illustration Calculation of Gamma

	Level of Living				
Innovativeness (Degree of)	A	B	C	D	E
High	6	6	9	3	6
Medium	8	7	22	9	19
Low	2	1	6	6	9
Total	16	14	37	18	34

In this table, level of living is shown in
columns and degree of innovativeness in rows.

To calculate gamma (γ), one starts at the
left-hand top corner i.e. with figure 6, adds all
numbers to the right and below this figure and multiplies
the figure by 6. This is repeated for columns
B, C, D and E.

As there are no more numbers to the left after Column E, one shifts to the second row and starts with figure 8 giving the same statistical treatment to the figures. The sum of these products is labelled concordant pairs and is designated "S".

To obtain the discordant pairs the same procedure is repeated but this time starting at the top right hand corner and working to the left. The product then is labelled discordant pairs and designated "d".

Gamma (γ) is then given by the formula:

$$= \frac{s - d}{s + d}$$

The following is the actual computation of the gamma measure from the hypothetical case:

$s = 6(8 + 28 + 15 + 28) + 6(28 + 15 + 28) + 9(15 + 28)$
$$+ 3(28)$$

$= 1242$

$+ 8(1 + 6 + 6 + 9) + 7(6 + 6 + 9) + 22(6 + 9) + 9(9)$

$= 536$

$d = 6(15 + 28 + 8 + 10) + 3(28 + 8 + 10) + 9(8 + 10)$
$$+ 6(10)$$

$= 756$

$+ 19(6 + 6 + 12) + 9(6 + 1 + 2) + 22(1 + 2) + 7(2)$

$= 446$

$\begin{aligned} s &= 1778 \\ d &= 1202 \end{aligned}$

$\therefore = \frac{s - d}{s + d} = 576/2980$

$= 0.19 \qquad 0.20$

TESTING HYPOTHESES

Income vs. Level of Adoption

Income is one of the more profound measures of inequalities: by hypothesis it is positively related to individual level of innovation adoption.

In this study, this hypothesis is upheld.at a X^2 value of 30.1 significant at .01 level and a gamma value of 0.25 (see table).

Table 17:   Income vs. Levels of Adoption

Incomes: shs. per annum

Adoption Level	0-2400	2401-3600	3601-4800	4800
High	10.7	30.4	5.7	45.0
Average	45.6	43.5	62.9	15.0
Low	43.8	26.1	31.4	40.0
Total	100.1	100.0	100.0	100.0
Base	169	23	35	20

n=247

X^2(Cal) = 59.4 $>$ X^2 (obs) = 22.46 (6 df)
.001

γ = 0.25

By examining this table further it may be seen that 45.0 per cent of Mbooni farmers who fall in the high level of adoption category are also the high income earners, as compared with 40.0 per cent of those in the low adoption level who fall in this class.

Only 10.7 per cent of the high adoption level
fall in the low income category as compared with
43.8 per cent of the low adoption level farmers who
come in the same income group.

In Mbooni there is evidence to show that
adoption of certain practices on the farm for example
require cash as a necessary pre-requisite. This is
the case with for example the grade cow. While keepin
of graded animals is itself desirable as well as
being an indication of sophistication in farming, it
needs extraordinarily complicated and expensive
maintenance, i.e. fenced paddocks, purchased fodder,
spraying, greasing, etc. therefore requiring the
farmer to possess enough capital not only to purchase
the animal but also to maintain it.

It has also been noted that adoption behaviour
over time has had effect on income in Mbooni.

The argument here is that early adopters of
income generating innovations e.g. coffee have
tended to reap a pioneer benefit in terms of credit
and market advantage, since they come to the market
when the prices for the product in question are still
high. On the other hand, late adopters come to the
market when it is already glutted, prices low and

even some of them are barred from adopting such an innovation due to establishment of quotas that control production.

In the final analysis, it becomes a consequence of adoption behaviour that income differentials between the two groups become over-exaggerated in favour of the early adopters. Later, income may even determine capacity to adopt other innovations and to afford a certain level of living etc.

The other reason for dispairites is consequent upon the above argument.

It is the early adopter who usually has security that can win one a loan or any form of credit to improve oneself further.since the policy then is to give those whohave, the small farmer is again disadvantaged. With the shift by planners and extension force to concentrate on the small farmer, the advanced farmer approach has become less prevalent and there is at least the recognition that credit is essential to assist the small farmer achieve higher level of farming technology.

Cosmopoliteness Degree vs. Level of Adoption

With regard to cosmopoliteness degree, there is a positive correlation with level of adoption significant at 0.01 risk with a gamma value of 0.20 (see table).

Table 18:   Cosmopoliteness Degrees vs. Level of Adoption

Level of Adoption	Degree of Cosmopoliteness			
	Low %	L-Middle %	U-Middle %	High %
High	17.1	22.9	2.9	13.6
Average	43.4	43.8	55.1	35..6
Low	39.5	-33.3	42.0	50.8
Total	100.0	100.0	100.0	100.0
Base	76	48	69	59

n=25

X^2(Cal) = 14.79 $>$ X^2(obs) = 12.59 (6 df)

γ = 0.20

In a study done in Columbia (1969),[20] there was 0.546 zero order correlational value between cosmopoliteness and individual degree of home innovativeness. A zero order correlation of 0.44 was found between cosmopoliteness and individual degree of agricultural innovativeness at .01 level of risk.

In Rogers argument, peasants are less cosmopolite
than are more innovative individuals. This however
cannot be said of Mbooni farmers with such certainty.
By observing the figures presented across strata, one
notes that 39.5 per cent of the low adoption farmers
are highly cosmopolite, a figure that differs by
18.4 per cent from that of the high level adoption
farmers.

His argument (also supported by Learner) is
that low degree of cosmopoliteness limits the farmers
in their reach for innovations e.g. education.

As he argues:

"in less developed countries, the
necessary conditions e.g. roads and
public transport, are often non-
existent or at least not in very
good working order". (27)

Bisbee (1959) confirms this assertion when he
argues that:

"many villagers have no better
connections with their nearest town
or another village than a footpath
which even a donkey cannot travel,
in any but good weather. A peasant
in such an isolated setting has
little chance of becoming cosmo-
polite, the requisite means of
access are not yet developed". (28)

For Mbooni, this could hardly be the case.
Roads as well as buses exist. The situation is
usually that a major road cuts across the entire
area; it is passable at all seasons and footpaths
connect people to this road. Also with the pene-
tration of entrepreneurs into the rural areas, the
peasant has every chance of becoming cosmopolite.

Access to the nearest town is the other
factor. If the measure of cosmopoliteness is
frequency of visits to Machakos town, then everyone,
both in the low or high level adoption, is cosmo-
polite. This situation is generalizable to other
areas where the nearest town would be the case, e.g.
Kangundo or Tala for certain areas of Machakos.

It is no longer arguable that communication
means are not available to open up the rural areas
of Kenya to the outside world.

On the other hand, change agents are playing
a more and more important role in keeping people
in the rural areas informed, about the happenings
outside their immediate environment. There are
government extension agents, returned immigrants,
local entrepreneurs, who are actually the innovators
introducing not only new ideas to the rural people
but bringing material evidence to them.

It has also been noted that physical cosmo-
politeness is not really the key aspect in determining
level of adoption in an area like Mbooni. It is for
example possible to be widely exposed to the world
out of one's reach but never get there physically.
There are also innovative farmers who never have
been outside their environment but have simply
copied what the neighbour is doing. So if the multi-
plier effect is operational in Kenyan rural areas,
the case for lack of roads, buses etc. does not
arise.

All these factors do not minimize the
importance of being cosmopolite, but the importance
should not be overemphasized.

Contact with Extension Agent vs. Level of Adoption

Statistical evidence has failed to establish
strongly enough that contact with extension staff is
biased towards farmers with high level of adoption.
There is a X^2 value of 27.9 significant at .01 level
and a gamma level of 0.10.

For each category of extension officers,
there is almost uniform distribution within the
three groups of farmers (see table).

Table 19:   Contact with Extension Agent vs. *
                  Level of Adoption

Contact with Extension Staff

Level of Adoption	1 %	2 %	3 %	4 %	5 %	6 %	7 %	
High	16.2	17.9	20.3	19.3	21.6	26.7	13.9	
Average	33.5	56.4	46.4	51.5	31.4	43.3	31.6	
Low	30.3	25.6	33.3	29.3	27.0	30.0	54.4	
Total	100.0	99.9	100.0	100.0	100.0	100.0	100.0	
Base	142	117	69	99	74	60	79	n=64

$X^2(Cal) = 27.9 > X^2(Obs) = 26.22$ (12 df)

$\gamma = 0.10$

*(see appendix 4).

In extension literature, there has been a long
standing argument that extension officers tend to reach
only the "progressive farmer, and only rarely do they
see the 'lagging farmer'. This assertion is becoming
eroded although it may still be prevalent in certain
areas. There are reasons for this.

First, as a policy in extension service,
emphasis has shifted to the small farmer both in
terms of research and inputs e.g. credit aimed at
motivating the farmer. Secondly, traditional barriers
e.g. communication and blockades on small farmers to
grow certain crops, have been overcome. There are
more extension officers at the local level in every
part of Kenya's rural areas than ever were in the
country's extension history.

In recent times, the interministerial integrated
approach has eased the problem of individual ministries
reaching the farmer, by allowing other ministries to
share in the resources available in both planning and
rural programme implementation. Available extension
service has also been strengthened by other agents
outside government operating projects in the rural
areas e.g. missionaries and United Nations.

A glaring bottleneck in extension service
however remains concentration of resources e.g.
personnel, fuel and transport where they are not
needed most. This calls for decentralization.

It is also known that extension agents are
still thinly spread and this becomes an obstacle on
the way to reaching populations in difficult areas.
Techniques are still necsssary to strengthen the
capacity for the thinly spread extension force to
reach more farmers.

Finally, the extension force is poorly
trained as far as meeting the farmers needs is
concerned.

One of the problems noted with regard to
adoption levels in Mbooni is that farmers lack the

skills necessary to administer an innovation once
they have adopted it.

This situation cannot be remedied by an
extension force that is poorly trained. It may as
well be argued that to effect higher levels of
adoption in Mbooni, the extension agent as well as
the farmer have got to be trained.

Literacy vs. Level of Adoption

No association exists between literacy and
levels of innovation adoption in Mbooni (see table).

Table 20:   Literacy vs. Level of Adoption

Level of Adoption	Literacy by Ability to Read and Write			
	RW vernacular %	Swahili also %	English also %	None %
High	15.1	13.5	11.8	11.6
Average	53.2	59.6	41.2	42.0
Low	31.7	27.0	47.1	46.4
Total	100.0	100.0	100.1	100.0
Base	139	89	51	112

n=391

$X^2(Cal) = 11.08 < X^2(Obs) = 16.81$ (6 df)
                    .01

These findings run contrary to the findings
of Roling, Ascroft and Cege (1973)[29] in Tetu Division
of Central Kenya which show that individual literacy
level is associated with his degree of "progressiveness".
In fact they report that only 25.0 per cent of the
progressive farmers are illiterate.

The findings also refute those of Roger's
(1973)[30] who reports a strong correlation between
literacy and individual degree of innovativeness
among peasants in Columbia. Learner's findings in
the Middle East (1964)[31] which confirm that literacy as
a characteristic of "moderns" are negated. This
further proves the assumption that literacy is not
a key variable in determining individual degree of
innovativeness.

There are various reasons that could possibly
explain this state of affairs.

First, it should not be assumed that knowing
how to read will always expose the individual to
ideas that are useful and relevant to one's existence.
One may get exposed to new ideas through reading,
but they do not necessarily improve his level of
innovation adoption.

Secondly, even if such ideas were useful, one may not adopt them. This renders his level of literacy useless as far as his level of adoption is concerned. Literacy in this case becomes one of several factors that might affect individual level of innovation adoption, but not an important one as other studies tend to indicate.

Mass Media Exposure vs. Level of Adoption

Findings show that a negative correlation exists between degree of mass media exposure and level of innovation adoption (see table).

Table 21:   Mass Media Exposure vs. Level of Adoption

Level of Adoption	Media Exposure (Frequency)			
	Never %	Rarely %	Often %	Very Often %
High	7.4	5.0	25.9	20.5
Average	46.3	44.6	48.3	41.0
Low	46.3	50.5	25.9	38.5
Total	100.0	100.1	100.1	100.0
Base	54	101	58	39

n = 252

X^2(Cal) = 20.6 > X^2(Obs) = 16.81 (6 df)

γ = -0.15

This finding contradicts the one documented by Rogers (1973)[32] in his studies among the Columbian villagers. Here, he regards mass media exposure as

one of the critical pre-requisites of individual
innovativeness. He also notes that mass media exposure
is positively related to individual degree of inno-
vativeness.

In his study, he found a 0.819 correlation
coefficient with house innovativeness. This finding
is also confirmed by Learner (1964)[33] in his mid-
Eastern studies. He reports a positive correlation
between being a modern and mass media exposure;
being a traditional is negatively related to mass
media exposure.

In the Tetu study, it was discovered that
extension service, media exposure and material wealth
are all distributed in favour of the progressive
farmer.

Looking closely at the distribution of
farmers according to mass media exposure and levels
of adoption (see table) as many farmers in the low
adoption level get exposed to mass media often and
very often as do those in the high level adoption.
However only 5 per cent of those in high level
adoption get exposed rarely as compared with 50.5
per cent of low level farmers. 7.4 per cent never
get exposed as compared with 46.3 per cent low level
adoption farmers.

It should also be noted that the average
category of farmers have an almost uniform exposure
to mass media. The skewness noted with regard to
mass media exposure points to other critical commu-
nication and extension problems prevalent in the
rural areas.

One of the commonest and perhaps obvious
media is the radio. In the Tetu study (1972)[34]
79.0 per cent of "progressive" farmers had frequent
exposure to the radio media while only 49.0 per
cent of the "laggards" were in this category.
While only 21.0 per cent of the "progressives" had
exposure to radio media rarely, 51.0 per cent of
the "laggards" fall in this group.

There could be many reasons for the
consequences.

First, the cost of the device. It cannot
be assumed that in Kenya's rural areas the radio
is available to every average person. In the case
of "laggards" it could be lack of sufficient
funds, first to purchase the basics and then a radio.
As with most other possessions, this is not
particularly a problem among the progressives.
As has been noted quite often "progressives" happen
to be early adopters who pioneered adoption of cash

generating adoptions which enabled them to purchase many of their possessions including a radio.

It may be assumed that those low level adoption farmers who have exposure to radio media do so through sets owned by neighbours. For serious extension, this cannot be assumed to be significant means of communication.

The second problem has to do with means of communication. It is perhaps a familiar fact that most roads in the rural areas are seasonal. This means that critical services cannot reach these areas at certain seasons. Even if they can be reached effectively during dry seasons, there are delays e.g. depreciation of vehicles, that make all operations in the areas expensive and hinders continuation of services as required.

The other factor that might affect extension through printed media is the language in which they are printed. The assumption made in extension service is that Swahili is an understood language throughout the country. But for a majority of farmers, who cannot read vernacular, printed media in Swahili must be a bigger problem. On the other hand there is general lack of materials e.g. educational primas printed in local languages.

One of the most recent efforts to ease up the problem of reaching rural populations in local languages has been programmes such as the listening forums.

This programme has utilized the existence of women groups in the rural areas and produced cassette lessons on their felt needs in local languages. Group leaders have also been trained in techniques of cassette recorder operation as well as leadership skills. The ongoing effort is a pilot project pending replication to other areas.

Finally, the approach made to rural problems by extension officers does not indicate that the use of resources helps the situation.

Experience has shown that departments make their own approach to problems in the field instead of pooling resources e.g. transport and giving those problems an integrated approach. Their attempt to contact the local farmer fails because the farmer cannot bear the burden of meeting a new face everyday with a new message about different things all of which are meant to raise his level of living.

Of late, the integrated approach is revolutionizing communication, where the extension officers from various ministries plan together, approach the farmer together and give him an integrated message in a shorter time than would otherwise be the case.

Education vs. Level of Adoption

Figures on education do not establish association between one's level of adoption of innovations and his level of education (see table).

Table 22: **Formal Education vs. Level of Adoption**

Level of Education

Level of Adoption	No School %	Upto std. III %	Upto std. IV %	Upto std. VII %	Form II %
High	9.9	19.3	13.4	16.1	16.7
Average	39.6	52.6	55.8	38.7	50.0
Low	50.6	28.1	30.8	45.2	33.3
Total	100.1	100.0	100.0	100.0	100.0
Base	91	57	52	31	12

n=243

$$X^2(Cal) = 11.6 \; \angle \; X^2(Obs) = 15.5 \; (8df)$$
$$.05$$

This is not surprising particularly bearing in mind that a majority of farmers in Mbooni have upto standard seven level of education. This means that if indeed formal education was an important

determinant of adoption levels in Mbooni, the levels
of adoption already evident there would be low.

On the other hand, it should be noted that
adoption hehaviour, can over a long period of time
have dignificant fffect on distribution of not only
education, but also other basics of life in the area.

The hypothesis usually propounded here is
that it it those farmers with high adoption levels
who reaped pioneer benefits by adopting income
generating innovations e.g. coffee and were able
to send their children to school who later created
a new source of income for the family. This evidence
is not available in Mbooni but it may be expected
that impact to this effect will show in the future.
If then level of adoption of certain innovations
could affect education, it may also be said education
will necessarily be confined to those who can afford
i.e. those with high levels of adoption.

Table 23:   Levels of Living vs. Level of Adoption

Level of Adoption	Levels of Living			
	Low	L-Middle	U-Middle	High
High	10.0	10.8	11.5	27.5
Average	35.0	67.6	49.6	40.0
Low	55.0	21.6	38.9	32.5
Total	100.0	100.0	100.0	100.0
Base	60	37	113	40

N=25

$$x^2(Cal) = 26.1 > x^2(Obs) = 22.5 \text{ (6 df)}$$
$$\gamma = 0.11$$

As for levels of living, and levels of adoption
in Mbooni, the factors are positively associated.
Figures available (see table 23) show that there
are more farmers (55.0 per cent) of low level
adoption in the lowest level of living, than there
are of high level adoption (32.5 per cent). Likewise,
there are more high level adoption farmers in the
highest level of living (27.5 per cent) than there
are low level adoption farmers (10.0 per cent).

These figures seem to confirm unquestionably
the fact that high levels of living are a character-
istic of high level adoption group. Similar finding
was recorded by Rogers (1973)[35] in his study of
Columbian villagers. This should not however
obscure the inequality between groups that the above
figures reveal.

One reason why the above situation obtains
could be that people's level of living could have
depended on their incomes. If for a majority of
people this was limited, then it would be logical
to conclude that levels of living would be limited
too.

Secondly, levels of living in this study
were measured by possession of household material
items which every home expected to have, high level
of living was hypothesised to possess. Probably,
these items were too highly or too poorly rated
thus affecting the distribution of respondents
according to the actual living standards. It has
however been noted that those respondents who fall
in the lower steps of the scale are limited in terms
of type of house owned, fencing, water storage etc.
Mbooni evidence indicates that the basics e.g.
housing and food are comfortably available to only
a minority of people. To others, even subsistence
is not guaranteed.

If at the national level high level of living
is attributable to high education, high incomes and
possession of certain household items, then high
living level is a characteristic of the innovators
as well as the adopters of e.g. western education etc.
Innovativeness may therefore be argued to be a

critical determinant of inequalities in terms of level
levels of living.

Ecological Zones and Levels of Adoption

Ecology is believed to be one of the dominant
factors affecting levels of adoption of innovations
in Mbooni.

Statistics show that there is a strong positive
correlation of 0.3 gamma value between these factors
(see table).

Table 24:   Ecological Zones vs. Level of Adoption

Level of Adoption	Zones		
	Low	Middle	High
High	53.9	9.5	19.6
Average	14.7	43.2	47.1
Low	31.4	47.4	33.3
Total	100.0	100.1	100.0
Base	102	95	51

n = 248

X^2(Cal) = 48.94 $>$ X^2(Obs) = 9.49 (4 df)
γ = 0.30   .05

There are various reasons for this state of
affairs.

First, zones dictate to the dweller what crop
to grow. This means that farmers in the middle zones
may grow coffee but not those in the lower zone.
They rear graded animals since they grow fodder,
but not those in the lower zone. This in the final
analysis implies that upper zone farmers may get
incomes from these innovations but not those in the
lower zone.

The second reason has to do with mechanization
on the farm. In certain aspects, this is more
easily done in the lower than in the upper zone,
simply because of the flat nature of lower zone
topography as compared with hilly and rocky features
of the upper zones. This means for example, that
lower zone farmers can utilize ploughs, also tractors
etc. more easily than upper zone farmers.

The third factor is accessibility. Despite
the productivity of the upper zones, the terrain
makes it much more difficult to move the produce
than is the case in the lower zone. The areas are
sometimes inaccessible by heavy transporters or any
form of vehicle in the wet seasons.

This also affects accessibility by extension tone to farmers in the upper zone. Advantage of contact with change agents therefore may tend to favour the lower zone farmers.

Religiosity vs. Level of Adoption

Here, the intention is to discover, if those farmers in the low adoption level are also a frustrated group and hence the tendency to be religiously inclined.

For association between levels of adoption and prayer frequency per day, there is a negative correlation of -0.30 gamma value and a chi-square value of 24.3 significant at 5 per cent risk (see table).

Table 25:   Religiosity vs. Level of Adoption

	Level of Adoption		
Prayer Frequency Per Day	Low %	Average %	High %
4 times	15.8	13.3	3.6
3 times	47.4	56.1	44.0
Twice	31.5	15.3	16.7
Once	2.6	6.1	11.9
Never	2.6	9.1	23.8
Total	100.0	99.9	100.0
Base	38	98	84

n=220

$X^2(Cal) = 24.3 > X^2(Obs) = 15.51$ (8 df)

$\gamma = -0.3$

By further examination of the figures shown
in the above table it is seen that 15.8 per cent
of the farmers with low adoption levels have the
highest prayer frequency per day, as compared
with only 3.6 per cent of those in the high
adoption level.

In the same way, 23.8 per cent of farmers
with high levels of adoption never pray as compared
with only 2.6 per cent of the low level adoption
farmers who never pray.

It may then be argued that a high level of
adoption of given innovations goes with realization
of certain wants whereas low adoption is associated
with frustration and hence religiously inclined
tendencies.

When income levels are correlated to prayer
frequency per day, a gamma value of -0.4 is
obtained (see table).

Table 26:   Income Levels vs. Prayer Frequency Per Day

Prayer Frequency Per Day	Incomes (Shs. per annum)			
	0-2400 %	2401-3600 %	3601-4800 %	4800 %
4 times	9.3	6.3	0.0	11.1
3 times	39.2	56.3	57.1	83.3
Twice	28.4	18.8	0.0	0.0
Once	4.1	12.5	42.0	0.0
Never	19.1	6.3	0.0	5.6
Total	100.2	100.2	100.0	100.0
Base	194	16	7	18

$$X^2(Cal) = 35.4 > X^2(Obs) = 26.2 \ (12 \ df)$$
$$Y = -0.4$$

By observation, the above table shows that it
is not always the case that those in low income levels
will always show higher prayer frequency, than those
in the upper income levels. In fact if anything,
it is those in the higher income brackets who tend
to show the highest of prayer frequencies. For
example, 83.3 per cent of those studied have a prayer
frequency of 3 times a day; these are also the
high income group. This figure shows a tremendous
contrast with the figure 39.2 per cent for those
in the low income group who have the same prayer
frequency.

This state of affairs raises two important questions: one that querries the adequacy of prayer frequency as a measure for religiosity and the other that querries whether 4,800/- per annum is high income, that is sufficient to check one's frustrations, assist him realize his daily aspirations and hence save him from resorting to external control or even to prayer!

With respect to the latter querry, 4,800/- per annum works out to 400/- per month and there is no evidence that shows that this is enough income to maintain a family in the rural areas as far as the basics of life are concerned. Hence this situation does not save them from their frustrations, and they should hence pray as frequently as everybody else.

Fatalism vs. Level of Adoption

The aim behind testing for association between degree of fatalism and level of adoption of innovations is to find out if low levels of adoption necessarily encourage fatalistic attitude towards change and secondly to see if Roger's view that fatalism affects level of adoption can be upheld.

Statistics show that there is a negative association of -0.20 gamma value between these factors (see table).

Table 27: Fatalism vs. Level of Adoption

Level of Adoption	Degree of Fatalism		
	Low %	Average %	High %
High	0.0	2.1	5.3
Average	42.8	84.5	89.5
Low	7.1	13.5	5.3
Total	99.9	100.1	100.1
Base	14	193	38	n=245

X^2(Cal) = 20.2 > X^2(Obs) = 9.49 (4 df)
γ = -0.20   .05

A study of Columbian villagers (1973)[36] shows that significant negative correlation exists between degree of fatalism and what was referred to as modernization variables.

Literacy levels correlated to degree of fatalism by -0.33, mass media exposure -0.36, cosmopoliteness -0.214, agricultural innovativeness -0.27, and home innovativeness -0.396. These associations were significant at .05 X^2 value.

Here, the argument advanced is that adoption
of new ideas is in direct opposition to fatalism.
There is a tendency for people to be less fatalistic
as innovations, particularly income generating
ones, help a farmer realize some of his aspirations,
hence escaping frustrations, that are likely to lead
one to believe in fate.

Finally, it has been argued that attainment
of high levels of adoption could promote fatalism.
This is so because, attainment of such levels is
always accompanied by creation of unequal groups of
farmers, which means in the process a class of low
and frustrated adopters is created. This makes
it susceptible to fate.

In studies of innovations and equity in
Kenya,[37] it has been shown that three possibilities
are open to low level adoption farmers.

First, they can migrate to urban areas and
look for employment.

Secondly, they can remain in their respective
areas and work for successful farmers from whom
they can earn small incomes to meet their daily
needs.

Finally, they may resort to retreatist behaviour e.g. alcoholism, fatalism and crime.

The latter is becoming a more and more real alternative in the rural areas, and it is no longer just a question of assuming that farmers are originally fatalistic and difficult to change, but also that the very process e.g. adoption that is meant to improve them, itself leads them to fatalism, crime, etc.

Of all the factors examined in this section some are strongly associated with adoption levels and others not, while others are only weakly associated. But which of these is the dominant factor?

This question is answered by multivariate analysis, that is carried out between several of these factors and levels of adoption.

MULTIVARIATE ANALYSIS

In this mode of analysis, the effect of a given set of variables on a dependent variable is assessed for each one of them. It is possible to carry out a multivariate analysis of any number of variables (n).

There are two approaches to multivariate analysis.

The first takes into account three dichotomous variables and calculates if the Q (Yule's Coefficient) measure significantly differ from each other, between any two of the variables when worked out for a known dependent variable.

A good example of this mode of analysis is Leo A. Goodman's analysis[39] of three dichotomous variables (work satisfaction, social approval and sex). He found out that Q's differ significantly for the variables. Since, this method deals with only three variables, the concern of the study is with the second mode of analysis that can deal with any number of variables.

The assumption governing the second mode of analysis is that when using cross sectional data to analyse the effect of several independent variables upon a dependent one, a coefficient that expresses the amount of relation of each variable to the dependent is obtainable.

The usual procedure in multivariate analysis is to tabulate the data and examine the percentages in the dependent attribute in the various classifications.

The first consideration to take into account
is to decide what states the dependent variable
falls into.

For example any dependent attribute taken
to be dichotomous has two states: states 1 and 0.

If in a study a farmer's level of adoption
was being determined, then having high level of
adoption is state 1 and having a low level is
state 0. In the same way if the study is trying
to determine who of the farmers wishes to make use
of credit facilities and who does not, the wish
to make use of credit facilities is state 1 and
the latter state 0.

In a 2 x 2 x 2 contingency table, each
cell that bears a positive (+) relationship with
any of the variables in question is labelled to
reflect the relationship with whatever variable is
concerned.

If on the other hand a variable bears a
positive relationship with more than one variable,
it is so marked to show this relationship.

Taking as an example level of adoption
in Mbooni as the dependent attribute, in addition
to education, income and age as the independent
variables, the following illustration is used
to demonstrate how the effect of each of the
independent variables on the dependent is shown.

To start with, level of adoption is taken to
be in each of the two states: high level of adoption
state 1 and low level state 0.

In the following diagram Table A represents
state 0 and Table B state 1 of the dependent attribute.

A.　　　HIGH EDUCATION　　　　　B.　　　LOW EDUCATION

	AGE				AGE	
	H	L			H	L
H	$P123^1$	$P13^2$		H	$P23^5$	$P3^6$
INCOME						
L	$P12^3$	$P1^4$		L	$P2^7$	P^8

In this illustration, education is labelled
variable 1, age variable 2 and income variable 3.

In Table A, cell 1 the cell is positively
related to all the variables so it is labelled P123.

Cell 2 to variable 3 only, so it is labelled   P13

Cell 3 to variable 3 and 1 hence P12

Cell 4 to variable 1 only hence P1

In table B

Cell 5 to 2 and 3 hence P23

Cell 6 only to variable 3 hence P3

Cell 7 to variable 2 only hence P2

Cell 8 to no variable so it is labelled only P

If now we mark variable 1 a_1 for attribute 1 and variable 2 a_2 for attribute 2, and variable 3 a_3 for attribute 3, for each attribute, the following equation is deducable:

$$a_1 = \tfrac{1}{4} \ (P23 - P123) + P3 - P13) + (P2 - P12) + (P - P1)$$

$$a_2 = \tfrac{1}{4} \ (P123 - P13) + (P12 - P1) + (P23 - P3) + (P2 - P)$$

$$a_3 = \tfrac{1}{4} \ (P123 - P12) + (P13 - P1) + (P23 - P2) + (P3 - P)$$

The entire equation for each attribute is divided by 4 to reflect the effect of each cell and also of number of comparisons for each attribute.

If the cells were filled with frequencies, a_1 would represent the effect of education on levels of education, a_2 effect of education and a_3 effect of income.

When these frequencies are added, they usually do not total up to 1. There are reasons for this.

The first reason is that there is bias or error made in placing respondents in the correct category of an attribute or any of the two states mentioned.

The error made in placing them in state 1 is labelled r and is referred to as the random shock towards being in high level of adoption.

This is calculated by using the following mathematical expression:

$$r = \tfrac{1}{4} (2P + PL + P2 + P3 - P123)$$

The error associated with the decision to place the farmers in state 0 is labelled s and can be calculated by making use of the knowledge that $(a_1 + a_2 + a_3 + r) = 1$, therefore $s = 1 - (a_1 + a_2 + a_3$
$s = 1 - (a_1 + a_2 + a_3 + r)$.

In the study done by Stouffer on the American soldier,[38] soldiers were asked if they wanted to use their civilian skills in the army or outside. Less

than half said they would prefer to use these skills
in the army.

Among the independent attributes that were
examined to try and account for this response were
army rank (non-coms vs. privates) age (25 or 25)
and educational background (Grade or High School).

The findings when the multivariate analysis
was attempted were that education contributed 0.125
effect on the dependent variable, age 0.10 and army
rank 0.Q10. Random shock for r was 0.330 and s
0.435. In this case none of the factors dominated
and in fact much of the variation was unexplained.

In this study, six independent variables:
income, ecology, exposure to mass media, cosmopoliteness,
fatalism and literacy were correlated to the levels
of adoption in Mbooni with the following results:-

	Attribute	Effect
1.	Effect of Income	0.34
2.	Effect of Literacy	0.0084
3.	Effect of Cosmopoliteness	0.0075
4.	Effect of Ecology	0.2500
5.	Effect of Mass Media	0.0050
6.	Effect of Fatalism	0.0450
	Total	0.6484
	Unexplained variations of r and s	0.352

From these computations, the following can be said:-

(a)   There is an unexplained effect on the dependent variable of 0.352. This must then be the combined effects of other factors not included in this analysis.

(b)   Income level clearly comes out as the factor that dominates levels of innovation adoption in Mbooni.

(c)   Ecology follows with an effect of 0.25.

(d)   Fatalism has 0.045 effect, following ecology with literacy cosmopoliteness degrees and mass media exposure following in that order.

Income levels and ecology are then the factors that predominate in distribution of Mbooni farmers according to levels of adoption and are hence the factors that frustrate the use of the normal curve to categorize the farmers according to 'progressiveness degrees'.

CONCLUSION

Of the entire chapter, the following may be
said:-

(i)   The normal curve cannot be used to categorize
        farmers according to their degree of progressive-
        ness: A scale is more effective.

(ii)   Income levels and ecology are important
        factors determinig levels of adoption in Mbooni.

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CHAPTER FOUR

CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

At the inception of this study, it was intended to examine the factors affecting adoption levels and how adoption levels relate to inequality between groups of farmers.

Now the following major conclusions may be drawn:

(i)   Adoption levels will be affected by a variety of factors;

(ii)   A few of these factors dominate;

(iii)   Adoption levels of farmers cannot be measured by a normal curve.

FACTORS AFFECTING ADOPTION LEVELS

(1)   Educational and Literacy Levels

Education does not play an important part in determining adoption levels. This has been shown in the previous chapter.

It can in fact be argued that high adoption
levels can be achieved by a community of farmers
with minimum formal education levels. This is the
case in Mbooni and is likely to be in most other
rural areas.

A majority of farmers in Mbooni have upto
standard seven formal education; if indeed adoption
levels were dependent on formal education, the
levels of adoption evident in the area sould still
be low.

This state of affairs should, however not
conceal the role of formal education in promoting
literacy in an area.

There is evidence that shows that one's
literacy capability increases with the number of
years spent in school receiving formal education.
Gray (1956)[1] for example points out that a minimum
of four years is required for an individual to reach
and maintain literacy. It is perhaps common
knowledge that one of the earliest acquisitions of
an individual who enters a formal education system
is the ability to read and write.

Literacy on the other hand has been
associated with one's level of adoption as observed
by Rogers (1973).[2]

In this study however, it has been shown
that the literacy level of an individual is not
related to his level of adoption.

A conclusion may therefore be drawn that not
always will one's level of literacy be found in
association with his level of adoption. This further
establishes the fact that literacy is not a
necessary condition for technological change. It
can in fact be argued that technological change
can occur with the slightest of literacy level in
a community or even none at all.

This finding contradicts classical findings
e.g. that of Roger's (1973)[3] that level of literacy
is a strong correlate of individual "degree of
innovativeness".

It should however be noted that the
finding only indicates that the factor literacy
level should not be over-emphasized in studies
related to adoption levels, but not that it is
unimportant.

In the case of an individual farmer, ability
to read for oneself increases his ability to make
use of educational materials e.g. primers, without
necessarily depending on available extension force

for similar knowledge. This situation makes
easier the attempts of extension agents in reaching
the rural families. The farmer also gets exposed to
new ideas having to do with his immediate external
environment.

Finally, a few issues having to do with
an individual's literacy level remain questionable:

The first is whether literates do make use
of their skills. There is evidence to suggest they
do, as noted by Villaume (1974).[4]

The second one is more critical and poses
the question whether what they read contains useful
information or even the type of knowledge that can
help them develop a favourable disposition to
change. These two must remain research possibilities
for the future if the full impact of literacy in
rural development is to be assessed.

(2)   Mass Media Exposure

Documented evidence has shown mass media
exposure to be one of the critical pre-requisites
of the process of technological change.

In this study, a positive correlation between
mass media exposure and one's level of adoption was

found. This case is only true for Mbooni. Although
it cannot be generalized to other rural communities
of Kenya, the following could be inferred:

(a)   Mass media exposure can be expected to play
        a more and more important part in bringing
        about technological change in Kenya's rural
        areas particularly when the limited size of
        the available extension force and its poor
        training at the farmer level is borne in
        mind.

(b)   Mass media techniques themselves are becoming
        highly developed and more and more applied
        to communication efforts in social change
        in the rural areas. Benefits derived from
        such techniques are likely to benefit entire
        communities that come into contact with then
        wherever they might happen to be in the
        country.

(c)   A few members that happen to be exposed to
        mass media of communication in a community
        tend to disseminate their knowledge to others.
        Thus as mass media techniques multiply
        their effect, those reached first, may be
        assumed to reach many more by using similar
        media techniques or interpersonal channels.

In rural areas as elsewhere, a lot of decision
making depends on information available to the farmer.
This, one acquires through a combination of sources
and channels that are not usually experienced in an
urban setting. A farmer may for example get his
information through word of mouth, a "baraza"
through his co-operative society etc. These are
common channels in most farming communities in
Kenya. Electronic media for example the ratio are
also common with printed media the least common.
This is mainly due to literacy levels, that have
already been discussed. A farmer can only make use
of printed information if he can encode as well as
decode the written messages for himself or if there
are enough readers in the community to do so. This
usually is not the case.

It is therefore one kind of media that is
the informal one, that will continue to be critical
in determining one's level of adoption, as compared
to printed media that farmers cannot utilize ful
until a certain level of literacy is acquired in
Kenya's rural areas.

(3)   Geographical Mobility (Physical Cosmopoliteness)

Geographical mobility will be associated with
levels of adoption but only weakly.

Geographical mobility has been equated to
degree of cosmopoliteness of an individual and
measured by one's frequency of visits to towns. The
assumption here is that following the western experience,
urban centres are argued to be the source of new
ideas and hence by frequent visits to them one may
gather certain ideas, adopt them and if put into
practice, change his life.

The important factor about geographical
mobility is that one is able to see for himself and
could replicate his experience and decide to change
his way of life. It is not just the frequency of
visits to a town that would show one's openess
to ideas, otherwise everybody goes to town but not
necessarily to acquire any idea that is likely to
be useful to his life. As shown by the findings
of the study, both low and high adoption level
farmers have a high degree of geographical mobility.

Here, it should be pointed out that frequency
of visits to towns turns out to be a poor measure of
one's degree of mobility, and also that geographical

mobility is not a seriously critical factor in
determining adoption levels since many people are
physically mobile but not necessarily innovative.

There are various reasons for this:

First, geographical mobility is not a
comprehensive measure of one's openness to new ideas,
since it is known that apart from being physically
mobile one could be mentally cosmopolite. This
quality is usually denied subsistence farmers.

However, according to this study, it is
as much their property as that of anybody else.

Classical scholars of peasantry e.g. Learner
(1959)[5] may have been right to argue that peasants
are characterized by low degrees of geographical
mobility since most areas were not opened up.

Today however, one must take such a finding
with a pinch of salt since a few occurences within
the last two decades have turned the balance and
still continue to do so. These are such factors
as mass media, road network and the impact of
extension agents.

Thus views such as those of Bisbee (1951)[6]
that:

> "many villagers have no better
> connection with the nearest town
> than a footpath which even a
> donkey cannot travel in any but
> good weather..".

are proved by this and other studies not only invalid
but eroded by time and advance in technology.

There is a second reason why one's frequency
of visits to towns is a poor measure of one's degree
of mobility. It is not necessarily the case that
those ideas that one acquires in towns are useful
or meaningful to his everyday living back in the
rural areas. Often, it is the opposite. A visit
to town could mean a host of things; one could for
example squat in town without employment, and
perhaps end in deviant activities or could also
take to his community ideas that are not compatible
with the way of life in the rural areas thereby
introducing an undesirable consequence on society
e.g. drug taking etc. Such are unintended conse-
quences of one's visits to towns, which one must
bear in mind when trying to assess the value of
geographical mobility. This is often not the case.

On the other hand, there are reasons why
one's degree of mobility should relate to his level
of adoption of innovations.

New ideas are known to emanate from
without a social system more often than they do from
within a system. In an area like Mbooni and other
areas of Machakos, income generating innovations
e.g. growing of coffee, keeping of graded animals
etc. came as new ideas that had their root from
without the Mbooni community.

If Mbooni was not the first area to grow
coffee for example, and another area e.g. Nyeri
grew coffee earlier, then through physical mobility,
news of coffee growing could have been brought to
Mbooni, by those who went, saw and brought the
idea back to the farmers of Mbooni. If those who
travelled outside Mbooni did not share the idea
with the rest of the farmers, then it means they
would be at an adoption levelwhere the rest of the
farmers were not. Later on when the farmers adopt
similar innovations, they would be late comers and
unlikely to reap the benefits that accrue to such
innovations as keeping of grade animals or growing
of cash crop.

If contact with the world outside one's
environment means openness to new ideas, some of
which can change an individual's life, then it can
be inferred that geographical mobility provides such
a chance and hence affects an individual's level of
innovation adoption.

(4)   Ecology

In the previous chapter, it was shown that
the distribution of farmers according to innovativeness
degree does not follow a normal curve. It was
therefore argued that a few factors must dominate
adoption levels in the area. One of these factors
turned out to be the ecological zones.

The study therefore concludes that ecology
must affect adoption levels in whatever part
of Kenya is being considered.

As has been noted in chapter Two, the
lower zone is mainly flat with soils that favour
growing of such crops as tomatoes, cotton, fruits
and maize.

The flat nature of topography implies that
mechanization of the farm could be done much more
easily here than on the upper zones. The plough

for example, is an implement that is applied much
more easily in the lower than in the upper zones.
In the mechanization scales done for Mbooni for
example, the wheelbarrow and the tractor appear
as items possessed by the higher level adoption
farmers.

In terms of crops, the upper and the middle
zones have the advantage of having the proper
climates to produce cash generating crops e.g. coffee.
The lower zone is only suitable for the crop tomato
as a cash crop whose dependability as a cash
earner is controlled by availability of water which
is rather scarce in Mbooni.

This means that income differences occur
between the farmers of the lower zone and those
of the upper zone due to ecological contrasts.

In fact it is on the upper zone that the
farmers have founded co-operative movement, around
both the cash crops i.e. coffee and livestock,
particularly the grade animal. These co-operatives
are much rarer in the lower than in the upper
zones. Since they are both service and profit
organizations, it means that only farmers of the
upper zone enjoy these services as well as flow of
incomes quite contrary to the situation in the lower
zone.

(5)   <u>Income Levels</u>

This has been shown to be the number one factor determining adoption levles in Mbooni. This is shown clearly by the sequence of items on the scale. The scales for the area show that there is a tendency for farmers in the high adoption levels to possess implements that are more capital intensive than those in the lower adoption levels.

The implements that characterize the high level adoption farmers with regard to farm mechanization are wheelbarrows, tractors, fence, water tanks and the like. This is as opposed to the tendency by the low adoption farmers to adopt the basic tools whose adoption portrays low cash demand in their purchase. Examples of such tools are the "panga", "jembes", storage crib.

A conclusion may therefore be drawn that income is instrumental in determining what innovations a farmer adopts, a factor that further affects what earnings a farmer realizes from his innovations, which further affects equity in an area.

(6)   Contact with Extension Staff

The study has shown that contacts with extension
staff is well balanced between the high and low level
adoption farmers. This is contrary to the long
standing extension notion that extension officers
only see the 'progressive' farmer and only rarely do
they see the "lagging" farmer.

It may then be argued in conclusion that
emphasis must have shifted from the progressive to
the small farmer both in terms of research and inputs
e.g. credit aimed at motivating the farmer. It
may also be implied that traditional barriers e.g.
communication and blockades on small farmers to
grow certain crops have been removed. Integrated
approach has also played its role in pooling
together the efforts of various extension agents
and reaching the rural families with an integrated
message but about various aspects of family life.

It should however be noted that there have
been problems and a conclusion must be reached with
regard to these.

First, there is, from Mbooni experience
a concentration of resources e.g. fuel, transport etc.
where they are not needed most. This is the likely
situation throughout the country.

Secondly, the extension force is poorly
trained, particularly at field level. For example,
those with higher qualifications are concentrated
in the higher levels of hierarchies, while in fact
their services are most required at the farmer level.

(7)   Levels of Living

There is association between individual
level of living and his level of adoption for Mbooni
farmers. Although it can not be said with certainty
that level of adoption of an individual is influenced
by his level of living, there is higher probability
that vice versa is true.

In an earlier chapter it was shown that one's
level of living corresponds with what he realizes
everyday as opposed to standard of living which
corresponds with his expectations. If the two are
not equal, then there is dissatisfaction. One way
of reducing this dissatisfaction is to urge the
disgruntled to adopt innovations, particularly
income generating, from which they can derive
benefits that can improve their lives.

This means that as an individual adopts more
and more innovations, one acquires a higher adoption
level and at the same time raises his level of

living. This seems to be the case in Mbooni and is
likely to continue.

(8) Religiosity

A conclusion, with regard to this factor may
be reached that it will be negatively associated with
adoption levels in Kenya. This is the case for
Mbooni.

It has been argued that, those farmers
in the lower adoption levels in most rural areas
of the developing world resort to religion because
they are unable to meet their daily needs and hence
believe that they are not accountable for their
destiny, but somebody else is.

Higher levels of adoption, higher incomes
etc. are argued to help an individual realize one's
goals, while the contrary is true, for those in
lower income categories. They must necessarily continue
pacifying their motivation by resorting to external
control.

Now if religion is there as an alternative to
an innovation, then it can hamper adoption behaviour
and prevent a farmer from benefitting from such an
innovation, if he believes that his well being is

determined, not by benefits accruing to an innovation but by an external force regulating his existence.

It should however be noted that at other times, religion has been used to justify the favourable outcome of an innovation. For example for a good yield of a crop etc. It could perhaps be more usefully applied to justify other success in the process of adoption e.g. showing that it is God' wish for a farmer to adopt income generating innovations and to use the accruing incomes to improve himself etc. In fact a people's religiosity could be utilized to their advantage if it is integrated into other development efforts being made to improve the rural farmer. This point is elaborated later as a recommendation.

(9)   <u>Fatalism</u>

Fatalism has often been found in direct opposition to levels of adoption of a community of farmers.

There is a tendency for people to be less fatalistic as innovations, particularly income generating ones, help a farmer realize some of his aspirations, hence frustrations that are likely to lead one to believe in fate.

Although high levels of fatalism are still prevalent among rural farmers, there is an equal awareness of usefulness of adopting an innovation, and this could be predicted to continue in rural areas in the future.

The disturbing factor however is that attainment of high levels of adoption by a small section of farmers, seems to continue perpetuating fatalism. This is so because, hand in hand with higher levels of living, higher incomes, etc. goes the creation of a frustrated group of farmers who are susceptible to notions of fate.

However, it does not mean that fatalism acts as a barrier to adoption of innovations since highly fatalistic farmers are known to change their outlook and adopt new ideas as fast as those deemed less fatalistic. It is hence not harmful to be fatalistic as long as one sees the need to adopt an innovation that in the final analysis might give him what he originally believed was the concern of fate.

Adoption Levels and Inequality

Evidence presented in this work shows that
adoption behaviour of a group of farmers could
enhance inequality between them. For Mbooni this is
true and the same could be concluded to be true of the
entire country. There are various reasons for this
state of affairs.

The main reason for this is that an
innovation of whatever type e.g. agricultural is
never adopted at the same time by members of a social
system. Some members adopt earlier than others and
with every other innovation that they adopt, they
accumulate benefits as compared with farmers who have
either adopted a few innovations or none at all.
Thus, such farmers acquire higher levels of adoption
than those others in the same community.

These factors are the pioneers and enter the
race for innovation adoption earlier than anybody
else.

The obvious consequences of this is that
they reap the pioneer benefits that accrue to the
adoption of a particular innovation. As a case in
point, adoption of coffee as a cash crop in Kenya
is considered.

Those farmers who adopted the crop in the
early days i.e. when it was declared a crop manageable
by African farmers, entered the market at a time when
the demand for the crop was high unmatched by supply
and prices were high.

As a result, they were able to earn considerable
incomes from their crop, some of which they re-invested
e.g. in income generating innovations like keeping
of graded animals and the rest in self improvement.
They were for example able to send their children
to school, construct themselves permanent homes, etc.

Due to the demonstration effect of these few
farmers, other members of the social system were
motivated to adopt the innovation with the effect
that supply of the coffee crop to the available market
exceeded demand. Consequently, the late comers
gluffed the market therefore slashing the prices to
a point where it was no longer economical or
gainful to continue growing coffee. The late adopters
therefore reaped no benefit from growing coffee.

Today, it is such small differences in
adoption behaviours that seem to account for
inequalities that are prevalent among members of
Kenya's rural communities, in terms of education,
incomes, land size, etc. It is those who entered

the race earlier who have and continue to get more
while the late comers tend to loose even what they
have.

A factor like income, has a loopsided
distribution in Mbooni and is skewed in favour of high
level adoption farmers. This could be concluded
to be the case for the rest of Kenya's rural areas.

Although higher levels of adoption for
Kenya's rural farmers is desirable, the inequalities
that are consequent upon adoption behaviour should
not be overlooked.

Quick acquisition of higher levels of living
here is perhaps dependent more on the ability of
planners to control inequalities rather than on their
ability to advance one section of a community and hope
that the advanced will pull the less fortunate out
of their miseries.

RECOMMENDATIONS

(1)   Adopt Problem Solving Approaches in Rural Development

In everyday living, man spends most of his time solving problems that face or threaten his existence. This is usually so because he is usually deficient of certain requirements that are deemed essential for living. What he realizes everyday for example differs from what he wants,

To solve such problems, he follows certain steps that may generally be said to be theoretically characteristic of every man.

First, he tries to understand the problem and to define it in such a way that he is quite clear of his wants as well as the actual situation that faces him.

Secondly, he identifies those factors in the environment that create the problem that he faces and which are likely to help him achieve his objectives if manipulated.

After these two steps, man attempts to choose as appropriately as possible that combination of thought and technology that will enable him to

manipulate the factors in his environment that will
bring him results.

Following this he will go into action to
implement his decisions and to find out what aspect
of his self designed strategy is effective, he then
acquires means by which to confront the problem
wherever it may arise; should he on the other hand
fail, he will either modify his approach or drop
it entirely and try another model.

This pattern of individual approach to personal
problems has been modified to constitute what has
generally come to be known as "problem solving research"
at community levels.

Problem solving research aims at solving
social problems by developing workable models which
a practitioner may not only use, but replicate
wherever a similar problem for which the model is
developed occurs. Thus the goal of problem solving
research is not to acquire knowledge that improves
theory but to gain knowledge that can improve some
farmer's life. This is the type of research that
this study recommends.

At community level, the problem solving
research has been shown to involve four different

groups of people; the researchers, the practitioners policymakers and the community.

According to a theoretical model developed by Roling (1974),[4] the researcher begins his work at the society level where a problem is believed to exist. At this level, the researcher identifies and defines the problem.

In the next stage, the researcher concentrates on policy objectives, mainly dealing with the policy-makers, so that he clearly understands what regulations guide the policymaker in seeking solutions to the problem in question.

From here, the researcher usually acquires permission to examine the community in question and tries to identify those factors that are likely to help account for that problem, and which both the policymaker and the community may finally manipulate, to solve the problem.

At this stage, the researcher compiles his findings about the community and presents them to both the community and the would-be practitioner. Here, the findings are supposed to be discussed and a rough strategy formulated with the aim of affecting the dependent variable.

In the stage that follows, the strategy formulated is implemented mainly by setting up a pilot project so that the model designed is tested. It is at this stage that the model is monitored, questions answered as they arise and the adjustments of the strategy carried out.

Evaluation then follows. This stage mainly involves presentation and discussion of results and repetition of implementation if necessary. Dissemination and replication usually go with this step, since it is here that the researcher is able to tell the success or failure of the designed model in problem solving. It is also at this stage that the policymaker, now having an effective tool to treat social problems makes a decision to apply the model wherever such a problem occurs.

The problem solving research recommended here does not claim to be foolproof, but it seems to be the only logical way that will save research findings from redundancy and uselessness to action oriented programmes in the rural areas.

(2)   <u>Use Alternative Techniques to Normal Curve in</u>
        <u>Classification of Farmers in the Rural Areas</u>

The normal curve has been used by classical
scholars of diffusion studies to categorize farmers
into "progressives and laggards". However, this
technique has been proved inapplicable in situations
where a few factors might dominate a distribution.

It is, hence in this light recommended that
alternative techniques for classifying farmers e.g.
scaling, should be tried out more and more so as to
up-date such techniques to enable future researchers
to approximate reality more accurately. The
technique is explained and used in page   of chapter
Three.

(3)   <u>Examine More Factors to Explain Technological</u>
        <u>Change</u>

The factors examined in this study are
not exhaustive as far as explaining adoption levels
is concerned. Others like education and income
distribution need deeper analysis.

The study then recommends, a study of
additional factors as well as more comprehensive
examination of those already researched. This will
help confirm what factors are more closely related

to adoption behaviour and refute those others that
have been put forward by other scholars and which
in fact are not seriously related to adoption
behaviour of farmers in a rural setting.

(4)   Conduct Research Aimed at Eroding Criticisms
             Levelled at Social Science Research

There are two criticisms that almost every
research can satisfy.

One that blames social science research for
conducting academic surveys to improve theory only
and the other for measuring or studying variables that
are not manipulable and cannot be used in an action
programme. Although it is academic to improve
theory, it is also useful to acquire knowledge with
which we can change a farmer from one state of being
to another.

A research that allows us to do this is hence
recommended.

(5)   Examine the Potential of Using Religions
             Groups for Change

There is no society that is without religion,
or religious institutions. Mbooni is no exception.

Although it has been shown that religion can
at certain times impede change, it is not always the
case and it is recommended here that chances that
exist for applying it to useful change, should be
exploited. A few examples are mentioned.

First, religious institutions can be a useful
channel through which to reach masses of people,
particularly in the rural areas. Some institutions
even have media, both electronic and inter-personal
as well as printed which are all used to propagate the
gospel. Their use should be diversified to supplement
whatever efforts are being made to change people's
lives in the rural areas.

Secondly, religious institutions can play an
important role in training and producing change agents
who then become carriers of development messages.
There are institutions that produce bishops, priests,
nuns etc. but who are not properly equipped to
propagate social change in the rural areas.

Such institutions instead of raising scholars
ill equipped for development should specifically train
them as change agents who know something about
research, statistics planning and the like. Since it
is known that religious institutions have been
accepted by the common people more than anything else,

they should be used to fill the extension gap that
is known to exist because the government cannot afford
to recruit more extensionists.

(6)   Use Non-formal Education and Functional Literacy
           in Changing Adoption Behaviour in Rural Areas

        The hopelessness of formal education in
provision of basic skills to an individual, with which
one could make a living, has been severally exposed
through scholarly undertakings of all manner.

        Non-formal education has gained in importance.
This trend should continue through:

(a)   Need identification of rural communities.

(b)   Programme mounting to meet such needs.
        This step particularly calls to social
        scientists to make policy recommendations
        that are based on experimentation if their
        efforts are to continue being relevant in
        satisfaction of rural needs.

(c)   Strengthening of functional literacy efforts
        in the rural areas. This approach should
        pay particular attention to the following:-

      (i) Whether those who acquire the
           skills of reading and writing
           actually use them.

It is a common practice in the rural areas
to find that those who claim to have acquired
the skill of reading cannot do it well because
they do not get access to materials that
enable them to practice and to become
confident readers. This kind of literacy
cannot benefit the reader.

     (ii) Whether the materials made
           available to readers in the rural
           areas contain information that is
           relevant to their everyday experience
           or even to development. If not, it
           then means that what is read in the
           rural areas is unlikely to contain
           any idea that can change the lives of
           rural dwellers.

(d)   Continued training of the extension force,
        that is in daily contact with the farmer.

        It is a known fact in Kenya's extension
        structure that the lower echelon extension
        workers are poorly trained and also that those

best trained are placed at levels where they
are needed least and at a distance from the
problems they are meant to tackle.

Greater concern should be made to re-allocate
this know-how and to pay greater attention
to training of field extension force at
farmer level.

(7)   <u>Emphasize the Small Farmer Approach, Which Seems
        to be Gaining in Importance Over the
        Progressive Farmer Approach</u>

Two factors are important here:

(a)   The planners concerned with the progressive
        farmer approach, and

(b)   The extensionist bias towards the same farmer
        in terms of service provision.

The findings of the study show beyond doubt that we
are dealing with a farmer who has a small income, poor
exposure to media, limited land resources, etc.

In view of this, emphasis must necessarily
continue to shift from the progressive to small farmer
approach by specifically following some of the
recommended strategies, for example:

(a)   Advance of credit to small farmers so that they
        can afford to adopt innovations that are income
        generating.

(b)   Training in practices associated with new
        techniques that may increase a farmer's
        income through farming.

(c)   Establishment of reasons for selectivity of
        extension workers and therefore training
        them to appreciate the importance of approaching
        the small farmer in the same way they would
        do with the progressive farmer.

CONCLUSIONS

In conclusion, this study has attempted
as far as is academically possible to jump the barriers
it set itself. By so doing, it has exposed itself
as a target for academic archers, to be criticized and
used as a ground for further inquiry to advance the
existing knowledge in social science.

Above all the study has made certain
recommendations that emphasize the importance of
going beyond the traditional research practice and
build models that not only improve theory, but also

give social scientists knowledge with which they
can change the life of a people.

Footnotes to Chapter Four

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Good Day. As you may already know, I am one of the officers
working on Mbooni Integrated Rural Educational Project.
Some time back, government officers working on this project
went round Mbooni collecting information on families like yours.
That information was used in developing a curricula for use in
training farmers at the Centre.

As you probably helped us last time we would be grateful
if you could respond to a few questions answers to which will
help in the development of Mbooni.

NAME: .... SUBLOCATION: ....

A.1

    (a) Sex (tick) Male...... Female......

    (b) Age ......

    (c) Marital Status:

Single	Married	Divorced	Widowed	Other (specify)

Q.2

    (a) How big is your land? .... acres/hectares

    (b) Other pieces ....

Q.3   From where do you get your water for home use?

	Spring	River	Tap	Well	Tank	Other (specify)
Dry Season						
Wet Season						

Q.4   Have you ever grown/kept on your farm any of the following?

Hybrid/ Katumani	Coffee	Grade Cows	Tomatoes	Cotton	Passion Fruit	Macadania
Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
If yes, year began	19	19	19	19	19	19

Q.5   When started:

Cattle Dipping	Hand spraying	Fodder feeding	Fencing	Using A.I.	Paddocking	Report Diseases
Year	19	19	19	19	19	19
Still doing						

Q.6

Has on Farm

	W.Barrow	Cutter Pliers	Tractor	Spray pump	Fork jembes	Rake	Ox Cart	Bicycle
	Yes/No	Yes/No	Yes/no	Yes/no	Yes/no	Yes/no	Yes/no	Yes/no
Year Began	19	19	19	19	19	19	19	19

Q.7

Did any of the following staff visit this farm since this time last year? (Tick)

	Agric. worker	Vet. Worker	Comm. Dev.	Admin. Officer	Health Officer	Home Economics
	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
Did you go to see them	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No

Q.8

How far did you go in school? (tick)

No school	Upto Std. 3	Upto Std. 4	Upto Std. 7	Upto F.II	O-Lev.	A-Lev.	Univ.

Q.9

Can you (tick)

	Vernacular	Swahili	English
	Yes/No	Yes/No	Yes/No
a. Read	Yes	Yes / Yes	Yes / Yes
b. Write	No/Yes		
c. Speak	Yes	Yes	Yes

Q.10

You have any children? Yes...... No.......
If yes, how many ....

Children's	1st	2nd	3rd	4th	5th	6th	7th
a. Age							
b. Education							
c. Occupation							

If children have secondary education, did they attend: (tick)

1-Govt. school ..... 2- Harambee.... 3- Private school ....

Q.11

i.   How far would you want any of your children to continue
       with their education? ....

ii.   What jobs would you want your children to do
       (a) .... (b) .... (c) ....

Q.12

What type of the following do you have (tick)

Fire Place for Cooking			Lighting					
Stone firewd.	Jiko Charcoal	Stove Gas	Fire	Kerosene lamp	Tin lamp	Gas lamp	Candle	Electr.

Fencing				Toilet			
Wire	Bush	None	Other (specify)	Pit	Nil	Other (specify)	

Q.13

Interviewer observe house (tick)

Walls		Roof			Floor			Windows		
Stone	Mud	Thatch	Iron	Tin	Mud	Stones	Cement	Glass	Wood	None
✓			✓				✓	✓		

Q.14

Which of the following items do you have (tick)

1...✓.Table
2.....Easy chairs
3...✓.Sofa set
4...✓.Radio
5.....Vono bed
6.....China tea cups
7.....China plates
8...✓.Forks
9....✓.Tea spoons
10.✓.Plastic basin/ bucket
11.✓.Karai

12..✓separate kitchen
13....Water tank
14.✓..Wheel barrow
15....Bicycle
16....Motor vehicle
17.✓..Wooden box
18....Suitcase
19.✓.Clock/watch
20✓.Foam mattress
21....Thermos flask
22.✓.Cupboard

23..✓.Sheets
24..✓.Towels
25..✓.Tooth brush
26.✓.Torch
27.✓.Iron Box
28....Grinding mach.
29....Bookshelf
30....Carpets
31....Television
32....Frying pan

Q.15   Apart from farming, what other work do you do? (tick)

H.wife	Trader	S.keeper	Clerk/ Sman	Labourer Domestic servant	Skilled Artisan	Teacher	Govt.officer
	✓	✓				✓	

Casual labour/ petty trader	Other specify

Q.16

How many meals does your family take per day?

1. One........... 2. Two........... 3. Three........

Which of the following did your family eat last week? (tick)

Meat	Eggs	Bread	Milk	Butter/Jam B.band	Chicken	Chapati	Rice	Fruit juice

Q.17

From where do you get your agricultural/household information? (tick)

No source..... Friend, word of mouth...... Chief/subchief.......

Baraza....... Missions...... Teacher..... Radio..... FTC......

Extension worker...... Other..........

Q.18

Are you

	Coffee coop.	Dairy coop.	Church comm.	School comm.	Local comm.	Maendeleo
			Name of Organisation			
1. Member						
2. Committee Member						
3. Offices held						

Q.19

How often do you read/have read to you

	Daily	Twice	Once/wk.	Never	Other specify
a. Daily N/P-Taifa					
b. Monthly/Wkly.mag.					
c. Other (specify)					

Q.20

Do you listen to radio programmes? Yes.... No....

If yes, which ones: (list) 1. ....

2. .... 3. ....

How often do you listen to these programmes?

Very often ...... Often .... Rarely.........

Q.21

How often per month/year do you visit

a. Machakos................

b. Nairobi................

c. Other (specify) ....

Q.22

How many times since this time last year did you attend each of the following

Number of Times	Chief/ S.Ch. Baraza	Agric. Show	Uhuru/ Ken. Day Mada- raka	Agric. Field Day	Family Planning talk	Econ.	Adult classes
Never							
One							
Two							
Three							
Four							
Five							
Six							
Other							

Q.23

Imagine you were each of the following personalities named below, play their roles and answer the following questions:

a. If you were the Chairman of a Coop. Society what would you do next

....

b. D.C., what could you do about water?

....

c. Education Officer, schools in area?

....

d. Extensionist, higher crop yield?

....

e. Loans officer, get more farmers loans?

....

Q.24

Now, let us talk about religion and God.
What denomination do you belong to? ....

Q.25

How often do you pray per day? (tick)

4 times	Thrice	Twice	Once	Never	Other (specify)

Q.26

The following is a list of beliefs which ones do you agree with?

There is no God........   There is Hell.......

Miracles are possible.......   There is after life........

It is God's will that people be poor.......

Children are God's gift.............

Q.27

The following are some statements about life, indicate the respondent's feeling by ticking in the apporpriate box.

	Agree Strlv.	Agree	Uncertain	Disagree	Disagree strongly
1. The success of a person depends on luck not intelligence					
2. When a man is born his life is determined					
3. People must be poor because it is God's wish					
4. Man can plan the future because it depends on him					
5. It is better to accept things as they come and not to plan for the future					
6. Only if one wins charity can his life improve					
7. God punishes evil doers					
8. New ways of farming work better in assuring crops then weather					
9. God gives diseases					
10. Good harvest is an act of God					

Q.28

How much money (gross) did you realize last year

Coffee	Milk	Cabbages	Passion fruit	Maize	Beans	Livestock	Arts & crafts	Cotton

Wattle	Charcoal	Business	Salary	Help from relatives

Thinking back do you remember when you began to do each of the following practices for the first time on this farm. If you cannot remember, give approximate year according to key events e.g. when some of your children were born.												
Activities	Cotton		Coffee		Tomatoes		Maize		Passion Fruit		Livestock		
	Yr.	If no, why	Yr.	If no, why	Yr.	If no, why	Yr.	If no, why	Yr.	If no, why	..... Activity	Yr.	If no, why
1. Early planting											1. Establishing leys		
2. Ox or tractor ploughing											2. Cattle dipping		
3. Use of approved seeds											3. Hard spraying		
4. Seed dressing											4. Greasing (Using Pygrease)		
5. Crop rotation											5. Vaccinations		
6. Crop grading											6. Fodder feeding		
7. Staking											7. Grazing regime		
8. Spraying											8. Stall feeding		
9. Watering											9. Using Bana Grass		
10. Spacing											10. Attending field Dem.		
11. Fertilizer application											11. Fencing		
12. Pruning											12. Keeping small livestock		
13. Dusting											13. Keeping grade cattle		
14. Weeding											14. Using A.I.		
15. Mulching thinning											15. Keeping Zebu cattle		
16. Application of Manure											16. Paddocking		
17. Shading											17. Dairy instalment		
18. Soil levelling											18. Watering		
19. Burning diseased plants											19. Steaming up		
20. Soil fumigation											20. Dehorning		
21. Began using casual labour											21. Concentrate feeds		
22. Keeping records											22. Keeping milk records		
23. Began water conservation (Terracing, Furrows)											23. Cutting		
											24. Conservation feeds		
											25. Reporting disease		
											26. Giving salt lick		

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ACTUAL FREQUENCIES

Table 17:   Income vs. Levels of Adoption

Incomes (Shs. per annum)

Adoption Level	0-2400	2401-3600	3601-4800	4800
High	18	7	2	9
Average	77	10	22	3
Low	74	6	11	8
Total	169	23	35	20

$s = 1080 + 1925 + 308 + 190 + 22 + 176 = 3701$

$d = 1809 + 273 + 334 + 1760 + 1057 + 740 = 5973$

$$\therefore \gamma = \frac{2272}{9674} = 0.23$$

Expected Numbers		0.7	0.1	0.1	0.1
Expected Frequencies	1	25.2	3.6	3.6	3.6
	2	78.4	11.2	11.2	11.2
	3	69.3	9.9	9.9	9.9
$\frac{(0 - E)^2}{E}$		2.1	3.2	0.7	8.1
		0.03	0.00	10.4	6.0
		0.32	1.54	0.1	0.0
$x^2 = 32.49$					

Table 18:   Cosmopoliteness

Level of Adoption	Low	L.Middle	U.Middle	High
High	13	11	2	8
Average	33	21	38	21
Low	30	16	29	30
Total	76	48	69	59

s = 2015 + 2475 + 1298 + 1239 + 102 + 1140 = 8269

d = 1336 + 1575 + 200 + 748 + 693 + 630 = 6182

$$\therefore \quad \delta = \frac{2087}{14451} = 0.15 \quad 0.2.$$

Expected Numbers		0.3	0.19	0.27	0.23
	1	10.2	6.5	9.2	7.8
Expected Frequencies	2	33.9	21.5	30.5	26.0
	3	31.5	20.0	28.4	24.2
$\frac{(O - E)^2}{E}$		1.0	3.1	5.6	0.0
		0.0	0.0	1.8	1.0
		0.1	0.8	0.0	1.4
$x^2 = 14.79(6\ df)$					

Table 19:   Contact with Extension Staff

Adoption Level	1	2	3	4	5	6	7
High	23	21	14	19	16	16	11
Average	76	66	32	51	38	26	25
Low	43	30	23	29	20	18	43
Total	142	117	69	99	74	60	79

s = 9223 + 12388 + 6405 + 8778 + 3500 + 3520 + 3230 + 4131

         + 1792 + 2318 + 1088 + 1118   = 57491

d = 4972 + 4075 + 6528 + 3770 + 5600 + 4636 + 5130 + 4896

         + 2336 + 2499 + 2838   = 50290

γ = 7201/107781 = 0.1

Expected Numbers		0.22	0.18	0.1	0.15	0.11	0.09	0.12
Expected Frequencies	1	26.4	21.6	12.0	18.0	13.2	10.8	14.4
	2.	69.1	56.5	31.4	47.1	34.5	28.3	37.7
	3	45.3	37.1	20.6	30.9	22.7	18.5	24.7
$\dfrac{(O-E)^2}{E}$		0.4	0.0	0.3	0.1	0.6	2.5	0.8
		0.7	1.6	0.0	0.2	0.4	0.2	4.7
		0.1	1.4	0.3	0.1	0.3	0.0	13.

X^2 = 27.9 (12 df)

Table 20:   Literacy

Level of Adoption	RW Ver- nacular	Swahili Also	English	None
High	21	12	6	13
Average	74	53	21	47
Low	44	24	24	52
Total	139	89	51	112

s = 4641 + 7400 + 1728 + 4028 + 594 + 1092 = 19483

d = 3120 + 4324 + 1170 + 1428 + 1416 + 2332 = 13790

γ = 5693/33273 = 0.20

Expected Numbers		0.36	0.23	0.13	0.29
Expected Frequencies	1	18.7	11.9	6.8	15.1
	2	70.2	44.8	25.4	56.6
	3	51.8	33.1	18.7	41.8

$\frac{(O - E)^2}{E}$

0.3	0.0	0.1	0.3
0.2	1.5	0.8	1.6
0.7	2.4	0.6	2.6

x^2 = 11.08 (6 df)

Table 21:   Media Exposure

Level of Adoption	Never	Rarely	Often	Very Often
High	4	5	15	8
Average	25	45	28	16
Low	25	51	15	15
Total	54	101	58	39

s =   680 + 2025 + 1850 + 1350 + 645 + 420 = 6970

d = 1512 + 1456 + 2190 + 2128 + 250 + 1125 = 8661

γ = 1691/15631   = -0.15

Expected Numbers		0.2	0.4	0.23	0.15
	1	6.4	12.8	7.4	4.8
Expected Frequencies	2	22.8	45.6	26.2	17.1
	3	21.2	42.4	24.4	15.9
$\frac{(O - E)^2}{E}$		0.9	4.8	5.9	2.1
		0.2	0.0	0.1	0.1
		0.7	2.1	3.6	0.1

x^2 = 20.6 (6 df)

Table 24:

Level of Adoption	Zones		
	Low	Middle	High
High	55	9	10
Average	15	41	24
Low	32	45	17
Total	102	95	51

$s = 6985 + 930 + 369 + 697 = 8981$

$d = 1330 + 1848 + 423 + 1312 = 4913$

$\gamma = 4068/13894 \quad 0.30$

Expected Numbers	0.41	0.38	0.21
Expected Frequencies 1	30.3	28.1	15.54
2	32.8	30.4	16.8
3	32.8	35.7	19.7

$\frac{(O - E)^2}{E}$	13.47	13.0	2.0
	9.7	3.8	3.1
	1.10	2.4	0.37

$X^2 = 48.94$

Table 25:   Prayer Frequency

Level of Adoption	Low	Average	High
4 times	3	13	6
3 times	37	55	18
Twice	14	15	12
Once	10	6	1
Never	20	9	1
Total	84	98	38

s = 345 + 1628 + 238 + 100 + 416 + 770 + 30 + 6

= 3533

d = 984 + 1296 + 540 + 29 + 1027 + 2310 + 450 + 120

= 6756

χ = -3223/10289 = -0.31

Expected Numbers		0.38	0.45	0.17
	1	8.4	9.9	3.7
Expected Frequencies	2	41.8	49.5	18.7
	3	15.6	18.5	6.9
	4	6.5	7.7	2.9
	5	11.4	13.5	5.1

$$\frac{(O - E)^2}{E}$$

3.5	0.97	1.4
0.2	0.61	0.03
0.2	0.66	2.4
1.9	0.38	1.2
6.5	1.50	3.3

X^2 = 24.3 (8 df)

Table 26:   Income (Shs. per annum)

Prayer Frequency/ Day	0-2400	2401-3600	3601-4800	4800
4 times	18	1	0	2
3 times	76	9	4	15
Twice	55	3	0	0
Once	8	2	3	0
Never	37	1	0	1
Total	194	16	7	18

s = 432 + 684 + 385 + 16 + 8 + 36 + 12 + 1 + 0 + 4
$$+ 0 + 3 = 1582$$

d = 396 + 0 + 0 + 0 + 424 + 0 + 114 + 176 + 900
$$+ 135 + 74 = 3854$$

γ = 2272/5436 = -0.4

Expected Numbers	0.82	0.06	0.02	0.07
1	17.2	1.3	0.4	1.5
2	85.3	6.2	2.1	7.3
Expected 3	47.3	3.5	1.2	4.1
Frequencies 4	10.7	0.8	0.3	0.9
5	32.0	2.3	0.8	2.7

$\frac{(0 - E)^2}{E}$	0.0	0.14	0.4	0.2
	1.0	1.3	1.7	8.1
	1.3	0.1	1.2	4.1
	0.2	1.8	9.6	0.9
	0.8	0.7	0.8	1.1

x^2 = 35.4 (12 df)

Table 27:   Degree of Fatalism

Level of Adoption	Low	Average	High
High	0	4	2
Average	13	163	34
Low	1	26	2
Total	14	193	38

s   =   0 + 144 + 364 + 326   =   834

d   =   406 + 56 + 918 + 163   = 1243

γ =   -411/2079   =   0.20

Expected Numbers	0.1	0.8	0.20
	0.6	4.8	1.2
Expected Frequencies	21.0	167.2	42.0
	2.9	22.4	5.8
	0.6	0.1	0.5
$\frac{(O - E)^2}{E}$	11.6	0.2	1.8
	1.8	0.7	2.9

x^2 =   20.2 (4 df)

Table 19

1. Agricultural Worker

2. Veterinary Worker

3. Community Development

4. Administrative Officer

5. Health Officer

6. Home Economics Officer

7. Missing Data