THE EFFECTS OF SELECTED

COMMUNICATIONS VARIABLES ON THE

ADOPTION OF NEW AGRICULTURAL

PRACTICES BY SMALLHOLDERS IN

CENTRAL KIAMBU, KENYA

by

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ABSTRACT

THE EFFECTS OF SELECTED COMMUNICATIONS
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The research reported here was conducted in Kenya. The
study had three major objectives:

(1)   to determine the effects of message content
      on the receivers' knowledge, attitude, and
      usage of chemical fertilizers;

(2)   to determine whether the source of the
      message had any independent impact on the
      receivers' responses and;

(3)   to determine whether respondents with
      different demographic and socioeconomic
      characteristics were influenced differently
      by the message content and the source of
      that message in terms of their knowledge
      about, attitude toward, and usage of
      fertilizer.

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Guided by these objectives and the available diffusion literature evidence the following conceptual hypotheses were advanced:

(1) Message content will highly influence knowledge, attitude, and overt behavior of potential adopters of an innovation;

(2) Credibility of the source of the message will also influence audience responses;

(3) Several receiver variables will influence knowledge, attitude and overt behavior of potential adopters of an innovation;

(4) Because knowledge, attitude, and overt behavior occur in that sequence, according to diffusion theory, attitude will be more highly related to overt behaviour than knowledge.

The research design that was used to test these hypotheses, after defining them operationally, involved two surveys of the same respondents with an embedded before-and-after experiment. The experimental portion of the design was a 3 x 2 factorial with message content having three levels of information content (high, moderate, and low) and source credibility having two levels (high and low). The

design also incorporated two control groups only one of which was measured before the experiment.

The two waves of data - "before" and "after" - were subsequently subjected to one-way and two-way analyses of variance and, where appropriate, to simple and multiple regression analyses. The results of these analyses were then used to test the hypotheses. It was concluded, following the pertinent tests, that:

(1)   Message content and source credibility interact in their influence on the dependent variable knowledge. That is, given high source credibility (the agricultural officer), high technical information content (coffee fertilizer news) has the highest positive effect on knowledge followed by low technical information content (National Development news) and moderate information content (general farming news) in that order. But given low source credibility (the local cooperative union officer) the higher the technical information content, the higher the effect of message on knowledge.

(2)   The effects of message content and source credibility on attitude partly depend on the

initial attitude toward the "new" product.
That is, given low initial attitude (a high
potential for attitude change), low technical
information content (National Development news)
has the largest impact on attitude irrespective
of the level of source credibility followed by
high and moderate technical information content
in that sequence. But given moderately high
initial attitude (a moderate potential for
attitude change) the message level interacts
with source credibility level in influencing the
dependent variable attitude. Finally, given
high initial attitude (little or no potential
for positive attitude change) the treatment
variables have a negative impact on attitude.
The magnitude of this effect is determined by
the interaction between the message content and
source credibility.

(3) Message content interacts with source credibility
     in influencing fertilizer usage per acre but the
     results were not very decisive.

(4) The effects of selected demographic and socio-
     economic variables are less pronounced than
     the literature suggests. Only income, education
     and number of wives had significant beta coefficients.

(5) The relationship between the dependent
     variable attitude and fertilizer usage per
     acre is not any stronger than the relationship
     between knowledge and usage per acre. That
     is, although the correlation coefficient
     between attitude and usage is numerically
     larger than the correlation coefficient between
     knowledge and usage, the difference between
     the coefficients is not statistically
     significant.

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CHAPTER I

INTRODUCTION

Both researchers and administrators agree that for
low-income countries such as Kenya to progress economically,
they must develop their agricultural sectors since the latter
support more than seventy-five per cent of the population.
But for agricultural development goals to be realized, indi-
vidual farmers must first adopt new agricultural inputs and
methods including chemical fertilizers, insecticides, and
farm-machinery.

The speed at which this adoption process occurs largely
depends on communication effectiveness.[1] The latter is in
turn "a function of source, message, and channel attributes
and the interaction of these attributes with the characte-
ristics of the audience.[2] Thus to speed up the adoption
process, which is essential to development, a change agent[3]
must design and deliver his messages in such a way that all
attributes of the four communication components reinforce
each other. That is, the communicator must ensure that he is

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[1] Everett M. Rogers and F. F. Shoemaker, Communication of
Innovations: A Cross-Cultural Approach (New York: Free
Press, 1971), p. 129.

[2] Thomas S. Robertson, Innovative Behavior and Communication
(New York: Holt, Rinehart and Winston Inc., 1971), p. 136.

[3] The term change agent has been defined as "a professional
who influences innovation decisions in a direction deemed
desirable by a change agency."

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perceived as a reliable and competent source, that the message
he wants to deliver is relevant to the needs and goals of the
intended audience, and that the message-carrier (channel) is
readily available to the potential adopters.

Given this proposition, one would expect the literature
on diffusion research to abound with studies which have in-
corporated all or most of the four communication components.
Unfortunately, this is not the case. While it is generally
agreed that communication effectiveness is a function of the
four variables a majority of studies in the diffusion and
communication literature have only incorporated one or at
best two of these variables as will be elaborated later in
this chapter.

Objectives of the Present Research

The research reported here was conducted with three
objectives in mind. First, the author sought to determine
the effects of message content on the receivers' knowledge,
attitude, and usage of chemical fertilizers.[4] That is, the
main purpose of the study was to discover whether smallholders
who received messages with high-information content so far
as coffee fertilizers are concerned, behaved differently
from those who received messages with moderate - and low-

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[4] In this context the term "message content" refers to "the
material in the message that is selected by the source to
express his purpose," see David K. Berlo, The Process of
Communication: An Introduction to Theory and Practice,
(New York: Holt, Rinehart and Winston, 1970), p. 59.

information content.

Second, the research reported here tried to determine whether the source of the message has any independent impact on the receivers' responses. Several laboratory studies have concluded that the source of the message substantially influences the impact of the message.[5] Similarly, theoretical discussions have proposed that source credibility is an important component of a communication process. Thayer, for instance, drawing from writings of Hovland and his colleagues, argues that "... receivers come to weight or to judge the validity of certain kinds of messages emanating from certain sources in terms of their credibility."[6]

In view of the above, the second objective of the present study was to determine whether, say, two groups of smallholders receiving identical messages, with one emanating from a high credibility source and the other from a relatively low credibility source, would respond differentially. Specifically, this research project tried to determine whether those who received information circulars from a high credibility source - a local agricultural officer - were affected differently from those who received such circulars from a relatively low credibility source - a local cooperative Union

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[5] Most of these studies were conducted by Carl I. Hovland and his colleagues and their findings are summarized in Carl I. Hovland, Irving L. Janis and H. H. Kelley, Communication and Persuasion (New Haven: Yale University Press, 1953).

[6] Lee Thayer, Communication and Communications Systems (Homewood, Illinois: Richard D. Irwin, Inc., 1969), p. 169.

officer - with respect to knowledge about, attitude towards, and usage of fertilizer.

Third, the author sought to determine whether respondents with different demographic and socioeconomic characteristics were affected differently in terms of knowledge, attitude, and usage. It appears logical to expect smallholders of different demographic and socioeconomic levels to behave differently even if they are receiving identical messages which emanate from the same source. There are several correlational studies which have concluded that some demographics influence innovative behavior.[7] Hence, it is plausible to assume that respondents with different demographic and socoeconomic characteristics will respond differentially to identical information circulars.

Rationale for the Research Objectives

The rationale for setting the above research objectives is partly because the studies reported in the literature have been narrow in scope and partly because they have, by and large, been methodologically deficient. In terms of scope, the majority of studies have concentrated only on one or two communication variables - particularly channel attributes and audience characteristics. The lack of concentration on the other two variables (message and source) has been clearly

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[7] See, for instance, Rogers, "Communication of Innovations," Appendix A.

brought out by several authors, including Rogers and Shoemaker who argue that "considering the channel variable alone is insufficient to explain behavior of a receiver in the innovation-decision process."[8] The authors further argue that the message content carried on the diffusion channels has been totally ignored.

The same observation is made by Fett when he declares that measures of message content are almost never included in the research design.[9] Writing in the same vein, Tannenbaum states that "until very recently there has been practically nothing bearing on the message and audience variables responsible for limiting or enhancing the attitude (knowledge and usage) change potential of a given Communication."[10]

The question that immediately comes to mind is why researchers continue focusing on mass media measures alone when it is apparent that the message content and the source of message are also important determinants of communication effectiveness and, therefore, of innovative behavior. It appears that the major motivating force is the ease of data

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[8] Rogers, "Communication of Innovations," p. 265.

[9] John H. Fett, "Content and Situational Relevance of Agricultural News in Brazilian Papers," Journalism Quarterly, XLIX, p. 505

[10] Percy H. Tannenbaum, "Initial Attitude toward Source and Concept as Factors in Attitude change through Communication," Public Opinion Quarterly, XX, No. 2, p. 423.

collection. Since the beginning of the present diffusion tradition in 1943,[11] hundreds if not thousands of correlational studies have established time and again that economic variables, demographic variables, communication variables, and attitudinal variables are the four "gcod" predictors of innovative behavior. However, while data on economic and demographic variables can be relatively easily gathered from individual respondents, and their accuracy verified by corresponding census figures, the data on communication variables (except those pertaining to mass media) and attitudinal variables are more difficult to collect. For instance, it is easier to ask a respondent the number of times he read a particular newspaper during the previous one week than to determine whether or not the articles in the newspaper contained messages relevant to his needs and goals.

Because of this problem, many researchers have generally tended to equate mass media exposure with exposure to relevant messages. However, if the true role of communication in the adoption process is to be understood, an attempt must be made to measure the effects of all pertinent communication variables rather than relying on partial measures and easily measured proxy variables.

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[11] Bryce Ryan and neal C. Gross, "The Diffusion of Hybrid Seed Corn in Two Iowa Communities," Rural Sociology, Vol. VIII, pp. 15-24.

Although it has been argued that there is a general lack of studies incorporating all the communication components in the research design, there are at least three field experiments which, while still narrower in scope than advocated here and suffering from several methodological deficiencies, are comprehensive enough to warrant a brief review. Another reason for reviewing these experiments is that they were all conducted in developing countries and, therefore, their findings are more directly applicable to the research setting of this study than those conducted in developed economies. Put another way, the experiments were chosen for review partly because of their geographical diversity and partly because their methodologies illustrate most, if not all, of the deficiencies of the studies in the diffusion literature.

The first of these experiments was conducted in India by Menefee and Menefee.[12] The design included three experimental and one control village and entailed before-and-after measurements. In the experimental villages, a weekly cyclostyled newsletter containing local, national and world affairs was distributed to the villagers for a period of thirteen weeks. In addition, weekly discussion meetings pertaining to the issues raised in the newsletter were held in one of the villages (Halkurke) where a radio had also been installed.

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[12] Seldon Menefee and Audrey Menefee, "An Experiment in Communications in Four Indian Villages," Indian Journal of Research, XI (August 1965), pp. 149-158.

When the data on knowledge level changes were computed, scores were highest for the experimental village which was given intensive treatment (Halkurke) and lowest for the control village. On basis of this finding the researchers concluded that a mimeographed newsletter, distributed to the villages, would produce a significant increase in the villagers' information levels.

A similar experiment was conducted on the other side of the globe by Brown.[13] This researcher also conducted a before-and-after study whose primary objective was to assess the impact of a mimeographed newsletter on the level of technical knowledge assimilated by a sample of Chilean farmers. His findings supported the hypothesis that a mimeographed newsletter which contained information relevant to farmers would increase their knowledge level. Brown sums up his findings by stating that "even illiterate farmers showed an improvement in knowledge because they had someone else, mostly a member of the family, read the circular for them."

A final field experiment to be reviewed here was conducted in Mexico by Vasquez et al.[14] The authors' objective was partly to replicate Brown's study in another population

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[13] Marrion R. Brown, "Communication and Agricultural Development: A Field Experiment," Journalism Quarterly, XLVII, pp. 725-34.

[14] Arturo Vasquez A., Gregorio Martinez V., and Richard D. Powers, "Circulars for Informing Poorly Literate Farmers," Journalism Quarterly, XLVIII, pp. 535-38.

of peasant farmers and partly to determine if the length of
the circulars and the frequency with which they were sent to
the farmers had an important influence. The research design
was in general similar to the previous two but differed in
that it had two control groups whereas the others had only
one. Once again, on the basis of their findings, the authors
concluded that "circular letters appear to be an excellent
teaching device for diffusing agricultural technology but we
have no evidence that shorter, more frequent letters do a
better job than longer ones sent less frequently."

It is not reasonable to state that the above experiments
and others like them[15] have not made substantial contributions
to our understanding of the role of relevant newsletters in
developing countries. Their findings have at least questioned
the conclusions of several writers who suggest that because of
high illiteracy rates in developing economies, printed mass
media play a very minor role in dissemination of information.
In theoretical terms, the experiments have also partially
satisfied what Rogers has advocated:

> Future diffusion research ought to make much
> greater use of field experiments and longi-
> tudinal panel studies which, by their research
> designs, are able to take 'moving pictures'
> of the diffusion process.[16]

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[15] For instance, see Tannenbaum, Percy H., "Initial Attitude
Toward source as factors in Attitude Change thru Commu-
nication," Public Opinion Quarterly, XLIV.

[16] Everett M. Rogers, "A Personal History of Research on the
Diffusion of Innovations," paper presented at the Ninth
Paul D. Converse Marketing Symposium (Urbana: Ill. May 16-17,
1975, p. 21

Similarly, they partially satisfy what Hovland advocated when he wrote that "a genuine understanding of the effects of communication on attitude (knowledge and usage) requires both the survey and the experimental methodologies."[17]

However, in spite of these contributions, the experiments are so restricted in scope as to make their findings less useful than they might have been. Their first deficiency is that they all operated with a single dependent variable - knowledge level. This is unfortunate considering that in theoretical terms a multiple response is hypothesized. For instance, according to several researchers in consumer behavior and communication, receivers of messages usually make three kinds of responses - knowledge changes, attitudinal changes and, in some cases, overt behavioral changes. Further, these responses are hypothesized to occur in that sequence depending on the situation in question.[18] Similarly, Deutschmann argues that broadly (communication) effects can be described as some change in the receiver of the message which may be giving attention to and perceiving the message; learning factual material from the message; learning new attitudes or modifying old ones as a result of the message;

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[17] Carl I. Hovland, "Reconciling Conflicting results derived from Experimental and Survey Studies of Attitude Change," American Psychologist, (1959), pp. 8-17.

[18] John A. Howard and H. N. Sheth, A Theory of Buyer Behavior (New York: John Wiley and Sons, Inc., 1969).

behaving in a novel way or modifying former behavior.[19] By
failing to deal with stages that follow knowledge level, the
above experiments come up with findings which are less useful
since "knowing about an innovation is often quite a different
matter from using the idea or product."[20] This divergence
between knowledge about innovations and actual adoption
process was noted as early as thirty-five years ago when Ryan
and Gross found that while nearly all the farmers in a study
of two hundred-and-fifty-nine were aware of a new seed corn,
there was a period of time when only a very small percentage
of them had actually planted the corn.[21] For this reason,
the three experiments are at best only partial tests of the
effects of purposeful communication on innovative behavior.
While the research reported here is by no means a complete
test of Communication effects, it is wider in scope in that
it has incorporated three dependent variables - knowledge,
attitude, and usage. It, therefore, provides a more com-
prehensive view of communication effects.

A second deficiency of the experiments cited above,
with the exception of that of Vasquez et al, is that they

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[19] Paul J. Deutschmann, "Measurement in Communication
Research," in Ralf O. Nafziger and David M. White,
Introduction to Mass Communications Research (Baton Rouge:
Louisiana State University Press, 1963), p. 225.

[20] Rogers, "Communication of Innovations," p. 108.

[21] Edward J. Robinson, Communication and Public Relations,
(Columbus, Ohio: C.E. Merrill Books, 1966), p. 407.

have ignored the possible effect of the measurement process. If "before" measurements contribute to respondents' learning, as has been suggested by several authors,[22] it is not valid to call the difference between "after" and "before" measurements "true" communication effects unless it is shown that the measurement process by itself does not result in respondents' learning. This study has overcome this problem by incorporating a second control group in the design for which there was no "before" measurement. Therefore, the effect of premeasurement can be assessed.

A final deficiency found in the relevant literature is that the source of the message was not controlled for. Such an oversight is problematic as there are several laboratory studies which have been conducted to assess the impact of source credibility (trust worthiness and expertness) on attitude change. For instance, Hovland et al. argue that "an important factor influencing the effectiveness of a communication is the person or group perceived as originating the communication and the cues provided as to the trustworth-

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[22] See, Leo P. Crespi, "The Interview Effect in Polling," Public Opinion Quarterly, XII (1948), p. 99. The problem is also theoretically discussed by Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-experimental Designs for Research, (Chicago: Rand McNally College Publishing Company, 1966), p. 9.

iness, intentions, and affiliations of this source."[23]

While laboratory studies may have problems of generali-
zability to real life situations, they do suggest that the
source of communication can have an influence on audience
response that is independent of the message content and the
channel through which the message is transmitted. Therefore,
rather than take the findings of such studies either with
scepticism or as dogmas of faith, as many textbooks have done,
field experiments should be conducted to assess the true
impact of the Communicator on adoption process. The research
project discussed here addresses this issue by treating the
source of the message as one of the experimental stimuli.

To sum up, the problems identified in this section are
both substantive and methodological. Substantively, past
studies of adoption process have largely ignored the role of
message content and source credibility although the two
components are, theoretically, expected to influence communi-
cation effectiveness and, therefore, the adoption process.
Methodologically, the majority of previous studies are corre-
lational in nature which means they are less reliable in
determining cause-effect relationships between communication
variables and response variables. Others are experimental

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[23] Carl I. Hovland, Irving L. Janis and H. H. Kelley,
Communication and Persuasion (New Haven: Yale University
Press, 1953), p. 13.

studies with substantial design deficiencies. Hopefully, the research objectives cited above and the design spelled out in Chapter III have overcome most, if not all, of these problems.

The Research Setting

The study reported here was conducted in Kenya, a relatively small country situated on the east coast of Africa with the Equator cutting right across the centre. However, because of altitude,the climate in several parts of the country is similar to that of temperate lands. For administrative purposes, the country is divided into provinces, districts, divisions,locations, and sublocations with the latter being the smallest unit. Demographically, Kenya occupies an area of 225,000 square miles (approximately half the size of Ontario) but only one-quarter of the land mass is arable. Today, Kenya's population is estimated at fourteen million people, the majority of whom are Africans anthropologically divided into over forty ethnic groups.

Roughly, eighty per cent of these Africans live in rural areas and depend largely on agriculture for their livelihood. The major staple foods are maize (corn), cassava, bananas, and beans. Most of these crops are grown on small-holdings; more than half of these are less than five acres in area. Other important crops (cash crops) are coffee,

cotton, tea and pyrethrum.

Coffee cultivation has been selected as the context in
which to research the effects of the communication components
discussed above. Coffee cultivation takes place in higher
altitudes ranging from about two thousand to eight thousand
feet above sea-level.[24] Needless to say, since the farm-
sizes are generally small (less than five acres) the actual
land area allocated for coffee growing is even smaller.
Therefore, to increase output, a smallholder would have little
or no alternative but to use modern farming technology which
includes the use of fertilizers and insecticides. Perhaps
unknowingly the government, with the advice of International
Coffee Agreement personnel, has intensified this need by
establishing "acreage" as opposed to output as the basis for
controlling the production system.

Historically, the colonial government "greatly affected
the pattern of coffee cultivation by prohibiting it on African
Farms everywhere in the country until 1935, and in Central
Province (of Kenya) until 1954."[25] Another historical event
that has greatly influenced coffee growing in the Central

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[24] This altitude range is for Arabica Coffee only. In case
of Robusta, the other type of coffee which is grown in
East Africa particularly in Uganda, the altitude range
is between 4,700 and 6,000 feet above sea-level.

[25] A.M. O'Connor, An Economic Geography of East Africa
(New York: Frederick A. Praeger, 1971), p. 285.

Province was the Swynnerton Plan. This blueprint advocated land consolidation, farm planning, and expansion of cash crops.

Under consolidation each farmer received a title deed for his piece of land. With a deed, a smallholder could then obtain loans from financial institutions to finance various developments. However, the expected progress in planting and production was not immediately forthcoming because smallholders generally suspected the Colonial Government and there was a lack of cooperation.[26] This suspicion was finally dissipated by the 1960 Lancaster Conference which marked the beginning of the end of colonial rule in Kenya.

In view of the above, it appears unlikely that before the 1960 the majority of smallholders had either planted coffee or used chemical fertilizers. It is this situation which makes the coffee cultivation context a good one for this type of research.

Data-gathering

To collect pertinent data, a sample of four hundred small coffee growers in Central Kiambu (Githunguri and Kiambaa Divisions) was used. The sample comprised 246 (61.5 per cent) males and 154 (38.5 per cent) females. The data were collected

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[26] The Africans suspected that their lands would be seized by the white settlers once they were planted with coffee.

from these respondents by personal interviews because mail-
questionnaire and telephone interviews are presently not
feasible research tools in rural Kenya. The questionnaire
used by the interviewers was designed to elicit information
on knowledge, attitude, and fertilizer usage both before and
after the experiment. Further the questionnaire was designed
to collect relevant data on demographic, socioeconomic, and
other personal characteristics. A more detailed description
of the questionnaire and other aspects of the research de-
sign is given in Chapter III.

Anticipated Contributions of the Study

The anticipated contributions of the present research
are both theoretical and practical. Theoretically, the study
will, it is hoped, make several contributions. First, the
research design, a survey with a before-and-after experiment
embedded within it, will hopefully establish causal link
between message content and source credibility on the one
hand and knowledge, attitudes, and fertilizer usage behavior
on the other. Such research is badly needed because, as
discussed above, many of the studies in the literature have
been correlational in nature and therefore, it is difficult
to be decisive as to the direction of the arrows connecting
different variables which influence the adoption process.
The design of the study is such that it will also be possible
to disentangle the effects of source credibility from those

of the message content and the channel. This is important
because it will be possible to say that given a level of
message content, the source credibility should be high or
low if communication effectiveness is to be increased.

Second, the anticipated research findings will add to
the little that is already known about innovative behavior in
developing countries, particularly in Africa. A casual look
at the literature suggests that the majority of studies which
have been completed in the area of communication in general
and diffusion in particular have been conducted in North
America and Western Europe. Since developing countries have
cultural values and norms that are different from those of
the Western World, it is not clearly known to what extent
research findings in industrialized countries can be genera-
lized to developing countries such as Kenya. There is no
doubt that several studies have been conducted in developing
countries particularly in India and Latin America but there
is a dearth of this kind of research in Africa. It is there-
fore hoped that the present study will make a contribution
to our understanding of the role of communication on the
adoption process in Kenya. In the very least, it is antici-
pated that despite the mass illiteracy that appears to dominate
the rural areas of developing countries such as Kenya, a
mimeographed circular that contains messages relevant to
smallholders will increase their knowledge about coffee

fertilizers. Such knowledge is badly needed since the small-holders have pathetically small farms and can only increase their output by adopting and properly using modern farming technology.

In practical terms, the present research is expected to be useful to at least three other groups. First, it is anticipated that the results will prove useful to marketers of agricultural innovations such as fertilizers, insecticides, and farm equipment. Presently these marketers have tended to use salesmen and mass media to appeal to the over seventy-five per cent of the population living in rural Kenya. That is, by and large they have tended to follow the marketing techniques of developed countries. This is not surprising because nearly all business corporations in Kenya are subsidiaries of multi-national companies. The research reported here will, it is hoped, show that using another medium - cyclostyled news-letters - to reach potential buyers of farm inputs is highly effective.

Further, since the product studied here (that is, ferti-lizer) is not an integral part of the research design, it is anticipated that the research findings will prove useful to marketers of consumer innovations. Rural dwellers are both producers and consumers. Therefore, while this study has zeroed in on adoption of production-innovations the

findings have some bearing on adoption of consumption-
innovations. That is, if it is found that the level of mes-
sage content and/or source credibility influence the response
patterns of the smallholders with respect to production in-
puts this would also suggest that the same variables, either
alone or in combination with others, will influence response
patterns when consumption-products are involved. The findings
of this study are therefore expected to be of utility to
marketers of consumer goods.

Finally, it is hoped that the Kenya government will
find the research findings beneficial particularly so far as
communication with smallholders is concerned. In its 1974-78
Development Plan, the government has set the following
agricultural sector goals:

> a. to achieve 6.7% target rate of growth
>   of marketed production through inten-
>   sified land use,
>
> b. to improve the distribution of rural
>   income by obtaining a significant
>   increase in the proportion of farmers
>   who obtain a cash income from their
>   land,
>
> c. to devise methods of developing the
>   less favored areas and to promote a
>   more even development among different
>   areas of the country,
>
> d. to increase the opportunities for
>   employment in the agricultural sector;

e. to improve standards of nutrition
   in the rural areas; and

f. to increase agricultural exports. [27]

While effective communication is not a panacea for all agri-
cultural ills, it can go a long way toward ensuring that
these goals are realized. The government can either resort
to personal communication, radio or printed media. In terms
of personal communication, the government is currently using
agricultural officers and other extension workers to educate
smallholders. However, because of the shortage of qualified
manpower only a small portion of these farmers can be directly
reached.[28] Additionally, the government, through the Voice
of Kenya (national radio), airs several short agricultural
programs during each week but it is difficult on a priori
basis to assess the effectiveness of such programs. But
since the majority of farmers do not own radios, it is likely
that the programs only benefit "progressive farmers". Printed
media are also widely used by the Ministry of Agriculture.
Unfortunately, most of the pamphlets are written in English

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[27] Development Plan 1974-78, Part II (Nairobi: Government
Printers, 1974) p. 22.

[28] Siegfried Schonherr and Erastus Mbugua, "New Extension
Methods to Speed Up Diffusion of Agricultural Innovation,"
Discussion Paper No. 200 (IDS: University of Nairobi,
May 1974), p. 1.

again indicating that they only reach "elite" farmers.[29]
It is the opinion of this author that the circular used here
is more effective in imparting knowledge on smallholders
than the current leaflets published by the Ministry of
Agriculture partly because it is in the local language and
partly because it contains only one issue - fertilizer
application to coffee plants. It is proposed that if the
type of circular used here were to be adopted by the
Government and used in combination with personal communication
and electronic media, the smallholders in Kenya would acquire
more knowledge about coffee growing and increase their pro-
ductivity and well-being.

To sum up, it is anticipated that the research
findings will reveal the effects of message content, source
credibility and interaction between the two if any. Thus,
all those involved with "selling" their ideas to smallholders -
industrial and consumer marketers and government - are
expected to benefit from the results of this study. Theore-
tically, the project is expect to further our knowledge of the

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[29] See for instance, Fertilizer Recommendations for Most
Important Annual Crops in Kenya, Coffee Growing:
Crop Advisory Leaflet No. 255, and Crop Production
Pocket Book, (Nairobi: Agricultural Information Centre,
Ministry of Agriculture, Kenya).

Communication process particularly in the realm of the adoption
process in less developed countries.

Plan of Materials in Subsequent Chapters

The remaining materials reported here are divided into
four chapters. Chapter II contains the conceptual framework
of the communication and adoption process. This discussion
is centered around five topics: (1) communication models,
(2) Adoption Models, (3) the simplification and interpretation
of Adoption models in terms of a Circular model of Communi-
cation, (4) a discussion of source and message effects and,
(5) the development of the conceptual hypotheses for this
research. Hence, it is in this chapter that the bulk of the
relevant literature is reviewed.

Chapter III contains the research design for the study
and is subdivided into six major subheadings: (1) Experimental
design, (2) Research Instrument, (3) Sampling procedure,
(4) Operational definition of main independent and dependent
variables, (5) Questionnaire Pretesting and, (6) Statement
of the Operational hypotheses.

The results of the study are examined in Chapter lV.
First, the "before" scores on knowledge, attitude, and usage
are discussed and necessary adjustments are also made.
Second, the "after" scores on the dependent variables are

examined to determine whether the results are statistically

significant. This is followed by a discussion of score

changes and performance of the two-way analyses of variance.

The final section of this chapter is devoted to testing of

the hypotheses stated at the end of Chapter III. The final

chapter summarizes and discusses the research findings and

the implications for the various interest groups previously

mentioned.

CHAPTER II

CONCEPTUAL FRAMEWORKS FOR
COMMUNICATION AND ADOPTION-PROCESSES

Introduction

Chapter I presented a discussion of the need for including all communication variables in the research design, outlined the objectives and rationale for the present study, and concluded with anticipated contributions of the research. Chapter II will contain a review of the theoretical and empirical literature on communication and adoption processes, interpret the relevant variables of the latter in terms of communication components, discuss the concepts of source and message effects, and conclude with a statement of the conceptual hypotheses.

Communication models

An in-depth review of the literature suggests that there is no comprehensive theory of communication. However, there exists a multitude of models all of which claim to "accurately" represent a general communication process. To put some order in the "theoretical jungle" of communication literature a historical-structural approach will be followed. This approach was satisfactorily used by Barnes who argued that:

>...communication theory has passed through three
>quite distinct stages during the past thirty years.
>Throughout that period have been developed, firstly,
>what may be labelled the one-way linear models of
>the communicative process; secondly, the reaction or
>homeostatic models; and thirdly, the more current
>circular and helical models.[1]

Thus, the discussion of communication models will be centered

on (1) one-way linear models, (2) consistency models and

(3) circular and helical models.

One-way Linear Models-

There are several linear models but since most of these

are similar only two of them will be reviewed in this section.

Perhaps the most quoted model in the literature is the one

that was developed by Lasswell in 1948.[2] Lasswell argued that

all communication involves "who says what, through what channels

of communication, to whom...with what results?" One implication

of this formula is that every communication has five components:

source, message, channel, receiver, and effects. The model also

implies that the communication process is linear with source as

the beginning and receiver (or effects) as the end of the process.

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[1]
James G. Barnes, "The Communications Effect of Selected Retail
Price Promotional Advertising Cues" (Unpublished Ph.D. Thesis,
University of Toronto, 1975), p.40.

[2]
Harold D. Lasswell, "The Structure and Function of Communication
in Society", in The Communication of Ideas, ed. by Lyman Bryson
(New York: Harper and Row 1948), p. 37.

A third implication is that all communications are purposive
or instrumental. These implications have both been supported
and challenged by subsequent researchers.

Westley and MacLean, for example, argue that messages can
either be purposive or nonpurposive whereas they hold that
Lasswellian formulation posits only persuasive messages. In
summarizing the problems of the Lasswellian model, they stated
that:

> The difficulty here is (that) the model seems to
> demand the presence of a communicator - the who -
> and to imply that his communication is a purposive
> one...There is also an unidirectional implication..
> ..that ignores feedback phenomena.[3]

Another linear model was conceptualized by Shannon and
Weaver.[4] As in the Lasswellian formula, the authors identified
five components of a communication as shown in Figure II-1.

FIGURE II-1

THE SHANNON-WEAVER MODEL OF
THE COMMUNICATION PROCESS

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[3] Bruce H. Westley and Malcoln S. Maclean, Jr., "A Conceptual
Model for Communications Research", Journalism Quarterly,
XXXIV (1957), pp. 37-51.

[4] Claude Shannon and Warren Weaver, The Mathematical Theory
of Communication (Urbana: University of Illinois Press,
1949), p.5.

The contributions of this model to communication theory were
summarized by Johnson and Klare:

> Of all single contributions to the widespread
> interest in models today, Shannon's is the most
> important. For the technical side of communica-
> tion research, Shannon's mathematical formulations
> were the stimulus to much of the later effort in
> this area....In addition, Shannon also presented
> a schematic diagram of a general communication
> system which was the source of impetus for many
> subsequent diagrammatic models of the general
> communication process. 5

This contribution was reiterated by Darnell when he stated
that one of Shannon's contributions was a description of the
essential functions of a general communication system.[6]
However, the model is not without its critics. For instance,
Westley and Maclean criticize Shannon's model for the same
reasons they critize the Lasswellian formulation - the
contention that a communicator must always be present.[7]
Dance also criticizes the model because of its emphasis on
the information-carrying capacity of a given communication
system. He argues that "information theory provides the
same number of bits (of information) whether the coin is
flipped to see who buys the beer or to see who leaves the

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[5] F. Craig Johnson and George R. Klare, "General Models of
Communication Research: A Survey of the Developments of a
Decade", Journal of Communication, XI (1961), p. 15.

[6] Donald K. Darnell, "Information Theory" in Joseph A. DeVito,
Communication: Concepts and Processes (Englewood Cliffs:
Prentice-Hall, 1971), pp. 37-45.

life raft so that it will not sink with everybody aboard."[8]

The literature abounds with other linear models including those of Fearing[9] and Berlo.[10] All these models conceptualize a communication situation where the communicator (source) is purposely trying to influence the audience (receivers) in some predetermined way as was mentioned above. Further, they explicitly or implicitly assume that the receivers will act accordingly. This assumption of the inactive audience has been challenged by several researchers, including Cox[11] and Bauer.[12] These researchers contended that receivers also act as communicators either directly or indirectly. Through their selective processes (attention, comprehension, and retention), the receivers of a message can (and often do) greatly affect communication effectiveness.

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[8] Frank E. X. Dance, "Toward a Theory of Human Communication", in Human Communication Theory: Original Essays, ed. by Frank E. X. Dance (New York: Holt, Rinehart and Winston, Inc., 1967), p. 292.

[9] Franklin Fearing, "Toward a Psychology of Human Communication," Journal of Personality, XXII (September 1953), pp. 74-75.

[10] Berlo, "The Process of Communication", pp. 23-39.

[11] Donald F. Cox, "The Audience as Communicators", in Proceedings (Chicago: American Marketing Association 1963), p. 58.

[12] Raymond A. Bauer, "The Initiative of the Audience", Journal of Advertising Research, III (1963), pp. 2-7.

Thus, the source does not have an unlimited power to influence the audience: the message must of necessity incorporate the needs, goals, and personal characteristics of the intended receivers if the communication is to be effective.

Consistency Models

The second stage of conceptualizing the communication process entailed the development of homeostatic or consistency models. Of particular importance here are the "Balance Model" developed by Heider[13] and elaborated by Rosenberg,[14] Osgood's "Cogruity Model";[15] and Festinger's "Dissonance Theory."[16] A brief discussion of these models is in order because they have provided some insights regarding the expected effects of communication.

The balance model was developed by Heider to explain social events which normally involve a person (P), an Other person (O) and some event, idea or object (X). He was,

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[13] F. Heider, The Psychology of Interpersonal Relations (New York: John Wiley and Sons, 1958).

[14] M. J. Rosenberg, "Cognitive Structure and Attitudinal Affect," Journal of Abnormal and Social Psychology, LIII, pp. 367-72.

[15] Charles E. Osgood and Percy H. Tannenbaum, "The Principle of Congruity in the Prediction of Attitude Change", Psychological Review, LXII (1955), pp. 42-55.

[16] Leon Festinger, A Theory of Cognitive Dissonance (Evanston, ILlinois: Row, Peterson, 1957).

therefore, concerned with all possible P-O-X relationships. To Heider, a relationship is in balance when expectancies are met. For instance, when the relations of all the three units are positive the situation is said to be in balance. On the other hand, if the person, P, dislikes the object X, but likes the Other person, O, who in turn likes X, the situation is unbalanced. In this case, the person will do "something" to rectify the situation.

The application of the balance model was extended to the realm of persuasive communications by Rosenberg and Abelson.[17] According to these researchers, persuasive communications are accepted by the person to the extent that they help resolve cognitive imbalances.

The Congruity model was expounded by Osgood and Tannenbaum in 1955. This model asserts that human beings normally evaluate objects on a scale which runs from good to bad or any other scale with bi-polar adjectives. Since some evaluations are likely to be consistent while others are inconsistent, incongruent situations are not uncommon. When these situations exist, the individual experiences psychological tension which motivates him to change his attitude

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[17] Rosenberg, and R. P. "Abelson. An analysis of cognitive balancing", in C.I. Hovland and M.J. Rosenberg (eds.), Attitude Organization and Change (New Haven, Conn: Yale University Press, 1960), pp. 112-163.

toward the other person or toward the object.

It must be noted that the Congruity model goes further than the balance model in its specification of effects. While the balance model deals only with the signs of the relationships, the Congruity model incorporates both the signs and the intensity of the relationships. The latter specification is useful since it provides insights as to what changes are likely to occur in an incongrous situation.

According to Cohen, the congruity model approaches the study of the effects of persuasive communications by focusing on the links between sources toward which one has an attitude and objects towards which one has an attitude.[18] He further contends that "when assertions made by persuasive communications produce incongrous relationships between source and objects, attitudes change; and they change in the direction of increased congruity depending upon the sign and extremity of the initial attitudes toward the two members of the linked pair".[19]

Following the development of the Congruity model, Festinger propounded his theory of cognitive dissonance. He posits dissonant situations as ones where one cognitive element is not

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[18] Arthur R. Cohen, Attitude Change and Social Influence (New York: Basic Foods, Inc., 1964).

[19] Ibid., p. 68.

implied by the other. That is, if X implies Y, then holding

X and the obverse of Y is dissonant.

The major differences between dissonance theory and

the two previously discussed consistency models was succinctly

brought out by Cohen when he states that:

> Unlike the other formulations of incon-
> sistency...the theory of dissonance
> contains no assignment of positive,
> negative or neutral signs to cognitive
> elements in and of themselves. Rather
> it stresses the notion of psychological
> implication and assumes that dissonance
> results from the fact that one element
> follows from the obverse of another.
> More importantly, the dissonance
> formulation is unique in that it has
> something special to say about indivi-
> dual behavior...[20]

While Cohen emphasizes the differences between dissonance

and the other two Consistency models, Day has emphasized their

similarities. According to Day, these models are similar

partly because they share the basic assumptions that an

individual strives to achieve consistency within his cognitive

system and between his cognitive system and overt behaviour

and partly because they assume that inconsistency produces

a "psychological tension" which generates efforts to modify

or change the cognitive system.[21]

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[20] _Ibid._, p. 79.

[21] George S. Day, "Attitudes and Attitude Change", in Harold
Kassarjian and Thomas S. Robertson (eds.) _Perspectives in
Consumer Behavior_ (Glenview: Scott, Foresman and Company,
1972), p. 195.

These three models of the communication process are
similar to the linear models in that they regard the source
as the normal initiator of interaction. However, they
differ in that they allow for the existence of the active
role of the receiver. That is, they recognize that the
message-receivers can initiate communication. For instance,
when the individual receives an inconsistent message from
the mass media, he may engage in interpersonal communication
to get "social approval" of his having accepted or rejected
the message from the media.

Circular and Helical Models -

The third stage of conceptualizing the communication
process involved the introduction of the concept of feedback
in the linear models. This addition changed the previously
linear models into circular ones. The implication of this
addition is that a communicator and a receiver normally
exchange roles as communication proceeds. The temporal ex-
change of roles is a must in the case of face-to-face communi-
cation otherwise interaction is impossible. Feedback is
also present in case of communications through mass media
although it is less precise and more delayed than in face-
to-face situations. The mass media communicators receive
feedback through the rating of their messages by the audience
and, though more tenuously, through the overt behaviour of

the latter.

Today nearly all researchers and authors incorporate feedback in their diagrammatic representations of the communication process. However, Schramm[22] was perhaps the first researcher to present the notion of feedback in a schematic form. He illustrated the concept of feedback as in Figure II-2.

Figure II-2

MODEL OF THE EXCHANGE OF ROLES
BETWEEN THE SOURCE AND THE RECEIVER

[22] Wilbur, Schramm, "How Communication Works" in The Process and Effects of Mass Communication, ed. by W. Schramm (Urbana: University of Illinois Press, 1965), p. 8.

Circular models such as the one above are very common in
the communication and marketing literature[23] but are norm-
ally modified to clearly bring out the essential components
of a communication process.(Figure II-3).

Figure II-3

THE CIRCULAR MODEL OF COMMUNICATION

Who...   says what...   in what channel...   to whom...

...with what effect?

Further theorizing by Dance has overcome the implication
of the circular model that communication comes back to exactly
the same point from which it started. He argues that a helix[24]

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[23] See, for instance, Philip Kotler, Marketing Management
(Englewood Cliffs: Prentice-Hall, Inc., 1976), p. 324.

[24] Dance, "Toward A Theory of Human Communication," p. 296.

(Figure II-4) provides a more representative picture of what happens in a repetitive communication not only because it incorporates the forward-looking dimension of linear models and the feedback of the circular model but also because it avoids their weaknesses. In other words, he contends that the model he developed differs from previous models in that it explicitly brings out the dynamic nature of commucication process.

Figure II-4

The Helix

However, as Berlo had earlier pointed out, all communication models are by and large similar especially so far as identifying the components of communication is concerned. He concludes that:

> A comparison will indicate the great similarities among them (the models). They differ partly in terminology, partly in the addition or subtraction of one or two elements, and partly in the differences in the point of view of the disciplines from which they emerged.[25]

It appears appropriate to say that there is no "true" model of communication and that the choice of a model to be used should largely be based on the purposes to which it is put. Therefore, since the primary purpose of this research is to assess the effects of message content and source credibility, a circular model as depicted in Figure II-3 will suffice.

Up to now the review of communication models has been done without any reference to the type of message carried by the channel. That is, the message was assumed to be a general concept. However, if we limit the domain of message to new ideas and practices we are then concerned with adoption process models. This is the subject matter of the next section.

Adoption process models

Adoption process or innovation-decision process has been

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[25] Berlo, "The Process of Communication," P. 30.

defined as a mental sequence of stages through which an individual progresses from first awareness of the new product, idea, or practice to final acceptance or rejection.[26] The implication of this definition is that an individual's decision to accept or reject an innovation is not an instantaneous one. However, while everyone agrees that the stages exist, there is less agreement among researchers regarding the correct number of stages to be conceptualized and the labels to be given such stages. Some of the rival models which have have been propounded are schematically shown in Figure II-5.[27]

The "AIDA" model which is still empirically untested is the oldest and was originally developed to study personal selling efforts and advertising. This model views the decision-maker as passing through four stages: attention, interest, desire and action. The "hierarchy of effects" model was conceptualized by Lavidge and Steiner[28] and named by Palda.[29] As Figure II-5 indicates, the model is similar

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[26] Rogers, "Communication of Innovations," p. 99.

[27] Kotler, "Marketing Management," p. 326.

[28] Robert J. Lavidge and Garry A. Steiner,"A Model for Predictive Measurements of Advertising Effectiveness," Journal of Marketing, XXV, (October 1961), pp. 59-62.

[29] Kristian S. Palda, "The Hypothesis of a Hierarchy of Effects: A Partial Evaluation," Journal of Marketing Research, III (February 1966), pp. 13-24.

Figure II-5

MODELS OF BUYER READINESS STAGES

Stages	AIDA model (1)	"Hierarchy of Effects" Model (2)	"Innovation Adoption" (3) Model.
Cognitive Stage	Attention	Awareness ↓ Knowledge	Awareness
Affective Stage	Interest ↓ Desire	Liking ↓ Preference	Interest ↓ Evaluation
Behaviour Stage	Action	Conviction ↓ Purchase	Trial ↓ Adoption

to the "AIDA" model differing only in that it divides each
of the cognitive and behavioural stages into two sub-stages.
This model was developed to measure advertising effectiveness
(a form of communication) with sales as the criterion. It
must also be noted that both the "hierarchy of effects" model

and the "AIDA" model were never intended to apply to new-product situations only but to all product advertising.

The third model, innovation adoption model, was defined by rural sociologists in 1955[30] and was specifically concerned with the stages that potential adopters pass through before accepting innovations. Unlike the two previous models, the Adoption process model is based on empirical findings in agricultural contexts. However, all the three models share at least one common characteristic: they all depend on the INFORMATION-ATTITUDE-BEHAVIOUR (IAB) MODEL OF COMMUNICATION THEORY. This implies that the potential adopters must first be provided with information (knowledge) before their attitudes can change and their attitudes must change before they can adopt the innovation. Such an assumption for the innovation-decision process is very important since should the relation-ship between information, attitude, and overt behavior ever be discarded the models would be greatly weakened if not destroyed.

However, it is most unlikely that this will ever happen because the literature suggests that the relationship between attitudes and behaviour depends on, among other factors, situational circumstances. Some researchers contend that

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[30] North Central Rural Sociology Subcommittee for the Study of Diffusion of Farm Products, cited in Rogers, "Commu-nication of Innovations", p. 100.

instead of the INFORMATION-ATTITUDE-BEHAVIOUR (IAB) sequence, we have in, some situations, a BEHAVIOUR-ATTITUDE-INFORMATION (BAI) sequence.[31] Others argue that in situations where there is a low degree of involvement, the response sequence is INFORMATION-BEHAVIOUR-ATTITUDE (IBA).[32] The existence of these "rival" formulations illustrate the unsettled issue of attitude-behaviour relationship.

It is not the intention here to present a detailed literature review of this controversy.[33] As Pinson and Roberto conclude after reviewing the literature on the attitude-behaviour relationship "... the important question is not whether attitude precedes behaviour change but rather under what conditions does attitude change precede behaviour change".[34] In the case of adoption and the diffusion of innovations, it seems logical

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[31]

This sequence is advocated by Dissonance-Attribution Theorists. See, for instance, Festinger "Dissonance Theory".

[32]

Herbert E. Krugman, "The Impact of Television Advertising: Learning Without Involvement," Public Opinion Quarterly, XXIX (Fall, 1965) , pp. 348-356.

[33]

Several studies have been conducted which either support or fail to support one or another of these models. See, for instance, W.A. Wicker, "Attitudes Vs. Actions: The Relationship of Verbal and Overt behaviour responses to attitude objects," Journal of Social Issues, Vol. XXV (1969), pp. 41-78.

Henry Assael and George Day, "Attitudes and Awareness as predictors of Market Share," Journal of Advertising Research, Vol. VIII, #4, pp. 3-10.

[34]

Christian Pinson and Eduardo L. Roberto, "Do Attitude Changes Precede Behaviour Change?", Journal of Advertising Research, Vol. XIII, (August 1973), p.36.

to argue that an individual cannot start using a new product
that he is not even aware of. Thus if we limit the concept
of information (knowledge) to awareness, then intuitively it
appears logical to say that awareness precedes attitude and
usage behaviour. Once the individual becomes aware of a
new product he may either adopt it right away or engage in
an evaluation process whereby he compares the new product
with existing ones in some terms. Hence, either IBA or IAB formula-
tion may be appropriate. If the latter process occurs, as
is likely in situations where there is a completely new
product as opposed to modifications of existing products,
then we have knowledge preceding attitude and the latter in
turn preceding usage behaviour.

Empirically, there are several studies which have supported
the IAB formulation. In 1968, Assael and Day conducted a study
that examined the relationship over time of the intervening
variables of attitude and awareness to a measure of aggregate
purchasing behavior-market share. After analyzing the data,
the authors concluded that "changes in attitudes are more
closely related to subsequent behavior change than are
changes in awareness (and)...that attitude change precedes
rather than follows a behavioral change".[35] In rural socio-

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[35] Henry Assael and George Day, "Attitudes and Awareness as
Predictors of Market Share," Journal of Advertising
Research, VIII, #4,(1968) pp. 3-10.

logy the IAB Model is supported by Beal and others.[36] These findings support the notion that communication pertaining to innovations must take place to inform potential adopters about the innovations, to persuade them to accept their superiority over existing products, and hopefully, to lead them to try new products and practices.

In communications research, the effects of communication which have been measured include changes in receivers' knowledge, attitudes, and overt behaviour.[37] But these are the three broad categories of the adoption process depicted in Figure II-5. Therefore, it is logical to use the measures of knowledge, attitude, and overt behavior as the dependent variables of the present study since they comprise what has been termed innovative behaviour.

Operationally, the first two (knowledge and attitude) are internal and this is termed covert behavior.[38] The third

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[36] George M. Beal and others, "Validity of the Concept of Stages in the Adoption Process", Rural Sociology, XXII (1957), pp. 166-168.

[37] See, Carl I. Hovland, I. J. Janis and H. H. Kelley, Communication and Persuasion (New Haven: Yale University Press, 1953); Rao, C.S.S. and Moullik, T.K., "Influence of Sources of Information on Adoption of Nitrogeneous Fertilizers", Journal of Extensional Education, II (1966), p. 17; and Arturo Vasquez et al. "Circulars for Informing Poorly Literate Farmers", Journalism Quarterly, XLVII, pp. 535-8.

[38] Stewart Henderson Britt (ed.), Consumer Behavior and the Behavioral Sciences (New York: John Wiley and Sons, Inc., 1966), p. 141.

(overt behavior) takes place outside the individual and can be directly measured. However, the two types of behaviour are related. This was acknowledged by Britt when he stated that "there is no overt behavior which does not involve both covert and overt aspects." Therefore, our separation of receiver responses into overt and covert behavior is simply for analytical purposes.

To return to the three models of adoption (Fig. II-5), it should not be construed from the foregoing discussion that they are flawless. There are several problems which have been observed. These include (a) lack of feedback (it is assumed that the process is continuous and unidirectional); (b) lack of specific time at which a buyer may be said to have adopted the innovation; (c) failure to allow for "skipping of stages" or to collapse them as appears to happen in case of impulse buying; (d) the implicit assumption that the intervals between the stages are equidistant, and (e) non-consideration of new product attributes and receiver-characteristics upon which the decision-process would intuitively be expected to depend.[39] In an endeavour to overcome these weaknesses and incorporate new theoretical and empirical developments, Rogers reconcept-ualized the innovation adoption model.[40] This model is discussed below.

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[39] Robertson, "Innovative Behavior and Communication", pp. 61-63.

[40] Rogers, "Communication of Innovations", p. 102.

Paradigm of the Innovation-Decision Process

This model was designed to "account for the major criticisms raised about the five-stage adoption process, to profit from recent researches on the process, and to be consistent with the learning process, theories of attitude change, and general ideas about decision making."[41] As Figure II-6 indicates, the innovation-decision process stages were not only reduced from five to four but their labels were also changed to: knowledge, persuasion, decision, and confirmation. Rejection, as a possible outcome of the decision process, was also recognized. However, perhaps the most important modification to the original model was recognition of the fact that perceived characteristics of innovations, nature of social system, and audience characteristics are important inputs to the innovation-decision process. A brief review of these inputs to the process is in order since most of them will be the independent variables of the present study.

Perceived product characteristics include relative advantage or superiority of new products over existing ones; compatibility or the degree to which new products disrupt existing patterns of behaviour; divisibility or extent to which a product is capable of being used in small quantities;

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[41] <u>Ibid</u>., p. 103.

FIGURE II-6

PARADIGM OF THE INNOVATION-DECISION PROCESS*

(ANTECEDENTS)

(PROCESS)

(CONSEQUENCES)

RECEIVER VARIABLES

1. Personality characteristics.
   eg. dogmatism, fatalism.

2. Social characteristics.
   eg. social integration,
   cosmopolitanism,
   social mobility.

3. Perceived need for the
   innovation.
   eg. to produce more food
   to feed increasing family members.   ETC.

COMMUNICATION SOURCES

(CHANNELS)

KNOWLEDGE → PERSUASION → DECISION → CONFIRMATION →

ADOPTION → CONT'D ADOPTION / DISCONTINUANCE

REJECTION → LATER ADOPTION / CONTINUED REJECTION

SOCIAL SYSTEM VARIABLES

a. Social system norms.
   eg. norms pro innovation.
b. Communication Integration
c. Tolerance of Deviancy
d. ETC.

PERCEIVED CHARACTERISTICS OF INNOVATIONS

1. Relative advantage
2. Compatibility
3. Complexity
4. Trialability
5. Observability

TIME

*Rogers and Shoemaker, "Communication of Innovations," p. 102.

complexity or the degree of difficulty in understanding
and/or using the product; and observability or the extent to
which the results of an innovation can be communicated to
others. All these attributes (except complexity which has
negative relationship) have been found by some researchers
to be positively related to the innovation-decision process
while other researchers have failed to reach similar con-
clusions.[42] Intuitively, the notion of positive relation-
ships is appealing but studies which control all the variables
except the ones in question should be conducted otherwise we
cannot be decisive regarding the relationship between the
attributes and innovative behaviour.

To understand the importance of perceived characteristics
in terms of the communication process, the distinction between
significative and symbolic messages must be noted. Howard
and Sheth argue that the seller (source) communicates his
offerings (innovations) either by the physical product itself
(significatives) or by symbols (pictorial and/or linguistic)
which represent the product.[43] They add that significative
and symbolic communications are the two major means of inter-
action between sellers and buyers. Thus, in terms of our

[42] These studies are listed in Appendix A of Rogers, "Communi-
cation of Innovation", pp. 350-352.

[43] John A. Howard and Jagdish N. Sheth, "A Theory of Buyer
Behavior" in Perspectives in Consumer Behaviour, ed.
H. Kassarjian and Thomas Robertson (Glenview: Scott,
Foresman and Company, 1973), p. 535.

Figure II-7

PARADIGM OF MODERNIZATION
ANTECEDENTS AND INNOVATIVENESS[44]

ANTECEDENTS   CONSEQUENT

Literacy

Mass media exposure

Empathy

Social Status

Achievement motivation

Educational Aspirations   INNOVATIVENESS

Occupational Aspirations

Change agent contact

Cosmopolitanism

Opinion leadership

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[44] Everett M. Rogers, Modernization Among Peasants: The Impact of Communication (New York: Holt, Rinehart and Winston, Inc; 1969), p. 292.

communication model, <u>perceived characteristics of an innova-</u>
<u>tion belong to the message component</u>.

Perhaps the most researched component of the innovation-
decision process is that of receiver variables. The variables
that have been studied include age, education, literacy,
income, family size, social status, and opinion leadership
and their relationships with innovativeness where the latter
is defined as the degree to which an individual is relatively
earlier in adopting new ideas than other members of his social
system. This concept is related to the innovation-decision
process model in that the time period an individual takes
to move from awareness to trial of a new product determines
whether the person is an innovator or not. The variables
that are hypothesized to influence innovativeness, one dimen-
sion of innovative behaviour, are schematically represented
in Figure II-7.

Several studies have found a positive relationship between
the above receiver variables and innovativeness; others have
found a negative relationship; and still others have found
no relationship. Because of sheer volume of this kind of
research, it is neither feasible nor is it necessary to
review it here.[45] One thing is most obvious in terms of this

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[45] A summary of findings of these studies is found in Appendix
A of Rogers, "Communication of Innovations," pp. 346-385.

research literature: results are very inconsistent. This
inconsistency may be due to research methodologies used,
operationalization of variables, computational errors, and
so on. However, notwithstanding the inconsistencies in the
literature, it is intuitively reasonable to expect some of
the receiver variables to have influence on innovative
behaviour - particularly in developing countries. What follows
is a brief review of the major antecedent conditions depicted
in Figure II-7 that are of importance to this study.

Literacy, which has been defined as the degree to which
an individual possesses masterly over symbols in their written
form or is able to encode and decode written messages,[46] is
hypothesized as one of the receiver variables that influence
innovative behavior. This literature suggests that "literacy...
contributes to the modernization process (process of adopting
new technology) by: (1) providing the means for print media
exposure, (2) allowing the receiver to control the rate of
message input, (3) facilitating the retrieval of print
messages for delayed use, and (4) unlocking more complex
mental abilities."[47] From the literature, it is apparent that
there are only a few investigations that focus on the relation-
ship between literacy and innovative behaviour. Those studies
which have used literacy as one of the independent variables

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[46] Rogers, "Modernization Among Peasants".

[47] Ibid., p. 72

have found it to be positively related to innovative behaviour.[48]
For this reason literacy has been included in this study as
one of the receiver variables.

A second variable that is hypothesized to influence
innovative behaviour is opinion leadership. It is usually
construed to refer to the "degree to which an individual is
able to influence informally other individuals' attitudes
and overt behaviour in a desired way with relative frequency."[49]
This concept was developed by Lazarsfeld and others in a
study of political behaviour in the 1940 U. S. Presidential
election.[50] The researchers found that contrary to earlier
expectations regarding the flow of information, opinion
leaders first receive information from mass media and then
transmit it to their followers.

It is difficult to talk about the concept of opinion
leadership without simultaneously discussing the two-step
flow model of communication. Schematically, the model is
depicted as in Figure II-8. This model has received several

[48] See, for instance, Daniel Lerner, The Passing of Tradi-
tional Society: Modernizing the Middle East (New York:
The Free Press, 1958); Paul J. Deutschmann, "The mass
media in an Underdeveloped Village", Journalism Quarterly,
XL, pp. 27-35; and Howard Schuman et al, "Social Psycho-
logical effects and non-effects of literacy in a New
Nation", Economic Development and Cultural Change, XVI,
pp. 1-14.

[49] Rogers, "Communication of Innovations", p. 243.

[50] Paul F. Lazarsfeld, et al. The People's Choice (New York:
Columbia University Press, 1948).

Figure II-8

THE TWO-STEP FLOW MODEL OF COMMUNICATION

```
          ┌─────────────────────────┐
          │      MASS MEDIA         │
          └─────────────────────────┘
                       │
                       ▼
          ┌─────────────────────────┐
          │     OPINION LEADERS     │
          └─────────────────────────┘
                       │
                       ▼
          ┌─────────────────────────┐
          │       FOLLOWERS         │
          └─────────────────────────┘
```

criticisms because of its simplistic way of looking at the
communication process. Among these criticisms include the
observations that: (1) the model assumed that followers are
passive whereas they actively seek information from both
opinion leaders and from the mass media; (2) the model
dichotomizes opinion leadership while influence is a relative
term; (3) the model assumes that mass media and interpersonal
communication channels are competitive rather than complement-
ary and, (4) it fails to consider time of knowing about
innovations. In spite of these shortcomings, the concept of
opinion leadership is important, particularly in developing
countries where there is a shortage of mass media and of other
change agents. It is hypothesized that "change agent success

is positively related to the extent that he works through opinion leaders."[51]   That is, if he persuades opinion leaders in a social system they will in turn persuade other members and an innovation will diffuse more quickly and with less expenditure of money and time. However, there are several thorny problems which must be solved if the concept is to be of practical significance: opinion leaders must be identified, it must be determied whether there is opinion leadership overlap across different topics, and a method of appealing to them must be devised. Research findings on these issues have been inconsistent.[52] Despite these inconsistencies, it has been generalized that earlier adopters have a higher degree of opinion leadership than later adopters. Thus, there is the likelihood of a high relationship between opinion leadership and innovativeness (one of the dimensions of the Adoption Process).

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[51] Rogers, "Communication of Innovations", p. 243.

[52] See, for instance, Marcus, Allan S. and Raymond A. Bauer, "Yes: There are Generalized Opinion Leaders", Public Opinion Quarterly, XXVIII (1964), pp. 628-632; James H. Myers and T.S. Robertson,"Dimensions of Opinion Leadership", Journal of Marketing Research (Feb. 1972), p. 41; Charles W. King, Jr. and J. O. Summers, "Overlap of Opinion Leadership Across Consumer Product Categories", Journal of Marketing Research, VII (1970), pp. 43-50; J.O. Summers and C. W. King, "Overlap of Opinion Leadership: A Reply", Journal of Marketing Research, May, 1971), p. 259; and Silk, Alvin J. "Overlap Among Self-designated Opinion Leaders: A Study of Seleced Dental Products and Services", Journal of Marketing Research, VIII, pp. 255-259.

- 55 -

A third variable that is hypothesized to influence
innovativeness is interaction that an individual has with the
change agent where the latter is defined as a professional
who influences innovation-decisions in a direction deemed
desirable by a change agency.[53] Such contacts will not only
expose the potential adopter to various innovations but also
assist him in understanding how a given innovation functions.
Among the various roles of a change agent are to: "(1) develop
need for change, (2) establish a change relationship,
(3) diagnose the problem, (4) create intent to change in
the client, (5) translate intent into action, (6) stabilize
change and prevent discontinuances, and (7) achieve a terminal
relationship."[54] A potential adopter who has more contacts
with a change agent is more likely to benefit from technical
knowledge of the agent and, therefore, to be more innovative
than one with fewer contacts. Thus a generalization that has
emerged from empirical studies is that earlier adopters have
more change agent contact than later adopters.

Other factors that have been hypothesized in Figure II-7
to influence innovativeness are mass media exposure, social
status, achievement motivation, education aspirations,
occupational aspirations, and cosmopolitanism. The concepts
of opinion leadership and change agent contact which were

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[53] Rogers, "Communication of Innovations", p. 227.

[54] Ibid., pp. 229-230.

discussed above pertain to the role of interpersonal communication channels in influencing innovativeness. Exposure to newspapers, television, radio, magazines, and movies pertain to the role of mass media in determining how quickly any given member of a social system will adopt the innovation. Empirical evidence suggests that mass media exposure positively influences adoption but it must be noted that this is only true when the mass media carry messages which are pro-change. Cosmopolitanism, which has been defined as the degree to which an individual is oriented outside his immediate social system,[55] is closely related to mass media exposure since one can learn about the outside world by either travelling or by exposing himself to media from outside his social system. It is facilitated by socioeconomic factors (social status and economic resources), occupational roles, and personality factors (dogmatism, intelligence, flexibility and self-reliance). Research evidence in this area, by and large, indicates that cosmopolitanism is positively related to innovativeness although there are also a number of studies which do not support this view.[56]

In addition to the five receiver variables discussed above (literacy, opinion leadership, cosmopolitanism, mass media exposure, and change agent contact) there are several

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[55] Rogers, "Modernization among peasants", p. 147.

[56] Rogers, "Communication of Innovations", p. 369-371.

demographic variables which are hypothesized to influence
innovative behaviour. These variables include age, income,
family size, size of farm (which is regarded as a measure of
social status in peasant economies) and educational level.
As Schramm and White argued thirty years ago, "it is rather
rare that at least some of these characteristics do not
have a bearing on communications research."[57] Needless to
say, communication is only one of a host of factors that may
influence audience response. Other factors which correlational
studies have found significantly influential are economic,
demographic, and attitudinal variables. Therefore, these
variables are incorporated in the present study to facilitate
the comparison of responses by different demographic classes
of respondents.

Another set of variables which is expected to influence
the adoption process is the nature of the social system. In
rural sociology, a social system is defined "as the collect-
ivity of units which are functionally differentiated and
engage in joint problem-solving with respect to a common
goal."[58] Included in this definition would be social organ-
izations such as a tribe, members of a village, city and so
on. Thus, small coffee growers in Central Kiambu qualify as

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[57] Schramm, "Age, Education, and Economic Status: Factors in
Newspaper Reading", pp. 149-59.

[58] Rogers, "Communication of Innovations", p. 40.

a social system since they are all involved in coffee-growing, face similar production problems and belong to the same community - the Kikuyu tribe.

Empirical evidence indicates that social system variables (cultural norms, statuses and roles) have a high influence on the adoption process.[59] The literature has also suggested that social systems characterized by "modern norms" are more receptive to innovations than those characterized by traditional norms". Hence, other things being equal, one would expect smallholders in Kenya to be less receptive to farm innovations than farmers in North America. However, since the present study is not a comparative one, cultural norms and roles of the respondents will not be measured. But it must be noted that social system variables define the character of the audience and will, therefore, influence its responses to communications about innovations.

Finally, social system variables will definitely reduce the degree of generalizability of the research findings even within Kenya. As was mentioned in Chapter I, Kenya's population is composed of over forty ethnic groups whose cultural norms are somewhat different. This proposition has been propounded by several writers including O'Connor who observes that:

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[59] *Ibid*, Appendix A.

> Among some tribes (in Kenya) there is
> a strong resistance from the group as
> a whole towards the economic advance-
> ment of the individual...This situation
> is particularly evident among some
> Nilotic tribes, as illustrated by Luo
> resistance to land consolidation, and
> has probably contributed to the low
> level of economic activity in Nyanza
> (Province)...individual enterprise
> perhaps reaches its peak among the
> Kikuyu...The Kikuyu are standing out
> increasingly as an economically
> progressive group, in contrast to
> the tribes who adhere rigidly to
> custom and among whom new developments
> cannot take place until they have been
> agreed by all.[60]

If this observation is correct then the results of the
present study should not be generalized to the whole of Kenya
because of the diversity of cultural norms. However, it
appears correct to generalize the results to the whole of the
Kikuyu tribe which occupies the whole of Central Province and
some parts of the Rift Valley Province. Therefore, while
this study does not include social system variables as inde-
pendent variables, they will be used in the interpretation
of selected research findings.

In summary, it must be noted that the discussion in this
section has centered largely on the variables depicted in
Figures II-6 & 7. The dependent variables - the stages of
adoption process - were reviewed first and this was followed

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[60] O'Connor, "An Economic Geography of East Africa", p. 258.

by a somewhat lengthy discussion of the pertinent independent
variables. It was suggested that perceived characteristics
of innovations can be considered as significative and symbolic
elements of the message content. That is, the change agent
can design the message in such a way that the object of the
message (innovation) will be perceived as possessing relative
advantage over existing products, as being compatible with
current patterns of behaviour and so on. From there the
author reviewed in some detail a number of receiver variables
including opinion leadership and literacy and briefly hypo-
thesized their expected influence on the adoption process.
Finally, the possible impact of social system variables was
broadly delineated. The consequences of adopting or reject-
ing an innovation normally extends far into the future and
because of time and financial constraints, they will not be
studied here.

Simplication and interpretation of innovation-decision model in terms of a circular communication model

In the preceding sections of this chapter various communi-
cation models were reviewed and it was concluded that the
SOURCE-MESSAGE-CHANNEL-RECEIVER-EFFECTS (S-M-C-R-E) model is
most appropriate for the purposes of the present study. After
that, the adoption process model and the variables that deter-
mine this process were discussed in detail. While doing so, an

attempt was made to relate each of these variables to the communication components. This section will endeavour to simplify and interpret the innovation-decision process model in terms of our communication model.

Reorganising the positions of the variables and using the notational form of our corresponding communication model, where applicable, Figure II-6 can be transformed into Figure II-9 where,

FIGURE II-9

MODIFICATION OF THE PARADIGM OF VARIABLES
THAT DETERMINE INNOVATION-DECISION PROCESS

R = Message (significative as well as symbolic);

C = Channels (mass media and interpersonal);

S = Source of message and innovation including salesmen, extension workers, and sometimes the channels,

K = Knowledge level.

P = Persuasion which involves development of <u>favorable</u> or unfavorable attitude toward an innovation (=A).

D = Decision whether to adopt the Innovation (U) or to reject it (N) =B= overt Behavior.

O = Confirmation of the decision. That is, continued use or rejection of an innovation.

From Figure II-6 and the discussion which follows that figure, it is then clear that: A receiver's knowledge of an innovation = f (Receiver variables, social system variables, perceived characteristics of the innovation, and communication sources including channels of communication). But these variables can be replaced by communication components, as in Figure II-9, without loss of much information. Therefore, in notational form of Figure II-9, the equation becomes:

$$K = f(S, M, R, C)$$

similarly,

$$A = f(S,M,R,C)$$

and

$$B = f(S,M,R,C)$$

However, if the three dependent variables - knowledge, attitude, and overt behaviour - occur in a sequence, as proposed by diffusion researchers, the magnitude and direction of each dependent variable is influenced by the magnitude and direction of the preceding variable(s). In such cases, the revised equations become:

$$K = f(S,M,R,C)$$

$$A = f(K,S,R,R,C,)$$

$$B = f(K,A,S,M,R,C)$$

These three equations represent most, if not all, of the variables whose relationships will be reported on in subsequent chapters. But it must be noted that only the source of message (S) and the message content (M) will be manipulated in the experiment. The receiver variables (R) discussed in the preceding section of this chapter will be measured and partly used as independent variables in regression analysis and partly for classifying respondent scores on the dependent variables. The channel (C) will be represented by a mimeographed circular and since only one medium is in question, it will be difficult

to get a clear picture of its influence.[61] Its effects are confounded with those of the message and the source of that message.

Since the primary objectives of the present study are to assess the effects of source and message content, a more detailed theoretical and empirical review of these two concepts is in order. This is accomplished in the following two sections.

The Concept of Source Effects

The concept of source refers to the origin of a communication message. Such an origin may either be easy or difficult to identify depending on the circumstances of the communication-situation. In situations where a Speaker directly addresses an audience in a lecture-hall or a stadium, there is no question as to who is the source of the message. However, in situations where a business firm advertises its new products on mass media and hires a spokesman (actor or actress) to deliver the message, identification of the source of the message is no longer obvious. Some members of the audience may regard the spokesman as the source; others

[61] An example of how the impact of a channel can be determined is provided by: Paul Spector and others, Communication and Motivation in Community Development: An Experiment (Washington, D.C.: Institute for International Services, 1963).

may perceive the medium in which the message is delivered as
the source; and others may still refer to the company as the
source. All three entities (spokesman, medium, and company)
are to some extent a source of the message. To differentiate
these three components of the "source", some researchers have
introduced the concepts of primary, secondary and tertiary
sources to refer to company, medium and spokesman respectively.[62]

Each of these sources may produce different effects while
using identical messages. In addition, the same source using
the same message may produce different effects on different
individuals since some receivers are more influenced by
sources than others.[63] Writing in the same vein, Hovland et al.
stated that:

> Differences in (communication) effectiveness
> may sometimes depend upon whether the source
> is perceived as a speaker who originates the
> message, an endorser who is cited in the
> message, or the channel through which the
> message is transmitted. However, the same
> basic factors and principles probably under-
> lie the operation of each of the many types
> of sources, so an analysis of the psycholo-
> gical processes mediating the reactions to
> one kind of source may be expected to be
> applicable to other types.[64]

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[62] Hovland, "Communication and Persuasion,"

[63] Kenneth E. Andersen, Introduction to Communication: Theory
and Practice (Menlo Park, California: Cummings Publishing
Co., Inc., 1972), Chapter 3.

[64] Hovland, "Communication and Persuasion", p. 19.

If this is true, then we can talk about source effect in general without differentiating whether we are referring to primary, secondary, or tertiary source effects.

Perhaps the dimension of the concept of source that has received most attention, both theoretically and empirically, is source credibility which is hypothesized to comprise cognitive and affective sub-dimensions. The literature suggests that the most highly credible source would be the one which scores high on both sub-dimensions. It has further been hypothesized that the success of a communication will depend, sometimes to a considerable extent, on how the audience perceives the source, that is, on source credibility.

Several studies, mostly laboratory experiments, have been conducted in an attempt to establish the impact of the source in communication. In 1951, Hovland and Weiss[65] had "an identical message presented to a sample of Yale undergraduates by different communicators (sources) and the relative effects on opinions subsequently measured without explicit-reference to the position taken by the communicator." The resulting analysis showed that the difference between the average net change for the credible sources compared with the

[65] C. I. Hovland and Walter Weiss, "The Influence of Source Credibility on Communication Effectiveness," Public Opinion Quarterly, (Winter, 1951-52), pp. 635-650).

less credible sources was initially 14.1 percent although this difference tended to disappear with the passage of time.

A similar study was conducted by Kelman and Hovland in 1953.[66] These researchers divided a sample of 330 high school pupils into three groups. All three groups were presented with the same taped message urging leniency for juvenile delinquents but the communicator was different for each group. For group one the speaker was identified as a juvenile court judge; for group two he was identified as a member of the studio audience while for the third group he was referred to as a suspected dope-trafficker out on bail. The subsequent measures of attitudes revealed that the judge's audience showed most shift toward leniency for delinquents and the suspected dope-trafficker's audience showed the least change. It was, therefore, concluded that an audience's attitude toward the source of a message affects its response to the message.

A third experimental study, conducted by Tannenbaum,[67] attempted to assess the impact of original attitudes of the

[66] Herbert C. Kelman and Carl I. Hovland, "Reinstatement of the Communicator in Delayed Measurement of Opinion Change," Journal of Abnormal and Social Psychology, XLVIII, (1953), pp. 327-335.

[67] Tannenbaum, "Initial Attitude Toward Source and Concept as Factors in Attitude Change through Communication," pp. 413-25.

recipient of communication toward both the source of communication and the concept (object, message, etc.), The subjects were 405 undergraduate psychology students. The author summarized his findings by stating that:

> ...both these variables (source and concept of message) are significant in determining the amount of attitude change, both with respect to concept-shift, which until recently has been a subject for speculation but not for experimentation,. ...It was demonstrated that the interaction between these two variables is a significant factor.[68]

In the realm of advertising, Fuchs[69] conducted an experiment whose objective was to assess the effects of magazine and sponsoring company's prestige on attitudes toward unknown advertised products. The research findings of this study confirmed the hypothesis that attitudes toward the products are a linear function of the prestige of the two source components.

From the above studies it is evident that, at least in laboratory situations, how the communicator is perceived by the audience influences their responses to communication. This lead one author to conclude that "a basic proposition

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[68]
  Ibid., p. 425.
[69]
  D.A. Fuchs, "Two Source Effects in Magazine Advertising," Journal of Marketing Research, 1 (1964), pp. 59-62.

from laboratory experimental studies in communication is that
the degree to which an individual's attitudes change is po-
sitively related to the credibility with which he perceives
the source (or channel) of persuasive messages."[70]

It must however, be noted that laboratory studies have
several weaknesses which may make their findings problematic.
First, in laboratory situations the subjects are forcibly
exposed to the message whereas in natural situations selective
exposure is more common. Thus, it is difficult to know
whether or not those variables found operative in laboratory
studies will be operative in real life situations. Second,
laboratory studies almost always utilize high school pupils
and college sophomores because they are more readily accessible.
But as Tolman puts it, "college sophomores may not be people."[71]
Third, the studies reviewed above deal with issues in which
there is a low degree of personal involvement. For instance,
the topics anti-histamine drugs, atomic submarines, and
steel shortage used in Hovland-Weiss study may, be so far
removed from the daily interests of the respondents (students)
that responses made in an opinion-questionnaire do not really

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[70] Rogers, "Modernization Among Peasants," p. 184.

[71] Cited in Hovland, "Reconciling Conflicting results derived
from experimental and survey studies of Attitude Change."
pp. 8-17.

mean anything. However, notwithstanding these weaknesses, laboratory studies have demonstrated time and again that source credibility has an impact on communication effectiveness. This laboratory finding should be subjected to field experimentation to assess its impact in a natural context.

The Concept of Message Effects

Schramm[72] defines message in terms of signs where a sign refers to a signal that stands for something in experience. He goes on to add that for the message to have meaning to the receiver, the source must encode his message in such a way that the receiver will understand the signs transmitted. For this to happen the source and the receiver must have similar experience with regard to the signs. Schramm diagrammatically illustrated the concept of shared experience as shown in Figure II-10.

According to this conceptualization, other things being equal, the larger the shared field of experience (shaded area) the more effective the communication. This concept of shared experience is analogous to what has been termed homopily (and its mirror image - heterophily) where homophily is defined as "the degree to which pairs of individuals who

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[72]

Schramm, "How Communication Works," in The Process and Effects of Mass Communication," p. 61.

FIGURE II-10

THE CONCEPT OF SHARED EXPERIENCE BETWEEN
THE SOURCE AND THE RECEIVER

interact are similar in certain attributes such as beliefs, values, education, social status and the like."[73] It is hypothesized that more effective communication occurs when the source and receiver are homophilous. In the diffusion field, the source of an innovation and the potential adopter are largely heterophilous with respect to the innovation and therefore communicating effectively is much more difficult than in other situations.

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Rogers, "Communication of Innovations," p. 14.

Different writers have proposed different conditions which a message must fulfill for it to arouse the intended response(s). However, those propounded by Schramm appear to be as reasonable as any. To quote him:

> (1) The message must be designed and delivered as to gain the attention of the intended destination... ...the message must be available... The designing of a message for attention, then, involves timing, and placing, equiping it with cues which will appeal to the receiver's interests...
>
> (2) The message must employ signs which refer to experience to both source and destination, in order to 'get the meaning across'...
>
> (3) The message must arouse personality needs in the destination and suggest some way to meet those needs... (and)
>
> (4) The message must suggest a way to meet those needs which is appropriate to the group situation in which the destination finds himself at the time when he is moved to make the desired response.[74]

It is evident from these conditions that there are several dimensions of the concept of message. One of these - structure - seems to have received most attention. Possibly, this is

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[74] Schramm, "How the Communication Works," p. 13-15.

because it entails studying its technical aspects: one-sided versus two-sided arguments, conclusion drawing by the communicator versus by the receiver, and order of message presentation (primacy versus recency effect and climax versus anticlimax). Several studies have been conducted in an endeavour to solve one or another of these issues but the findings have been inconsistent.[75] Therefore, it is not very clear which one or other of the above versions should be applied in a given situation. However, the literature suggests that in structuring messages, the initial position of the audience, the audience's level of education, and its chances of exposure to counter arguments, among other factors, must be carefully considered.[76]

Another important dimension of message is its function or content where "content" is defined as the material in the message that is selected by the source to express his purpose.[77]

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[75] See, for instance, C. I. Hovland and Wallace Mandell, "An experimental comparison of Conclusion Drawing by the Communication and by the Audience," Journal of Abnormal and Social Psychology (July 1952), pp. 581-88; Hovland, Janis, and Kelley, "Communication and Persuasion".

[76] C. I. Hovland, A. A. Lumsdaine, and F. D. Sheffield, Experiments on Mass Communication, Volume III (Princeton, N.J.: Princeton University Press, 1948), Chapter 8.

[77] David K. Berlo, The Process of Communication: An Introduction to Theory and Practice (New York: Holt, Rinehart and Winston, 1960), p. 59.

Messages can attempt to convey information, alter perceptions, stimulate desires, produce convictions, direct action, or provide reassurance.[78] Thus, the choice of message content should be based on the purposes of communication and the stage of the adoption process the audience is in.

A scan of the literature indicates that this is still largely a neglected research area as was emphasized in Chapter I. However, there are a few studies which have incorporated message content in their design. Included here are studies by Barnes[79] (information content of the promotional phrase), Enis and Stafford[80] (various informational inputs) and Vasquez et al [81] (information on proper number of plants per acre and how to fertilize them properly). While this kind of studies are not many, they nonetheless suggest that message content is an important communication component which may substantially account for the type and even the intensity of response(s) of the audience.

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[78] Kotler, "Marketing Management," p. 332.

[79] Barnes, "The Communications effect of Selected Retail Price Promotional Advertising Cues," p. 114.

[80] Ben M. Enis and James E. Stafford, "Consumers' perception of product quality as a function of various Informational Inputs," in Marketing Involvement in Society and the Economy, ed. by P. R. McDonald (Chicago: American Marketing Association, 1969).

[81] Vasquez, "Circulars for informing poorly literate farmers," P. 256.

Conceptual Hypotheses

On the basis of the objectives set in Chapter I and theoretical and empirical discussion presented in the preceding sections of this chapter, it is now possible to state the conceptual hypotheses which will be tested in subsequent chapters. These hypotheses are that:

1. Message content will highly influence knowledge, attitude, and overt behavior of potential adopters of an innovation;

2. Credibility of the source of the message will also influence communication responses of potential adopters of an innovation;

3. Several receiver variables will influence knowledge, attitude and overt behaviour of potential adopters of an innovation and,

4. Because knowledge, attitude and overt behavior occur in that sequence, according to diffusion researchers, attitude is more highly related to overt behavior than knowledge is.

CHAPTER III

THE RESEARCH DESIGN

Introduction

In Chapter II, the innovation-decision process and its
determinants was expressed in terms of S-M-C-R-E model, and
the literature on source and message effects was reviewed.
Finally, the pertinent conceptual hypotheses were outlined.
This chapter will contain a development of the research
design including operational definitions of the relevant
variables which will test these hypotheses. To accomplish
this goal, the chapter sequentially deals with the experi-
mental design, research instruments, sampling procedure,
operationalization of independent and dependent variables,
questionnaire pretesting, a brief discussion of the
analytical tools which will be used in Chapter IV, and a
statement of operational hypotheses.

Experimental design

The overall research design used in this study entails
a survey with a before-and-after experiment embedded within
it. The experimental portion of the design involves estab-
lishment of necessary controls, introduction of relevant
stimuli, and taking before-and-after measurements. The
necessary controls are partly provided by two control groups,

one of which is premeasured and partly by statistical analysis.
The relevant stimuli (treatment variables) are message content
which has three levels (high information content, moderate
information content, and low information content) and source
credibility which has two levels (high credibility and low
credibility). Therefore, in Winer's terminology this is a
3 x 2 factorial experiment.[1] The design indicates that there
are six experimental cells each of which represents a sub-
sample. Schematically the design is represented by Table III-1.

TABLE III-1

A 3 x 2 FACTORIAL EXPERIMENTAL
DESIGN

Source	message M1	M2	M3
S1	S1M1	S1M2	S1M3
S2	S2M1	S2M2	S3M3

Where:

      M1 = Coffee-fertilizer news.
      M2 = General farming news.
      M3 = National Development news.
      S1 = Agricultural officer
      S2 = Local Cooperative Union officer

[1] B. J. Winer, Statistical Principles in Experimental Design
(New York: McGraw-Hill Book Company, 1962), Chapters 5-6.

As the table shows, there are six experimental groups
each of which is presented with a different combination of
the two stimuli. The stimuli will be presented to the
respondents via controlled information circulars. These
circulars will be distributed every Monday to sampled
smallholders for a period of ten weeks. The circulars or
newsletters were enclosed in envelops and addressed to
individual respondents. Because the cost of personal deli-
very to each and every respondent would have been prohibit-
ively high, the author decided to have all the envelops for
each week dispatched to respective coffee-factories for
onward delivery to the respondents.

The experimental duration of ten weeks was based on
pragmatic criteria on this matter. For instance, while
Menefee and Menefee[2] distributed their circulars for a
period of three months, Brown[3] distributed them for twenty-
seven weeks. Therefore, the author felt that weekly
distribution of the information circulars for ten weeks is
long enough a period to allow treatment variables to have
measurable impact. As Vasquez et al. observed there is "no

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[2] Menefee, "An Experiment in Communications in Four Indian
Villages," p. 149.

[3] Brown, "Communication and Agricultural Development: A
Field Experiment," p. 726.

evidence that shorter (and) more frequent letters do a better job than longer ones sent less frequently."[4]

Following Haskins'[5] terminology the experimental procedure is sketched as in Table III-2. The experimental procedure has six experimental and two control groups only one of which is premeasured. The design has, therefore, not only controlled for the unidentified extraneous variables but also taken care of the problem of reactive tests. Those variables which are identified are controlled statistically as discussed in Chapter IV.

The Experimental Stimuli: The Circulars

As mentioned above, the stimuli of the experiment are contained in three versions of a newsletter each of which was distributed to different groups following the experimental procedure requirements. The first version of the newsletter contains news pertaining to coffee-fertilizers. Included here are the names of coffee-fertilizers that have been recommended by the Ministry of Agriculture, the correct amounts of nitrogen fertilizer to be used in a year per acre, the correct time for fertilizer application, the right method of applying fertilizers to coffee plants, reasons why fertilizers should be

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[4] Vasquez, "Circulars for Informing Poorly Literate Farmers," P. 538.

[5] Jack B. Haskins, How to Evaluate Mass Communications, Advertising Research Foundation Monograph, 1968.

TABLE III-2

THE EXPERIMENTAL PROCEDURE

SAMPLE	TIME						
	t1	t2	t3	t4	...	t10	t11
Group I: (S1M1)	01X1	X2	X3	X4	...	X10	02
Group 2: (S1M2)	01X1	X2	X3	X4	...	X10	02
GROUP 3: (S1M3)	01X1	X2	X3	X4	...	X10	02
GROUP 4: (S2M1)	01X1	X2	X3	X4	...	X10	02
GROUP 5: (S2M2)	01X1	X2	X3	X4	...	X10	02
GROUP 6: (S2M3)	01X1	X2	X3	X4	...	X10	02
GROUP 7: (CONTROL 1)	01	XO	XO	XO	...	XO	02
GROUP 8: CONTROL 2)	NO	XO	XO	XO	...	XO	01

Where: S_i = Level of source credibility,

M_i = Level of message content,

X_i = Stimuli presentation (= Circular Distribution),

X_o = Absence of stimulus, and

N_o = Absence of measurement

01 and 02 = observations

used, distributors of fertilizers in Kiambu District, and the correct method of storing fertilizers. That is, the first version of the newsletter concerns itself with the questions of "what," "when," "where," "how much," and "why" of coffee-fertilizers. Therefore, this is defined as high information content so far as coffee-fertilizers are concerned. It must be noted that the newsletter is high on information content only as far as coffee-fertilizers are concerned, and not on any other product-area.

The second version of the newsletter dealt with general sources of farming news. Covered here are the major sources of farming information including names of available farming pamphlets published by the Ministry of Agriculture, agricultural shows, names of radio farming programs and when they are aired, neighbours as sources of farming news and so on. Thus, this information circular does not specifically deal with coffee-fertilizers. However, since it gives various sources of farming information some of which discuss coffee-fertilizers, it is contented that those who received this type of newsletter were given an opportunity to read about the subject-matter of the study. Needless to say, the message content here is less informative than in the first version since it does not directly deal with coffee-fertilizers.

Therefore, this level of information content was termed
Moderate level of information content. Simply put, the
difference between high and moderate information content
circulars is that those who received the first type were
"spoon-fed" with the relevant material while those who
received the second were told where to find it.

The third and final version of the newsletter is con-
cerned with news pertaining to national development with the
importance of agriculture inserted here and there. Included
here are issues such as the importance of education, self-
help projects, preservation of wild-life and health to
national development. This circular, therefore, neither
deals directly with coffee-fertilizers nor with farming.
However, it is contended that in reading issues about national
development, the recipients of this version of the newsletter
would ask themselves what they can do at an individual level
to either contribute to national development or to develop
themselves. This may trigger information search process
which may lead to exposure to coffee-fertilizer news. In
terms of adopting coffee fertilizers this message is assumed
to be the least effective and is, therefore, termed low level
information content.[6]

As we saw in Chapter II, the effects of the three circulars
may be explained by factors other than the message content.
These factors include the source of the message and the structural
and organizational characteristics of the newsletter.

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[6] See the circulars in Appendix B.

source effect has been controlled in this research study by making it a treatment variable. The structural and organizational variables were controlled by ensuring that all the three circulars are as similar as possible in terms of their structure and material organization. For instance, in terms of conclusion drawing the "source" of each circular drew the conclusion rather than letting the receivers draw their conclusions. This was thought reasonable because, as the literature suggests, where the receivers are largely uneducated and the product is technically complex, conclusion drawing by the source is in order. Another aspect of the structural and organizational dimensions of the circulars is length. The length of "coffee fertilizer news" is one and two-thirds pages; "general farming news" is one and one-third pages; and "National Development news" is one and one-half pages. The author does not consider this divergence significant. However, even if it was, the available empirical evidence suggests that length is not an important factor.[7]

The Research Instrument

Even when field experiments are conducted, the pertinent data have to be collected by survey method. The survey part of the present study was carried out through personal interviews. Mail questionnaires, while normally less expensive per completed return than personal interviews, cannot currently be used in the rural areas of Kenya because postal

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[7] Vasquez, "Circulars for Informing Poorly Literate Farmers", p. 538.

services are either completely lacking or are grossly in-
adequate. Similarly, the telephone technique of data col-
lection is ruled out because very few rural dwellers have
telephones in their homes. However, even if telephones
were available, the technique would still not have been used
because the variety and amount of data required by this
study are beyond the capabilities of the telephone inter-
viewing techniques. For these reasons, there was no alter-
native but to use personal interview together with a ques-
tionnaire.

There were three kinds of questionnaires which were
slightly different because of the nature of the research
design and the nature of the data that was collected by
each. The first questionnaire was designed to collect
benchmark data for the six experimental and the first control
groups and may be termed the "before" questionnaire.[8] This
questionnaire was divided into three major parts as follows:

Part I: This part of the questionnaire was designed to col-
lect data pertaining to behavioral aspects of the respondents.
That is, it sought to establish the subjects' fertilizer
usage (one of this study's dependent variable) before the
experiment started. It also collected data of usage or
possession of other agricultural innovations including coffee-

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[8] See Appendix A-1.

spray pumps, grade cows, usage of mobile bank facilities, agricultural training centres and advise of agricultural officers. These data together with those pertaining to the year when a respondent first planted coffee and also applied fertilizer to his coffee for the first time are used to determine respondents' innovativeness.[9]

Part II: The second part of the questionnaire sought to establish the knowledge level and attitude of the respondents with respect to coffee fertilizers. The data on knowledge was collected by a series of questions designed to reveal knowledge level of the respondents in terms of "what", "when", "where", "how to" and "why" of coffee-fertilizers. The author attempted to design the knowledge test in such a way that it tapped as much as possible the major components of the concept of knowledge: awareness knowledge, "how to" knowledge, and the principle knowledge.[10]

The subjects' attitude toward coffee-fertilizers was collected by ten statements which were designed to tap the

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[9] For previous use of these data in this manner, see J.R. Wish and K. M. Harrison, Marketing-One Answer to Poverty: Food Marketing and Economic Development in Puerto Rico, 1950-65. College of Business Administration in cooperation with Centre for International Business Studies, Eugene, Oregon, (1969) pp. 123-164.

[10] Rogers, "Communication of Innovations," p. 106.

respondent's evaluation (favorable or unfavorable) of coffee-fertilizers. It must be noted that the present usage of the concept of attitude entails a single component-evaluation. The author did not, therefore, concern himself with the other two components (cognitive and conative components) because these are already represented by knowledge and usage of coffee fertilizers.

Part III: It is clear from the above discussion that the first two parts of the questionnaire elicited information concerning the three dependent variables of the research reported here. The third part of the questionnaire collected data on pertinent independent variables. The variables on which data was collected include opinion leadership, media exposure, cosmopolitanism, and source credibility of six sources of agricultural news. Some of the questions and/or statements for measuring these variables were borrowed from the literature but others were specifically developed for the present study.

This part of the questionnaire also collected data on demographics including sex of the respondent, completed years of schooling (education), size of farm, income, age, number of unmarried children and type of dwelling in which the respondent lives. As mentioned in Chapter II, these data are used to classify the respondents.

The second questionnaire was designed to collect "after"

experimental data for the first seven groups of the sample which had also received premeasurements. This questionnaire is much shorter than the first one because only data on the three dependent variables were collected during the second interview. As in the "before" questionnaire, part one of the "after" questionnaire elicited behavioral data including fertilizer usage and coffee-berry deliveries to the factory. Part II-A elicited data on knowledge level and Part II-B on attitude toward coffee fertilizers.[11]

The third questionnaire elicited information from respondents of group eight (control 2) which was measured only once - after the experiment. This questionnaire is similar to the "before" questionnaire in many respects but it elicits a wider variety of information. That is, while it results in the collection of all the data that the "before" questionnaire provided, it goes further than that by eliciting data pertaining to behavior that occurred during the experiment such as fertilizer usage. Therefore, the third questionnaire is, by and large, a combination of the previous two.[12]

Other Issues of the Research Instrument

Conducting research in developing countries involves several problems which are nonexistent in developed countries.

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[11] See Appendix A-3.

[12] See Appendix A-5.

One of these problems is <u>language.</u> Even in a small country such as Kenya, there are forty ethnic groups each of which has its own language or dialect. In addition to these forty or so languages, Swahili and English are spoken although neither of them can be labelled the language of the majority. They are used variously as a lingua franca. Given these conditions, the problem that must be solved is whether the questionnaire should be in English, Swahili, or any of the many vernacular languages. Whether the questionnaire is in English, Swahili, or vernacular may have substantial impact on the results of the study.

Chivumbo[13] observes that "quite often research questionnaires (for conducting surveys in developing countries) are written in English and are administered in the vernacular languages. This creates a problem of wording to convey the exact meaning of the concept from the English language so that in both cases the concept refers to the same thing". The author felt that this problem can be minimized in two stages. The first stage involves restricting the area of study to one ethnic group. To this end all the respondents in the present study were Kikuyus. The second stage entails use of a questionnaire that is written in the vernacular.

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[13] A. Chivumbo, "Social Research in Malawi: A Review of some Methodological Problems encountered in the Field," <u>East African Journal of Rural Development</u>, III, (1970).

Thus, the questionnaire was initially written in English and then translated into Kikuyu. (Appendix A-2, A-4, and A-6).

Since language is a tool of communication, it is argued on a priori basis that, other things being equal, using a questionnaire written in a vernacular language will elicit more accurate responses than one written in English because no interviewer translation is needed. Allowing interviewers to translate the English text as they conduct interviews introduces some biases which can be eliminated by writing the questionnaire in the vernacular. Other problems of conducting research in developing countries which are nonexistent in developing countries have either been discussed earlier (for instance, the problem of not being able to use mail questionnaires) or will be reviewed in the relevant sections of this or subsequent chapter(s).

Operationalization of Major Independent Variables

In Chapter II the author discussed the various factors that are hypothesized to influence innovative behaviour. It was mentioned there that the message content and credibility of the source are the two treatment variables of the experiment. It was also conceded that several receiver variables are likely

to have some bearing on audience responses. This section briefly explains how message content, source crecibility, and selected receiver variables were operationalized.

The Message Content

As detailed in section three of this chapter, there were three kinds of materials representing the three levels of information content. The high information content level was represented by the coffee-fertilizer news circular. The circular specifically provides information on various aspects of coffee-fertilizers ranging from their brand names to how to store them. It is contended on an a priori basis that any circular that contains information about a particular product and nothing else is high information content as far as that product and those who are interested in its use are concerned but not necessarily high on content with regard to other products or to people who have no interest in the product.

The moderate level of information content is contained in the general-farming news' circular. This circular does not specifically deal with various aspects of coffee-fertilizers but provides information about sources of farming information in general. The sources of information discussed may contain farming information pertaining to fertilizers of different crops including those of coffee, proper planting methods, pruning, spraying, grading produce and so on.

Thus, so far as coffee-fertilizers are concerned, this circular has less informative potential than the previous one.

The third level of message content is even more general. The circular discusses some factors that influence national development including education, preservation of wild life (Kenya is highly dependent on tourism), and general health of the population. Dotted here and there are references to farming or to the role of farmers. This level of information content is the least informative as far as coffee-fertilizers are concerned and is therefore termed low level of inform- ation content. Some people may tend to equate this level of information content with a zero level but the author holds that bombarding smallholders, who are generally tradition- oriented with development-oriented messages, may trigger information search. This search process is likely to lead to exposure to coffee-fertilizer news. Thus, no matter how low this level of information content may appear to be, it is higher than a zero level.

From the above discussion it is clear that message content is operationalized as a categorical variable and therefore no quantitative measurements will be taken on this variable. Treating message content in this way agrees with the way the literature has operationally handled the concept of Message Content.

The Source Credibility

The second treatment variable is source credibility which has been defined as the degree to which a communication source is perceived as trustworthy and competent by the receiver(s) of message. There are several ways in which the concept of source credibility has been operationalized in the past. Hovland and Weiss, for instance, used a five-point scale ranging from "very trustworthy" to "very untrustworthy."[14] Whether this scale tapped the other component of credibility - competence - is difficult to determine. Rogers, on the other hand, sequentially presented Colombian peasants with six sources of information about agricultural innovation "in the form of all possible pairs and asked which source in each combination they felt was more credible"[15] It is evident here that the author measured source credibility as a unit rather than breaking it up into its components and then taking the measurements of the components. A similar measure of source credibility had been used earlier among Brazilian peasants by Herzog[16] and the results of the two studies were almost identical.

For this reason source credibility in this study will be

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[14] Carl L. Hovland and Walter Weiss, "The Influence of source credibility on communication effectiveness,: Public Opinion Quarterly (Winter 1951-52), p. 638.

[15] Rogers, "Modernization Among Peasants," p. 185.

[16] Ibid., p. 185.

measured by the same method and using more or less the same sources of agricultural news: neighbours, salesmen, radio, agricultural officer, cooperative union officer and news- papers. Needless to say, for the purposes of this study, the author is primarily concerned with the credibility of Agricultural officer and Co-operative Union officer and its effect on fertilizer adoption.

It is assumed on an a priori basis that the agricul- tural officer is more credible than the cooperative union officer because the former is more competent in the technical aspects of agricultural production. He is also more likely to be trusted by smallholders because he does not handle cash destined to smallholders. But the Cooperative Union officer who is concerned with both the processing of coffee and its marketing is likely to be suspected of "cash embezz- lement" and to be labelled a "parasite" who survives on smallholders' sweat. Hence, he is likely to be perceived as less credible than the agricultural officer. That is, the agricultural officer will represent the high credibility source of circulars and the cooperative union officer will represent the low credibility source. However, it should be noted that the Cooperative Union officer is only likely to be low in credibility when compared with the agricultural officer. When compared with other sources of farming news such as salesmen, newspapers and radio, the Cooperative Union

officer is likely to be higher in credibility. This propo-
sition was supported by the data as discussed later in the
chapter.

The Receiver Variables

So far the author has discussed how the two independ-
ent variables - message content and source credibility -
were operationalized. However, as presented in Chapter II,
there are some receiver variables which may highly influence
the adoption process. The receiver variables which have been
considered useful are literacy, opinion leadership, mass
media exposure, cosmopolitanism, social status, and general
demographics. Some of these variables are easily measured
while others pose measurement problems. A brief review of
how some of these variables will be measured follows.

Literacy: This concept has been measured in the past in at
least four ways: completed grades of schooling, ability
to write one's name, asking the respondent whether he can
read and write, and presenting a card to the respondent and
asking him to read its content. Each of these methods has
its advantages and disadvantages. The "completed grades of
schooling" method has the advantage of simplicity once the
cut-off grades of schooling are determined. Unfortunately,
some people included in the literate categories may be
functionally illiterate if they have spent a long time doing

no or little reading and writing after leaving school. The
second method, ability to write one's name, is also relatively
simple but there are many people who are able to write their
name but nothing else. Hence, this measure would tend to
exaggerate the number of literates in the social system. The
third method, asking the respondent whether he can read and
write, has the advantage of collecting the data more quickly
since the interviewer has only to check "Yes or No". Its
usefullness, however, involves problems of social desirability".

The fourth method, presenting a card to the respondent
and asking him to read its content, is more objective than
the abovementioned measures. The technique has been success-
fully used by Rogers[16] to measure literacy among Colombian
peasants, by Ascroft[17] among villagers in Western Kenya, and by
Spector et al.[18] among Ecuadorean respondents. It, therefore,
appears justifiable to use the same measure in this study. The
eleven-word Kikuyu sentence which will be used to measure func-
tional literacy is: MUTHOMI MUUGI NI URIA UIKAGIA MAITHO MBERE
YA KIUGO KIRIA ARATHOMA (A smart reader is the one who

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[17] Rogers, "Modernization Among Peasants", pp. 75-78.

[18] Joseph R. Ascroft, "A Factor Analytic Investigation of
Modernization among Kenyan Villagers", (Unpublished
M.A. Thesis, Michigan State University, 1966).

[19] Spector, Communications and Motivation in Community
Development: An Experiment (Washington, D.C.: Institute
for International Services, 1963).

casts his eyes to the word following the one he is reading).
This sentence contains sixteen (84%) of the nineteen Kikuyu
language letters. Therefore, it is reasonable to assume
that any subject who reads all the words in the sentence can
read any material written in Kikuyu. Thus, the level of
functional literacy in the present study is measured by the
number of words that a subject correctly reads. An obvious
weakness of this measure is that the words are not arranged
according to a Guttman scale. That is, they are not arranged
according to increasing level of difficulty. When this
arrangement is attempted, the sentence no longer makes sense.
The author, therefore, decided to use the sentence as it is.

Opinion Leadership: The literature suggests that opinion
leadership can be measured in three different ways: socio-
metrically, by the use of judges who are expert on what is
going on in a given social system, and by the self-designating
technique. The first method- sociometric - involves asking
everybody in the social system being studied to name any
person to whom he turns for advice or information with those
receiving the greatest number of mentions being termed leaders.
Needless to say, this technique is appropriate where the
research is studying the whole population. Hence, the tech-
nique is not appropriate in this study. The second method -
use of judges - requires asking experts in a given community

to indicate who the opinion leaders are. This technique is also inappropriate here because it works well when the whole community is studied. That is, use of expert judges when only a portion of the community is studied is likely to result in waste of research funds because the identified opinion leaders may not be among the sample respondents.

The third technique - the self-designating technique - entails asking a sample of respondents to indicate to what extent they believe that others in the community regard them as opinion leaders. The most popular question has been: "Do you think people come to you for information or advice more often than they go to others?" This approach is most appropriate when a researcher is working with a sample rather than a total population and is, therefore, the one that will be used here. However, instead of asking only one question, six questions will be asked in order to tap both general specific opinion leadership. It must be noted that the validity of this technique is dependent upon the accuracy with which respondents are able to identify and report their self-images. But the technique is still useful here because how the respondents perceive themselves will be related to how they will behave.

Although this study has utilized the self-designating technique because of its simplicity and appropriateness where samples rather than whole communities are studied, the three

techniques have in the past been found to have results which
are positively correlated.[20] For instance, Havens found that
self-designating opinion leadership scores were correlated
+.300 with the number of sociometric choices, and +.640 with
composite opinion leadership ratings by four key informants.[21]
Thus, it appears reasonable to conclude that the choice of
which technique to use should be weighted in terms of whether
the researcher is gathering data from a sample or from a
whole community.

Mass Media Exposure

Mass media exposure was measured by asking respondents
to indicate the number of magazines and newspapers read within
the last specific time period; the number of times they
listened to the radio; and the number of movies seen within
the last one year. Since the units of measurements of these
components of media exposure are not the same converting all
measurements to standard scores was deemed necessary. Once
standardized, the scores were then summed to get a mass
media exposure index.[22]

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[20] Everett M. Rogers and Cartano, "Method of Measuring Opinion
Leadership," Public Opinion Quarterly, XXVI, pp. 435-441.

[21] Ibid., p. 441.

[22] See Appendix B-7 for the items summed to get a mass media
index.

Cosmopolitanism

Cosmopolitanism, the degree to which a subject is oriented outside his community, will be measured by the number of trips made in the previous three months to district and divisional headquarters, Waruhiu Farmers' Institute, Jacarada Coffee Research Station, Muguga Research Station, and Nairobi.[23] This measure considers only one dimension of cosmopolitanism - physical movement to places "outside"[24] the Kikuyu Community. However, the literature suggests that there are at least two dimensions of cosmopolitanism - physical and mental.[25] The latter involves learning about the outside world by reading newspapers, magazines, and listening to the radio. But exposure to these mass media are measured by media exposure index. Therefore, for the purposes of this study, cosmopolitanism will refer only to physical travelling to places "outside" the immediate social system. It is worthy noting that while places like Waruhiu Farmers' institute are geographically located within the community under study, it is still logical to regard them as "outside" places partly because the course materials are by and large novel to local residents.

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[23] See Appendix A-1, Q. 10.

[24] The term "outside" is used figuratively because some of the places listed above are geographically within the Community. However, sociologically they are outside the Kikuyu community either because their operations are national in outlook or because some of their personnel are from outside the community.

[25] Rogers, "Modernization Among Peasants," pp. 150-151.

Demographics

Several other independent variables including age, income, education, number of unmarried children and farm size (a measure of socioeconomic status in peasant societies) will also be measured. Operational definitions of these variables are direct and therefore no detailed discussion of their measurement is needed. However, this does not mean that they are normally reliably measured. In developing countries their measurement is particularly crude since many respondents rarely neither know how much money they make in a year nor are they sure of when they were born. Crude as these measures may be, it is assumed that the law of large numbers will prevail so that taken on the whole, the measures will have enough realibility to permit pertinent analysis.

Operationalization of the Dependent Variables

Following from what has been discussed thus far, the three dependent variables of this study are knowledge, attitude, and usage of coffee-fertilizers. A respondent's score on each of these variables was determined by responses to various questions and/or statements included in the questionnaire. A brief description of how each of the three dependent variables was measured follows.

The dependent variable knowledge was measured by a series of questions which appear in part II, section A, of the ques-

tionnaire. These questions were selected for their relevance to the subject matter of coffee-fertilizers. That is, all the questions are seeking some "knowledge" about coffee-fertilizers and are therefore said to have face validity. The questions were also selected so that they as much as possible tap the three dimensions of the concept of knowledge - used by Rogers and others in the innovation research tradition - awareness knowledge, "how to" knowledge and principle knowledge[26] as discussed earlier.

Determination of individual scores involved a count of the number of questions a respondent answered correctly. This means that we are dealing with a "right-wrong" method of scoring where if a correct answer is given the respondent gets a score of "one" and if the answer is wrong he gets a score of "zero". The individual total score then is the sum of all correctly answered questions. But while Part II of the questionnaire contains fourteen questions, the maximum obtainable score is twenty-four because some questions contain two or more parts and each part of the question carries a potential score of one or zero.

The above discussion suggests that all questions and/or parts thereof were equally weighted. It was felt that an attempt at differential weighting would be too arbitrary there

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[26]

Rogers, "Communication of Innovations", p. 106.

being no apparent basis for so doing. This approach to
scoring the knowledge variable is common in diffusion and/or
communication research[27] and is therefore followed in this
study.

The dependent variable attitude is more difficult to
operationalize than knowledge. The literature does not give
clear-cut guidance in this regard as several approaches to
its measurement exist. Some researchers use standard attitude
scales such as the one developed by Likert; others use indices
across various verbal items which may or may not have been
subject to some selection procedure; and still others use a
single statement of feelings, knowledge, or intentions. Given
this situation it was decided to operationalize attitude
through a series of statements which were selected for their
relevance to coffee-fertilizers. That is, the author was con-
cerned with measuring attitude toward a specific innovation -
fertilizer - rather than toward all innovations. The state-
ments were therefore tailor-made for this particular study.
It must also be noted that the author was only concerned with
one dimension of attitude - the evaluative dimension. Several
attitude researchers have conceptualized attitude as having
three dimensions - cognitive, evaluative and conative dimen-

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[27]
  See, for instance, Menefee and Menefee, "An experiment
  in Communications in Four Indian Villages."

sions[28]. It was felt that the Cognitive dimension was tapped by knowledge and the Conative dimension by the usage behavior. Thus the attitude measure of this study is concerned with measuring only the evaluative dimension. Put another way, the attitude measure for this study is a single dimension measure.

The attitude scale used here is a Likert type of scale with six intervals ranging from strongly agree (=6) to strongly disagree (=1). An individual's attitude score is obtained by summing his scores across the test-statements. However, since five of the statements are negatively scored while the other five are positively scored, the scores of negatively scored statements are reversed before summation. The score thus obtained represents the respondent's attitude measure.

On the face of it, operationalization of the dependent variable usage of fertilizer appears straighforward; simply ask the respondents to state how many kilograms of fertilizer were applied to his coffee during a specific time period. In actual fact, however, measurement of usage is not all that simple particularly when one is concerned with assessing usage of fertilizer that is due to experimental factors. In general, usage may be a function of prices, size of farm,

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[28] H. C. Trandis, Attitude and Attitude Change (New York: John Wiley and Sons, 1971).

number of coffee trees, weather conditions and several other
factors. The prices for the 1976/77 season were not different
from those for the 1975/76 season.[29] However, even if they
were different, there would be no reason to expect one ex-
perimental group to be more influenced by the price than
another. This is so because the groups were not significantly
different from each other with respect to annual income and
family size as discussed in Chapter IV.

The problem posed by different farm-sizes was overcome
by measuring usage per acre as opposed to the absolute amount
applied to coffee trees. That is, the author was concerned
with the intensity of usage (the issue of number of coffee
trees owned was handled statistically as described in the
following chapter). There are likely to be a host of other
environmental factors that may encourage or discourage fer-
tilizer application but these are likely to influence all
experimental groups equally. In addition, the inclusion of
control groups in the research design ensures that the effects
of these environmental factors can be measured. For these
reasons, it was felt that <u>measuring usage in kilograms per
acre was appropriate</u>.

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[29] The retail prices for the three major types of coffee-fer-
tilizer provided to me by officials of Ministry of Agri-
culture showed that there was no price change between the
1975/76 and the 1976/77 seasons. The fertilizer retail
prices are set by the government.

Pretesting the Questionnaire

A sample of thirty farmers in a sublocation other than the ones which were selected for the major study, but in Central Kiambu, was used to test all parts of the questionnaire. A pre-test sample of this size was deemed sufficient for the purpose of questionnaire testing since the objective here was to discover any major weaknesses of the research instrument and to develop appropriate scales.

Taken as a whole, the pilot study was concerned with providing answers to several questions including the following: Would the respondents be able to understand the research questions? If they did, would they be willing to provide answers to an interviewer? Would the answers elicited be amenable to analysis?

The second objective of the pilot study was to establish whether or not the respondents in the main study would cooperate. Although this problem also exists in developed countries, it is much more serious in developing countries where suspicion of strangers is more predominant. Respondents may refuse to cooperate because of fear that the interviewer may be a tax official or any other government official who is suspected of trying to "catch" them.

Needless to say, it was not possible to assess in exact

terms the degree to which the pilot study's respondents dis-
torted their responses if at all. Irrespective of the re-
search site, the problem of giving "socially desirable"
answers is always there but the author learned from the pilot
study interviews that respondent cooperation was not going
to be a problem in the main study.

The third objective of the pilot study was to discover
whether the research instrument elicited pertinent information.
That is, the pilot study was conducted to evaluate the content
and the format of the questionnaire. The results of the pilot
study and the author's experiences during the interviews led
to modifications of some questions and/or statements and to
elimination of others.

The data from the pre-test were also used to develop
measurement scales. As far as the dependent variable knowledge
is concerned, the subjects responded to twenty-one questions.
Their scores were determined by assigning a score of one to
each question if the response was correct and a zero score if
it was incorrect. The minimum obtainable score was therefore
zero and the maximum twenty-one. No weighting was attempted
because, as mentioned earlier, the author did not have any
theoretical or practical rationale for arguing that some
questions were more important than others. Thus, in terms of
a Guttman scale, it was not possible to arrange the items in

terms of their level of difficulty.[30]

Once the scores were obtained, the author carried out principal component analysis to determine whether knowledge as measured here was three-dimensional as proposed by Rogers and other communications researchers[31] or unidimensional. The results of this analysis are presented in Table D-1 (Appendix D).

From D-1, it is clear that out of 21 questions and/or statements only 14 were retained. Four statements were eliminated because they had a standard deviation of zero and the remaining three were discarded because they had a loading of less than .30. To improve the face validity of measurement of knowledge, the author added several statements which were expected to load on one or other of the three factors. For instance, "Necessary ingredient that all coffee-fertilizers must contain" was added to the list and was expected to load on Factor 1; "Right method of fertilizer application" was added and was expected to load on Factor 2; and finally, "Current prices of CAN, ASN, and SA brands were added and were expected

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[30] Louis Guttman, "The basis for scalogram analysis," in Samuel A. Stouffler and others, Measurement and Prediction (Princeton: Princeton University Press, 1960), pp. 60-90.

[31] Rogers, "Communication of Innovations," p.106. The three dimensions of knowledge have been hypothesized to be Principle Knowledge, "How to" knowledge, and the awareness knowledge.

to load on Factor 3. As a result of this addition, the knowledge scale comprised twenty-four statements and/or questions all included on basis of their loading on one of the three factors or because of their face validity.

With respect to the attitude scale development, the thirty respondents in the pre-test sample were sequentially presented with fifteen statements and were asked to indicate their level of agreement or disagreement with each of the statements on six-point Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (6). The data collected were then subjected to a principal components- Factor Analysis with the restriction of one factor as a maximum.[32] Five of the fifteen variables had an **absolute** loading of less than .40 and were therefore eliminated from the scale.

The next step in scale construction involved computation of item-total correlations (internal consistency) for the retained ten statements. This is an acceptable measure of scale reliability.[33] The factor loadings of the items com- prising the attitude scale and the corresponding consistency coefficients are contained in Table D-2.

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[32] D. J. Armor and Arthur S. Couch, Data-Text Primer: An Introduction to Computerized Social Data Analysis (New York: Free Press, 1972), p. 72.

[33] For all items which loaded negatively, the scores were reversed before computation of internal consistency coefficients.

So far as source credibility is concerned, it was required to determine which of the two sources of agricultural news - the agricultural officer and the local Cooperative union officer - was perceived as giving more credible information about farming. However, to conceal the sources of agricultural news which were of interest to the researcher, the respondents were successively presented with all possible pairs of six sources of agricultural news (Newspapers, neighbour, salesmen, radio, local cooperative union officer and agricultural officer). For each pair of sources they were asked to give their opinions as to which one they thought gave more credible information. Since there are six sources of news and the order of presentation does not seem to matter in this case, there resulted fifteen combinations of pairs of the stimuli (that is, $n(n-1)/2$). Of the thirty respondents, only one was eliminated from the analysis because of inability to respond.

With these data, it was possible to use the paired-comparison method to develop a source credibility scale. A brief review of how the scale was constructed is in order. The first step entailed compiling a table which shows the number of people who said one or the other source of information was more credible. The necessary data are presented in Table D-3.

The figures in Table D-3 can quite easily be converted

into proportions simply by dividing each cell-entry by the sample size (that is, by 29). These proportions are contained in Table D-4. Given these proportions and assuming normal distribution,[35] the proportions can be transformed into normal deviates. These normal deviates are presented in Table D-5 and were derived from Winer's table B.1.[36] By summing the normal deviates for each row the credibility scale values are obtained. These values can now be ranked from the highest to the lowest as shown in Figure III-1.

FIGURE III-1

SOURCE CREDIBILITY SCALE

salesmen	Newspaper	Neighbor	Radio	local coop. officer	Agricultural officer
-3.91	-3.04	-2.731	.59	2.02	7.07

It is evidently clear from Figure III-1 that the agricultural officer enjoys higher credibility than the local cooperative union officer as far as farming news is concerned. Thus in the main study, the agricultural officer was deemed to

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[35] Shizuhiko Nishisato, Elements of Scaling (Toronto: Department of Measurement and Evaluation, The Ontario Institute for Studies in Education, Part 1, 1975), Chapter 7.

[36] Winer, "Statistical Principles in Experimental Design", P. 640.

represent the <u>high credibility source</u> and the local cooperative union officer the <u>low credibility source</u>.

The Sampling Procedure

As indicated in table III-2, the sample used in this study comprised six experimental and two control groups. In the first wave, each of the seven groups had fifty respondents making the total sample four hundred respondents. A larger sample was not feasible because of financial and time constraints. Since each subject was to be interviewed twice - before and after the experiment - a larger sample than used here would have swelled the research expenses tremendously. This is particularly so in case of personal interviewing in rural Kenya partly because of transportation problems and partly because of the difficulty of locating preselected subjects.

Sampling was restricted to small coffee growers in Central Kiambu (Kiambaa and Githunguri Divisions) partly because different fertilizers are recommended for different crops and partly because not all small farmers in Kiambu grow coffee. For instance, with respect to fertilizers, while three kinds of fertilizers (ammonium sulphate nitrate, Calcium ammonium nitrate, and sulphate of ammonia) are recommended for coffee, there is only one fertilizer recommended for tea (25-5-5).[37] In view of this, a smallholder who grows tea but

[37] <u>Crop Production Pocket Book</u> (Nairobi: Agricultural Information Centre, Ministry of Agriculture, Kenya, January 1976).

not coffee should neither be expected to know about coffee
fertilizers nor would such information be relevant to him
if he were exposed.

Another reason why sampling will be confined to Central
Kiambu is that in addition to recommended fertilizers differ-
ing from crop to crop, they differ from district to district
even for the same crop.[38]   The reasons for these differences
are divergence in soil acidity, altitude above sea-level,
and climatic conditions. Needless to say, these differences
also exist to a lesser degree within the same district but,
at the risk of generalization, the agricultural advisers in
Kenya have made their recommendations on a district basis.
To reduce the risk further, the author decided to confine his
sampling area to two contiguous divisions in the district.
This decision is reasonable because it is more likely for two
adjacent divisions to be similar in terms of altitude above
sea-level, soil acidity, climatic conditions, and level of
economic development than another division several miles away
but within the same district. The reason for using two divi-
sions rather than one is to get sufficient sampling areas so
as to minimize contiguity of experimental groups.

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[38]
   Personal Conversation with Dr. Coenraad H. H. te Kuile,
   Senior Agricultural Adviser and F.A.O. Representative to
   Kenya.

The sampling method to select the four hundred respond-
ents was a multistage one. A brief discussion of the method
follows. For administrative purposes, as alluded to at the
end of Chapter I, Kiambu District is divided into divisions
which are in turn divided into locations which are further
segmented into sublocations. The first step in sampling
entailed listing all sublocations in Kiambaa and Githunguri
divisions (Central Kiambu) which are outside "settled"
areas[39] and where coffee growing occurs. This procedure
yielded eighteen sublocations. The second step involved the
random selection of eight from the list of eighteen sub-
locations. To ensure randomness of selection, all the eighteen
sublocations were numbered serially so that each number had
two digits in it. Then a random number table was used to
select eight sublocations following the procedure described
by Rummel and Ballaine.[40] However, the selection was somewhat
modified to reduce as much as practically possible the con-
tiguity of selected areas. This minimization of contiguity
of selected sublocations is necessary to reduce possible
contamination of one group by others.

Once the eight areas were selected, the next sampling

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[39] "Settled" areas are large-scale farms which were previously
run by white settlers.

[40] J. Francis Rummel and Wesley C. Ballaine, Research Methodo-
logy in Business (New York: Harper & Row, Publishers, 1963),
pp. 70-71.

step entailed determination of potential respondents in each area. An effort to locate one central place where a list of all small coffee growers in the eight sublocations is maintained, if at all, proved fruitless.[41] Therefore, the author personally visited the coffee-factory head office of each sublocation to obtain a list of the members of each Coffee Cooperative Union. Conversation with the respective managers revealed that the members' names were arranged according to when they became members. That is, if A became a member of the "Union" in 1966 and B became a member of the same union in 1968, the membership number of A was numerically smaller than that of B. No other considerations were present: quantity of coffee-berry delivered, size of farms, and number of coffee trees owned did not influence the listing of names of the growers. Therefore, a systematic sampling procedure was used to select a sample of fifty growers from each of the eight sublocations. This process involved selecting every nth name in the List of N names where n is less than N and N divided by n equaled fifty. The smallholders thus selected became the respondents of this study.

The third and final step of the sampling procedure

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[41]
    The author contacted Kiambu Coffee Growers Cooperative Union, Coffee Board of Kenya, and Central Bureau of Statistics and none of these institutions had the list.

involved random assignment of experimental stimuli to the
eight groups. The assignment procedure paralleled that of
selecting the eight sublocations. Table III-3 shows the eight
selected areas and the treatment combinations to which each
sublocation was to be exposed. It is felt that the sampling
procedure described here incorporated the **advantages of**

TABLE III-3

THE EIGHT SELECTED SUBLOCATIONS AND
THEIR CORRESPONDING EXPERIMENTAL STIMULI

GROUP #	NAME OF SUBLOCATION	MESSAGE CONTENT	SOURCE
1	NDUMBERI	HIGH	HIGH
2	KIAMBURURU	MODERATE	HIGH
3	IKINU	LOW	HIGH
4	GIATHIEKO	HIGH	LOW
5	GATHUGU	MODERATE	LOW
6	KIBICHOI	LOW	LOW
7	NYAGA	CONTROL 1	-
8	WAGUTHU	CONTROL 2	-

probability sampling and resulted in a representative sample
of subjects.

Data Gathering - All three questionnaires[42] described earlier
were prepared by the author and were then cyclostyled by The
Research Bureau (East Africa) Ltd. for data collection. The
Bureau also provided six interviewers and one supervisor all
of whom were its regular staff members. Since Kikuyu was the

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[42] See Appendix A for the particulars of each questionnaire.

medium of interviewing, all the participants in the survey were Kikuyus though not necessarily from Kiambu District. Prior to their dispatch to the field, the author, the interviewers and their supervisor held several meetings whose objectives were to explain to the interviewers how they were to go about locating the respondents; how to conduct interviews once the subjects were located and to clarify any ambiguities or questions the interviewers had. These meetings proved their worth in several ways. For instance, after some discussion it was agreed that since the author was already known by the officials of coffee-factories,[43] he should visit them again prior to the start of the interviews to request them (the officials) to provide a "guide" to the interviewers at least for the first few days. This was necessary because in Kenyan rural areas there are no sign-boards to show who owns which farm.

Once interviewing started, there were occasional meetings with the interviewers and/or the supervisor to discuss any problems that might have arisen. The author also occasionally travelled to the field to check how the interviewing was progressing. It is therefore contended that the data collection process went on smoothly.

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[43] The author had already visited the factories during the sampling stage.

The Analytical Models

The major analytical model used in this study is analysis of variance which involves statistical comparisons of more than two-group mean scores. There are three models of analysis of variance to be considered for use in the analysis of experimental data. The first of these models is called the random model and is appropriate when the levels of the pertinent factors are randomly selected from a population of all levels of the factor(s) in question. When all the factors are fixed the model is termed a fixed model because the levels of the factor are fixed by the researchers. In cases where some of the levels are fixed and others are randomly selected, the researcher uses a mixed model in his analysis. Defining the model being used is necessary because the way the main and interaction effects are statistically tested is dependent on the assumed model.

In the present study, the author fixed the levels of the two factors and therefore use of a fixed model is called for. It has been suggested in the literature that when a fixed model is used, all tests of the main and interaction effects should use the mean error sum of squares (MSE) as the denominator.[44] Therefore, all tests in the following

[44] Seymour Banks, Experimentation in Marketing (New York: McGraw-Hill Book Company, 1965), pp. 155-156.

chapter will have MSE as their divisor.

The usefullness of analysis of variance in communications research, whatever model is chosen, has been stressed by several researchers, including Tannenbaum, who states that:

> The analysis of variance technique seems to be tailor-made for communication research. Not only does it allow for the assessment of the effects of a number of independent variables at once but it also makes possible the identification and indexing of the effects of the interaction between these variables.[45]

In empirical terms, the technique has been used by a host of researchers to assess the effects of different treatments. Vasquez, Martinez, and Powers have used it to determine the impact of "circulars for informing poorly literate farmers" with respect to correct plant density per acre and proper fertilization methods.[44] Henderson, Hind and Brown have also utilized analysis of variance to determine "sales effects of two campaign themes[45] and Brown used it to assess the impact of newsletters on knowledge of peasant farmers in Chile.[46]

[45] Percy H. Tannenbaum, "Experimental Method in Communication Research," in R.O. Nafziger and D. W. White (eds.) Introduction to Mass Communications Research (Baton Rouge: Louisiana State University Press, 1966), pp. 74-75.

[46] Vasquez, "Circulars for Informing Poorly Literate Farmers," pp. 535-539.

[47] Peter H. Henderson, James F. Hind and Sidney E. Brown, "Sales effects of two campaign Themes", Journal of Advertising Research, December 1961), pp. 2-11.

[48] Brown, "Communication and Agricultural Development: A field experiment," Pp. 725-734.

The author, therefore, found it appropriate to use the analysis of variance model to determine the effects of the three levels of message (coffee-fertilizer news, general farming news, and National Development News) and the two levels of source credibility (Agricultural Officer and local co-operative union officer) on the three dependent variables - knowledge, attitude, and usage of fertilizer per acre. The technique of linear regression was also used, though to a limited extent, to assess the contribution of receiver variables to mean scores of the dependent variables. The results of these analyses are discussed in Chapter IV.

The Operational Hypotheses

On the basis of what has been discussed thus far, both in the last and the present chapters, it is possible to define the conceptual hypotheses given at the end of Chapter II so that they are amenable to statistical testing. This is accomplished next.

Hypothesis Ia - the more informative message content explains a greater portion of variation in the dependent variable knowledge than a less informative message content. The null hypothesis to be tested is:

HO: the coffee-fertilizer news, general farming news and National Development news explain equal amounts of variation in the dependent variable knowledge.

Hypothesis lb - the more informative message content explains a greater portion of the variation in the dependent variable attitude than the less informative message content. The null hypothesis to be tested is:

> HO: the coffee-fertilizer news, general farming news and National Development news explain equal amounts of variation on the dependent variable attitude.

Hypothesis lc - the more informative message content explains a greater portion of variation in the dependent variable usage of fertilizer per acre than the less informative message content. The null hypothesis to be tested is:

> HO: the coffee fertilizer news, general farm- ing news and National Development news explain equal amounts of variation in the dependent variable usage of fertilizer per acre.

Hypothesis 2a - the source with high credibility explains more variation in the dependent variable knowledge than the source with low credibility. The null hypothesis to be tested is:

> HO: the agricultural officer and the local cooperative union officer explain equal amounts of variation in the dependent variable knowledge.

Hypothesis 2b - the source with high credibility explains more variation in the dependent variable attitude than the source with low credibility. The null hypothesis to be tested is:

HO: the agricultural officer and the local
Cooperative Union officer explain equal
amounts of variation in the dependent
variable attitude.

Hypothesis 2c - the source with high credibility explains

more variation in the dependent variable usage of fertilizer

per acre than the source with low credibility. The null

hypothesis to be tested here is:

HO: the agricultural officer and the local
Cooperative Union officer explain equal
amounts of variation in the dependent
variable usage of fertilizer per acre.

Hypothesis 3 - several receiver variables, including income,

education, farm size and age, significantly influence scores

on the three dependent variables. The null hypothesis to be

tested here is:

HO: the "beta coefficients" of the twelve
receiver variables included in the
study with respect to knowledge,
attitude, and usage of fertilizer
per acre were statistically insignificant.

Hypothesis 4 - if the three dependent variables knowledge,

attitude, and usage of fertilizer per acre occur in that

sequence, the variable attitude is more highly related to

usage of fertilizer per acre than the variable knowledge is

related to usage. The null hypothesis to be tested here is:

HO: the correlation coefficient between

attitude and usage of fertilizer per
acre is equal to the correlation
coefficient between knowledge and
usage of fertilizer per acre.

CHAPTER IV

THE RESULTS OF DATA ANALYSES

Introduction

Chapter III presented the research design that was used, operationally defined the relevant independent and dependent variables, briefly discussed why the technique of analysis of variance is appropriate for analyzing data of the present study, and concluded with operational definitions of pertinent hypotheses. This chapter will utilize the data that were collected in accordance with the research design presented in the last chapter to test these hypotheses. The present chapter is divided into three major divisions. The first section analyzes the "before" data and makes necessary adjustments to ensure that all the groups are statistically similar at the beginning of the experiment. The second section analyzes the "after" data and changes in scores and assesses the effects of message content and source credibility. The last section is devoted to testing the null hypotheses which were outlined at the end of Chapter III.

Analyses of the "Before" Data

The first step in the analysis of the "before" data involved determination of cell-mean scores on knowledge, attitude and fertilizer usage per acre for the seven (six

experimental and one control) groups.[1] These mean scores
are presented in Table IV-1.

TABLE IV-1

CELL-MEAN SCORES FOR THE THREE
DEPENDENT VARIABLES "BEFORE" THE EXPERIMENT

Group Number	Stimulus Combination[2]	Knowledge Mean Score	Attitude Mean Score	Usage/Acre Mean Score
1	HH	7.980	50.120	25.703
2	HM	7.620	50.820	32.959
3	HL	8.380	49.520	23.687
4	LH	8.680	51.420	31.823
5	LM	8.500	51.640	52.016
6	LL	8.180	52.160	37.037
7	CONTROL	8.600	51.760	27.810

From Table IV-1 it is discernible that group 2 (HM) had
the lowest mean score (7.620) in knowledge and group 4 (LH)
had the highest score in knowledge at the beginning of the
experiment. However, with respect to the dependent variable
attitude it was group 3 (HL) which had the lowest mean score
(49.520) and group 6 (LL) which obtained the highest score

---

[1] Group 8 was only measured after the experiment.

[2] This refers to the stimulus combination to which each group
was to be exposed. The first letter represents level of
source credibility (H = high, L = low) and the second
letter represents message level (H = high, M = moderate,
and L = low).

(52.160). Finally, with respect to fertilizer usage per acre, it was group 3 (HL) which scored lowest (23.687) and group 5 (LM) which scored highest (52.016).

It is difficult to tell whether the groups were initially different or not. Therefore, the first problem to be dealt with involves determination of whether the cell-mean scores are significantly different from each other. There are basically two methods of checking this. The first method involves use of t-test. This test calls for success-ive comparisons of two means at a time. When t-tests are used, a total of twenty-one tests have to be made.[3] The problem with such a procedure is that when there are so many tests some of them are likely to "prove" significant or in-significant purely by chance. This problem is aggravated because the t-test comparisons are not independent.[4] The second method utilizes F-test which involves testing the differences among means for more than two groups simultaneous-ly. That is, the F-test indicates whether there is an over-all significant difference among means. It is, therefore deemed more appropriate for this study.

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[3] The formula for obtaining the total number of t-tests is $n(n-1)/2$ where n is the number of group means in the study.

[4] T.A. Bancroft, Topics in Intermediate Statistical Methods, (Ames, Iowa: The Iowa State University Press, Vol. 1, 1968), p. 100.

The relevant F-tests or one-way analyses of variance for the three dependent variables are presented in Tables IV-2, IV-3 and IV-4.

TABLE IV-2

ONE-WAY ANALYSIS OF VARIANCE FOR KNOWLEDGE SCORES BEFORE THE EXPERIMENT

	Mean Square	Degrees of Freedom	F-test[5]	Signific.
Among Groups	7.135	6	2.888**	.01
Within Groups	2.470	343		

TABLE IV-3

ONE-WAY ANALYSIS OF VARIANCE FOR ATTITUDE BEFORE THE EXPERIMENT

	Mean Square	Degrees of Freedom	F-test	Signific.
Among Groups	45.632	6	2.035	.061
Within Groups	22.428	343		

---

[5] All tests in this study will be done at 5% level or higher.

TABLE IV-4

ONE-WAY ANALYSIS OF VARIANCE FOR FERTILIZER USAGE PER ACRE BEFORE THE EXPERIMENT

	Mean Square	Degrees of Freedom	F-test	Signific.
Among Groups	3948.626	6	3.187**	.005
Within Groups	1239.113	262		

These three tables show that the groups were initially significantly different on their mean scores of knowledge and fertilizer usage per acre but not on their attitude mean scores. This being so, before any further analysis was embarked on, it was necessary to see whether adjustments for the initial group differences on knowledge and fertilizer usage per acre scores in terms of underlying demographic differences among groups could explain these differences.

A series of one-way analyses of variance for demographic and socioeconomic variables across groups were performed. The rationale behind this analysis is that it is possible for the groups to differ significantly on their initial scores on the dependent variables because of differences in, say, income, age, number of coffee trees owned, education, cosmopolitanism, size of farm in acres, and mass media

exposure.[6] The results of this analysis are shown in Table

IV-5.

TABLE IV-5

RESULTS OF ONE-WAY ANALYSES OF VARIANCE
FOR SELECTED DEMOGRAPHIC AND SOCIOECONOMIC VARIABLES

		MS	DF	F-test	Signific.
a.	Age:				
	Among Groups	1.278	6	0.782	over .500
	Within Groups	1.634	343		
b.	Education:				
	Among Groups	.553	6	0.764	over .500
	Within Groups	.724	343		
c.	Income:				
	Among Groups	7.468	6	1.810	.097
	Within Groups	4.125	343		
d.	Number of Coffee Trees Owned:				
	Among Groups	5724130	6	3.151**	.006
	Within Groups	1816370	343		
e.	Size of Farm in Acres:				
	Among Groups	6.891	6	2.822*	.011
	Within Groups	2.442	343		
f.	Media Exposure Index:				
	Among Groups	81.222	6	1.218	.297
	Within Groups	66.704	343		

---

[6] The variables listed constitute the major demographic and
situational variables measured in the "before" data.

TABLE IV-5

(Continued)

		MS	DF	F-test	Signific.
g.	**Cosmopolitan-ism:**				
	Among Groups	33.416	6	5.-379***	Under .001
	Within Groups	6.213	343		
h.	**Opinion Leadership:**				
	Among Groups	24.285	6	1.786	.102
	Within Groups	13.601	343		
i.	**Year Coffee First Planted:**				
	Among Groups	98.566	6	1.327	.245
	Within Groups	74.270	343		
j.	**Year Fertilizer Used on Coffee First:**				
	Among Groups	112.441	6	.821	over .500
	Within Groups	136.894	343		
k.	**Literacy (# of words read):**				
	Among Groups	17.765	6	.783	over .500
	Within Groups	22.956	343		
l.	**Pamphlets Received before Experiment:**				
	Among Groups	0.276	6	1.115	.354
	Within Groups	0.248	343		

The results of Table IV-5 indicate that out of the twelve demographic and socioeconomic variables, the groups were initially significantly different only in three of them - number of coffee trees owned, size of farm in acres,

and cosmopolitanism. This being the case the question that has to be answered is whether the initial differences in knowledge and fertilizer usage scores were due to these differences in independent variables.

Simple regression analyses with number of coffee trees owned, size of farm in acres, and cosmopolitanism as the independent variables and knowledge and fertilizer usage per acre as the dependent variables were carried out to answer this question. The results of these simple regression analyses are presented in Table IV-6.

The results in Table IV-6 show size of farm in acres and number of coffee trees owned were statistically significant with respect to fertilizer usage per acre but they were not statistically significant so far as knowledge was concerned. An examination of the regression results also revealed that explained variance (r^2) of number of coffee trees owned (9 percent) was higher than that of the size of farm in acres $(r^2=1.9$ percent). Therefore, the number of coffee trees owned was used to adjust the initial scores of fertilizer usage per acre.

The adjustment process involved subtracting the parameters of the regression equation weighted for number of coffee trees owned from the original scores of fertilizer usage per acre. That is, adjusted usage per acre = original usage per acre scores - 25.327 - 0.0088 (number of coffee trees owned). This means that the data are now residual scores rather than the original scores. Given

this situation, it is not unusual to have negative scores.

TABLE IV-6

SIMPLE REGRESSION RESULTS OF NUMBER OF COFFEE
TREES OWNED, SIZE OF FARM IN ACRES AND
COSMOPOLITANISM ON USAGE PER ACRE AND
KNOWLEDGE

		Coefficient	t-test	Signific.
A.	**Usage Per Acre:**			
i.	Size of Farm in Acres	3.1195	2.28*	.024
	Regression Constant	22.962		
	Multiple Correlation sqd (r^2)	0.019		
ii.	Number of Coffee Trees Owned	0.0088	5.14***	Under .001
	Regression Constant	25.327		
	Multiple Correlation sqd (r^2)	0.090		
iii.	Cosmopolitanism	-0.2459	-.29	over .500
	Regression Constant	35.287		
	Multiple Correlation sqd (r^2)	0.003		
B.	**Knowledge:**			
i.	Size of Farm in Acres	0.0840	1.56	.120
	Regression Constant	7.986		
	Multiple Correlation sqd (r^2)	0.002		
ii.	Number of Coffee Trees Owned	0.0	-.76	.446
	Regression Constant	6.340		
	Multiple Correlation sqd (r^2)	0.002		
iii.	Cosmopolitanism	0.0593	1.80	
	Regression Constant	7.951		
	Multiple Correlation sqd (r^2)	.009		

The adjusted fertilizer usage per acre scores are presented
in Table IV-7 and are also contrasted with the unadjusted

TABLE IV-7

ADJUSTED AND UNADJUSTED CELL-MEAN SCORES FOR
FERTILIZER USAGE PER ACRE

Group Number	Stimulus Combination	Unadjusted Mean Scores	Adjusted Mean Scores
1	HH	25.703	-6.346
2	HM	32.959	-2.638
3	HL	23.687	-7.499
4	LH	31.828	-3.771
5	LM	52.016	12.552
6	LL	37.037	5.384
7	CONTROL 1	27.810	-3.200

scores.

A one-way analysis of variance was recomputed using
the adjusted fertilizer usage per acre scores. The results
of this computation are shown in Table IV-8. The F-test
is no longer significant at the .05 level. This implies

TABLE IV-8

ONE-WAY ANALYSIS OF VARIANCE FOR
ADJUSTED USAGE PER ACRE

	MS	DF	F-Test	Signific.
Among Groups	2220.159	6	1.915	0.079
Within Groups	1159.172	262		

that the differences in initial fertilizer usage per acre
mean scores have been statistically explained by differences

in number of coffee trees owned.

The adjustment of initial scores on knowledge cannot in the present case be accomplished in the same way as fertilizer usage per acre because none of the simple regression analyses of Table IV-6 proved significant. Therefore, an item-analysis of all the variables comprising the dependent variable knowledge was performed. The item-analysis involved computation of one-way analyses of variance to identify the items (variables) for which the seven groups were significantly different. The results of this analysis are shown in Table IV-9. Examination of the results of Table IV-9 reveal that the groups were significantly different in their initial scores in nine out of twenty-four questions and/or statements.

When the nine statements and/or questions were eliminated from the knowledge measure so that knowledge was now measured by fifteen of the original twenty-four statements and/or questions the cell-mean scores turned out to be as shown in Table IV-10. These are contrasted with the unadjusted cell-mean scores in Table IV-10 also. Once the adjusted knowledge scores were obtained, the one-way analysis of variance for knowledge was recomputed. The results of this computation are shown in Table IV-11. The F-test for adjusted knowledge is no longer significant at .05 level of significance. However, while this result satisfies

TABLE IV-9

RESULTS OF ONE-WAY ANALYSIS OF VARIANCE
FOR ITEMS COMPRISING KNOWLEDGE

	MS	DF	F-Test	Signif.
Item 1:				
Among Groups	1.392	6	9.757^{c}	Under .001
Within Groups	0.143	342		
Item 2:				
Among Groups	0.344	6	3.531^{b}	.003
Within Groups	0.098	342		
Item 3:				
Among Groups	0.026	6	2.312^{a}	.034
Within Groups	0.011	342		
Item 4:				
Among Groups	0.161	6	2.296^{a}	.035
Within Groups	0.070	341		
Item 5:				
Among Groups	0.152	6	0.981	.438
Within Groups	0.155	343		
Item 6:				
Among Groups	0.016	6	0.957	.45,5
Within Groups	0.017	343		
Item 7:				
Among Groups	0.319	6	1.830	.093
Within Groups	0.174	343		
Item 8:				
Among Groups	0.020	6	1.0	.415
Within Groups	0.020	343		

TABLE IV-9

(Continued)

	MS	DF	F-Test	Signif.
Item 9:				
Among Groups	0.210	6	1.408	.211
Within Groups	0.149	343		
Item 10:				
Among Groups	0.026	6	3.128^b	.006
Within Groups	0.008	343		
Item 11:				
Among Groups	0.006	6	0.664	Over .500
Within Groups	0.009	343		
Item 12:				
Among Groups	0.250	6	1.078	.376
Within Groups	0.232	343		
Item 13:				
Among Groups	0.307	6	4.397^c	Under .001
Within Groups	0.070	343		
Item 14:				
Among Groups	1.112	6	11.725^c	Under .001
Within Groups	0.095	343		
Item 15:				
Among Groups	0.687	6	3.944^c	Under .001
Within Groups	0.174	343		
Item 16:				
Among Groups	0.459	6	2.052	.059
Within Groups	0.224	343		

TABLE IV-9
(Continued)

	MS	DF	F-Test	Signif.
Item 17:				
Among Groups	0.472	6	1.935	.075
Within Groups	0.244	343		
Item 18:				
Among Groups	0.390	6	1.673	.127
Within Groups	0.233	343		
Item 19:				
Among Groups	0.073	6	0.603	Over .500
Within Groups	0.122	343		
Item 20:				
Among Groups	0.273	6	1.099	.363
Within Groups	0.249	343		
Item 21:				
Among Groups	0.023	6	1.021	.412
Within Groups	0.022	343		
Item 22:				
Among Groups	0.0	6	0.0^c	Under .001
Within Groups	0.0	343		
Item 23:				
Among Groups	0.003	6	1.0	.426
Within Groups	0.003	343		
Item 24:				
Among Groups	0.003	6	1.00	.426
Within Groups	0.003	343		

Note: "a" means F-test significant at .05 level or higher.
       "b" means F-test significant at .01 level or higher.
       "c" means F-test significant at .001 level or higher.
       - See Table IV-12 for item descriptions.

TABLE IV-10

UNADJUSTED AND ADJUSTED CELL-MEAN SCORES
FOR KNOWLEDGE BEFORE THE EXPERIMENT

Group Number	Stimulus Combination	Unadjusted Mean Scores[a]	Adjusted Mean Scores[b]
1	HH	7.980	6.180
2	HM	7.620	6.160
3	HL	8.380	6.560
4	LH	8.680	6.400
5	LM	8.500	6.180
6	LL	8.180	6.400
7	Control 1	8.600	6.260

Note: "a" - based on twenty-four statements and/or questions.

"b" - based on fifteen statements and/or questions.

TABLE IV-11

ONE-WAY ANALYSIS OF VARIANCE FOR ADJUSTED
KNOWLEDGE BEFORE THE EXPERIMENT

	MS	DF	F-Test	Signif.
Among Groups	1.144	6	0.782	Over .500
Within Groups	1.462	343		

the objective of adjusting initial knowledge scores to ensure no significant differences at the beginning of the experiment, it is worthwhile to examine what the eliminated statements may have in common (if anything). The search process for this "commonness" is discussed next.

Since knowledge has been conceptualized by diffusion researchers as composed of three dimensions - awareness knowledge, "how to" knowledge, and principle knowledge[7] - a principal component factor analysis was carried out on the twenty-four statements and/or questions to find out where the eliminated items would load. The results are presented in Table IV-12. The table shows that six of the nine elimi- nated items loaded on Factor 1 which may be interpreted as the principle knowledge and two loaded on Factor 3 which may be interpreted as awareness knowledge. Item number twenty- two was thrown out of the analysis because it had a standard deviation of zero. The implication of these results is that the groups were primarily different only so far as principle knowledge is concerned. That is, eliminating the principle knowledge component from the overall knowlege measure makes the groups similar before the experiment started.

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[7] See, for instance, Rogers, "Communication of Innovations", p. 106.

TABLE IV-12

PRINCIPAL COMPONENT FACTOR
ANALYSIS OF KNOWLEDGE ITEMS

Item No.	Factor 1 (Principle Knowledge)	Loadings
(1)	Name of coffee fertilizer (A)	0.388
(2)	Name of coffee fertilizer (B)	0.650
(3)	Name of coffee fertilizer (C)	0.459
(4)	Ingredient that all coffee fertilizers must contain	0.710
(10)	Three months of the year during which fertilizer should be applied to coffee plants	0.201
(13)	KFA (Kenya Farmers Association) as a source of fertilizers	0.295

Factor 2 ("How To" Knowledge)

5	Same amount of coffee fertilizer to all plants?	0.685
6	Basis of deciding how much fertilizer to apply to each coffee plant	0.468
7	Same fertilizer for all crops	0.307
8	Right time to apply fertilizer on coffee plants	-0.511
11	Coffee factory as source of fertilizer	0.148
18	Fertilizer application makes crops grow faster	-0.352
19	Fertilizer increases yield	0.449
24	Right method of fertilizer application	0.298

Factor 3 (Awareness Knowledge)

9	Number of times fertilizer should be applied to coffee in a year	-0.247
12	Retail stockist as a source of fertilizer	-0.538
(14)	Other smallholders as source of fertilizer	-0.273
(15)	Best way of storing fertilizer	0.542
16	Fertilizer application increases quantity of harvest	0.615
17	Fertilizer application increases quality of harvest	-0.146
20	Number of kilo/bag sizes of fertilizer respondent knows	0.415
21	Current price of CAN fertilizer	-0.147
23	Current price of ASN fertilizer	-0.179

Note: All the circled items were eliminated from the measure of knowledge; item twenty-two was also eliminated from factor analysis because it had a standard deviation of zero.

This completes the study of the "before" data. It has been shown that the initial differences across groups so far as knowledge and usage per acre variables are concerned can be statistically controlled. Thus, analysis of the "after" data is now in order.

Analyses of the "After" Data

The first step in the analysis of the "after" data involved determination of whether extraneous variables and premeasurement had any effects on the "after" scores. If the relevant tests indicate that the scores on the three dependent variables were influenced by either environmental variables and/or premeasurement process then the after scores must be adjusted by their effects before assessment of the effects of the stimulus variables.

Environmental Effects

To assess the effects of the environment, it is necessary to compare the "before" mean score of Control 1 (Group 7) with its "after" mean score for each dependent variable. The t-tests for this comparison are presented in Table IV-13. The results indicate that there were no environmental effects so far as knowledge and usage per acre were concerned but that environmental effects played some part in influencing attitude scores. This means that there was something going on out there during the experiment.

TABLE IV-13

COMPARISON BETWEEN "BEFORE" AND "AFTER" MEAN
SCORES OF CONTROL 1 FOR THE THREE DEPENDENT VARIABLES

Dependent Variable	Mean Differ- ence	Standard Error	Degrees of Freedom	t-Test	Signific.
Knowledge	.010	.256	85	.039	NS
Attitude	2.213	.743	85	2.978	Under .001
Usage/Acre	4.341	4.25	50	1.021	NS

While the author has no explanation as to what these environmental forces were, an adjustment of the "after" attitude scores is deemed necessary if the true effects of the treatment variables are to be determined.

Measurement Effects

The research design of this study was such that it was also possible to assess whether the test was reactive. That is, did the process of taking the "before" measurements facilitate learning by respondents even before the experiment started? As mentioned earlier, this has always been a thorny problem because if premeasurement introduces learning by respondents and the research design does not provide means of assessing such effects, then it is not possible to

determine the true effects of the experimental stimuli.[8]
Fortunately, it is possible in this study to test whether
or not there was any marketing research effect. This test-
ing entails comparisons of post mean scores on the three
dependent variables for Control 1 (group 7) which was
measured before and after the experiment with those of
Control 2 (group 8) which was measured only after the
experiment. If there were any measurement or marketing
research effects the difference between these mean scores
should be statistically significant. The basic data for
this testing are contained in Table IV-14 and the t-test
results are presented in Table IV-15.

The three t-tests of Table IV-15 are not statistically
significant. This suggests that there were no measurement
or marketing research effects. If the tests had proved
significant, the post scores on the three dependent vari-
ables would have been adjusted by the mean scores of the
difference in order to determine the true effects of the
message content and source credibility. However, since the
three tests have "proved" insignificant no adjustment is
necessary in the present study so far as measurement effects
are concerned.

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[8] For a discussion of this issue see Crespi, "The Interview
Effect in Polling", p. 99; and Campbell and Stanley, "Ex-
perimental and Quasi-experimental Designs for Research", p.9.

TABLE IV 14

POST SCORE STATISTICS FOR
CONTROL 1 AND CONTROL 2

	Knowledge		Attitude		Usage/Acre	
	Con-trol 1	Con-trol 2	Con-trol 1	Con-trol 2	Con-trol 1	Con-trol 2
Mean	6.270	6.400	53.973	53.600	1.141	-4.010
Standard Deviation	1.154	1.058	2.918	2.358	12.466	26.143
Variance	1.332	1.119	8.515	5.560	155.401	683.979
n	37	50	37	50	17	41

TABLE IV-15

COMPARISON BETWEEN POST MEAN SCORES OF
CONTROL 1 (GROUP 7) AND CONTROL 2 (GROUP 8)

Dependent Variable	Mean Score Differ-ence	Standard Error	Degrees of Freedom	t-Test	Signific. Level
Knowledge	.130	.241	85	.539	NS
Attitude	.373	.584	85	.639	NS
Usage/Acre	5.151	5.082	56	1.014	NS

Note: The formula used to compute the values of t is

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$$

But the dependent variable attitude requires an adjustment so far as environmental effects are concerned as discussed in the previous section. This adjustment was accomplished by subtracting the mean difference (2.213 in Table IV-13) between "after" and "before" mean scores of Control 1 (group 7). Such an adjustment is necessary if the true effects of the treatment variables are to be assessed.

One-Way Analyses of Variance for Post Scores

This section examines the "after" mean scores of the three dependent variables and computes pertinent F-tests. The after mean scores are presented in Table IV-16. The knowledge and usage data were adjusted by the methods presented in the "before" data analysis section and the attitude data were adjusted by subtracting 2.213[9] from individual scores to remove "extraneous" variation. The results of this table indicate that with respect to knowledge group 2 (which received general farming news from the agricultural officer) obtained the lowest mean score (6.00) and group 3 (which received National Development news from local cooperative Union officer) obtained the highest mean score (7.026). With respect to attitude, group 1 (which

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[9] This is the difference between _after_ and _before_ mean scores of Control 1 which is the measure of environmental effect on attitude.

TABLE IV-16

CELL-MEAN SCORES FOR THE THREE
DEPENDENT VARIABLES "AFTER" THE EXPERIMENT

Group No.	Treatment Combination	Adjusted Knowledge Mean Score	Adjusted Attitude Mean Score	Adjusted Usage/Acre Mean Score
1	HH	6.632	50.787	7.366
2	HM	6.000	50.966	9.425
3	HL	7.026	51.377	14.340
4	LH	7.023	51.694	5.429
5	LM	6.750	50.991	30.964
6	LL	6.195	50.860	13.720
7	Control 1	6.270	51.760	1.141
8	Control 2	6.400	51.387	-4.010

received coffee-fertilizer news from the agricultural
officer) had the lowest mean score (50.787) and group 7
(Control 1) had the highest mean score (51.760). Finally,
with respect to fertilizer usage group 8 (Control 2) had
the lowest mean score (-4.010) and group 5 (which obtained
general farming news from local cooperative Union officer)
had the highest mean score (30.964). However, before any
importance can be attached to these figures further analysis
is necessary.

The first question to be answered here is whether the
cell-mean scores are significantly different across the
groups. To determine this one-way analyses of variance were
carried out as was done for the "before" data. The results

of these analyses are contained in Tables IV-17, IV-18, and
IV-19.

TABLE IV-17

ONE-WAY ANALYSIS OF VARIANCE FOR "AFTER" MEAN SCORES OF KNOWLEDGE

	Mean Square	DF	F-Test	Signific.
Among Groups	6.708	6	4.247***	Under .001
Within Groups	1.579	274		

TABLE IV-18

ONE-WAY ANALYSIS OF VARIANCE FOR "AFTER" MEAN SCORES OF ATTITUDE ADJUSTED FOR ENVIRONMENTAL EFFECTS

	Mean Square	DF	F-Test	Signific.
Among Groups	6.379	6	0.915	.485
Within Groups	6.971	274		

TABLE IV-19

ONE-WAY ANALYSIS OF VARIANCE FOR "AFTER" DATA MEAN SCORES OF ADJUSTED USAGE PER ACRE

	Mean Square	DF	F-Test	Signific.
Among Groups	2796.835	6	3.660**	.002
Within Groups	764.095	160		

The results in the preceding three tables indicate that the groups were significantly different with respect to adjusted knowledge and usage per acre but not with respect to attitude. Since none of these results was significant in the "before" data at .05 level, it is reasonable to conclude that at least with respect to knowledge and usage per acre, the experimental treatments had some effect.

As far as attitude scores are concerned it is not possible from the results of one-way analysis of variance to determine decisively whether the treatment variables had a significant effect or not because the effects of one factor (message content or source credibility) may be suppressed by counteracting effects of the other factor. Whether this was so will be discussed later when two-way analyses of variance are performed.

One-Way Analysis of Variance for Score Changes

Although the analysis of absolute "after" mean scores of the dependent variables (Tables IV-16 to 19) reveal some useful information, it does not give a very clear picture. For instance, it suggests that in case of knowledge group 3 (which received National development news from the local cooperative Union officer) was influenced most by the treatment variables; that with respect to attitude group 7 (which received no treatment) was influenced most; and that as far

as usage per acre was concerned group 5 (which received
general farming news from local cooperative Union officer)
was influenced most. While this may be so it is difficult
to tell by simply looking at the figures of Table IV-16.
Thus, to assess which treatment combination had greatest
effect on the dependent variables, an examination of mean
score changes is necessary. This is so because the bench-
mark mean scores were not identical. They were merely not
statistically different. The relevant mean score changes
on the dependent variables are presented in Table IV-20.
The table reveals that for some groups the effects of the
treatment variables were in fact negative. Therefore, it

TABLE IV-20

MEANS OF SCORE CHANGES FOR THE
THREE DEPENDENT VARIABLES

Group #	Treatment	Knowledge	Attitude	Usage
1	HH	.605	0.761	10.513
2	HM	-.256	0.710	2.049
3	HL	.564	1.633	23.071
4	LH	.721	0.252	8.867
5	LM	.545	-0.690	17.213
6	LL	-.220	-1.262	-1.090
7	Control 1	.010	0.490	0.969

is now possible, using figures of Table IV-20, to state the
groups which were influenced most by the treatment variables.
As for knowledge, group 4 (which received coffee fertilizer

news from local cooperative union officer) obtained the
highest mean score change (0.721) while group 6 (which
received National Development news from local cooperative
Union officer) obtained minimum mean score "change"
(-0.220). In case of attitude, however, it is group 3
(which received National Development news from the agricul-
tural officer) which registered highest change (1.633) and
group 6 (which received National Development news from
local cooperative Union officer) which witnessed the lowest
mean change (-1.262). Finally, with respect to usage per
acre group 3 recorded the highest change (23.071) while
group 6 registered the lowest change. It is, therefore,
possible to crudely assess the effects of message content
and source credibility simply by comparing the magnitudes
of mean score changes given in Table IV-21.

Before doing so, however, it is appropriate to carry-
out one-way analyses of variance for the mean score changes.
These analyses are presented in Tables IV-21, IV-22, and
IV-23.

Using the results of one-way analyses of variance and
the patterns of relevant mean scores (Tables IV-16 to 23)
and t-tests, it is now possible to determine the preliminary
effects of the treatment variables. This task is the sub-
ject matter of the next section.

TABLE IV-21

ONE-WAY ANALYSIS OF VARIANCE FOR
SCORE CHANGES IN KNOWLEDGE

Source of Variation	Mean Square	DF	F-Test	Signific.
Among Groups	7.068	6	2.808*	.012
Within Groups	2.517	274		

TABLE IV-22

ONE-WAY ANALYSIS OF VARIANCE FOR
SCORE CHANGES IN ATTITUDE

Source of Variation	Mean Square	DF	F-Test	Signific.
Among Groups	37.697	6	1.508	.176
Within Groups	24.997	274		

TABLE IV-23

ONE-WAY ANALYSIS OF VARIANCE FOR
SCORE CHANGES IN USAGE PER ACRE

Source of Variation	Mean Square	DF	F-Test	Signific.
Among Groups	1868.947	6	1.003	.426
Within Groups	1863.154	140		

Effects of Message Content: Preliminary Analysis

Since one-way analyses of variance for post knowledge scores (Table IV-17) and changes in knowledge scores (Table IV-21) are statistically significant, it means that at least two of the mean scores in both Tables IV-17 and IV-20 are different. This being the case an examination of the patterns of the mean scores can reveal the direction of message effects. The tables indicate that given high credibility (agricultural officer) the relationship between message content and knowledge is U-shaped. That is, the low level information content (National development news) has the highest effect (mean score change) followed by high information content (coffee-fertilizer news) and moderate information content (general farming news) in that order. However, the relevant t-tests indicate that the difference between high and low information contents' mean scores is not statistically significant at .05 level. This suggests that given high source credibility coffee-fertilizer news and national development news have equal impact on knowledge. On the other hand, the differences between high and moderate information contents and between moderate and low contents are significant under .001 and .01 level respectively. That is, given high source credibility (agricultural officer) coffee-fertilizer and National development news have higher impacts on knowledge than general farming news.

But given low source credibility (local cooperative union officer) the relationship between message content and knowledge is "linear". That is, the higher the information content the higher the effect of message on knowledge. However the pertinent t-tests reveal that the difference between high and moderate mean scores is not statistically significant at .05 level but the differences between high and low content on the one hand and moderate and low on the other are statistically significant at .001 and .05 level respectively. It must be noted that these t-tests were performed following an F-test and there is a difference of opinion as to how to interpret them. As Guildford noted more than twenty years ago:

> From a really rigorous point of view, we are not justified in interpreting t's found after making an F test as if no test had preceded them. Even when F is significant, this procedure is somewhat like taking a word or a phrase out of context and interpreting it so.[10]

In view of this the conclusions based on an examination

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[10] J.P. Guildford, Fundamental Statistics in Psychology and Education, (New York: McGraw-Hill Book Company, Inc., 3rd Edition, 1956), p. 264.

of the patterns of the mean scores appear more appropriate once the F-test has revealed singificant results. To sum up then, the effect of message on knowledge is partly a function of source credibility. That is, given that all circulars emanate from the agricultural officer, National development news has the highest impact on knowledge followed by coffee-fertilizer news and general farming news in that sequence. But given the local cooperative union officer as the origin of all the newsletters, the coffee-fertilizer news has the higest effect followed by general farming news and national development news in that order.

In case of attitude since the one-way analyses of variance for post scores (Table IV-18) and for changes in attitude (Table IV-22) have resulted in F-values which are not significant at .05 level, a preliminary conclusion that can be made is that message content has no influence on attitude. However, because, as mentioned earlier, it is possible for the effects of one factor which are significant to be neutralized by opposite effects of the other factor, the final decision as to whether message content has a significant impact on attitude change must await the performance of two-way analyses of variance.

With respect to usage per acre the one-way analysis of variance for post scores (Table IV-19) has an F-value which is significant at .002. An examination of the mean scores

in Table IV-16 reveal that given high source credibility
the relationship between message content and usage per
acre is U-shaped with low information content (national
development news) having the highest mean score followed by
high information content (coffee fertilizer news) and
moderate information (general farming news) in that order.
But given low source credibility the relationship between
message level and usage per acre is an inverted U. That
is, moderate information content (general farming news)
has the highest effect on usage per acre followed by high
information content (coffee-fertilizer news) and low
information content (national development news) having the
lowest effect on usage per acre. However, since the
F-test of one-way analysis of variance for score changes
is not significant at .05 level (Table IV-23) it is not
possible at this juncture to make a decisive conclusion
regarding the effect of message content on usage per acre.

Effects of Source Credibility: Preliminary Analysis

The preliminary effects of source credibility are
studied by "holding" message content constant in examining
the patterns of mean scores in Tables IV-16 and IV-20.
When this is done, it is found that with respect to know-
ledge, given high information content (coffee fertilizer
news) and moderate information content (general farming
news) the low credibility source has higher impact than

of attitude score changes. This is because it is
possible for a two-way analysis of variance to reveal
significant effect of one of the factors even though the
F value of one-way analysis of variance is insignificant.

With respect to usage per acre given high information
content (coffee-fertilizer news) and low information con-
tent (national development news) the high credibility
source (the agricultural officer) has higher impact than
the low credibility source (local cooperative union
officer). The mean score changes in usage per acre are
10.513 and 23.071 when agricultural officer is the source
of coffee-fertilizer news and national development news
and 8.867 and -1.090 when local cooperative union officer
is the source of the two levels of message content.
However, when message content is moderate (general farm-
ing news), the group which receives circulars from the
local cooperative union officer obtains a higher mean
score change (17.213) than the group which receives
circulars from the agricultural officer (2.049). Again,
this suggests the existence of an interaction effect
between message content and source credibility so far as
changes in usage per acre are concerned. The following
section of this chapter will test whether or not the
above conclusions are plausible.

high credibility source. That is, given coffee-fertilizer
news and general farming news, the agricultural officer
has less effect on knowledge than the local cooperative
union officer. However, given low information content
(national development news) the agricultural officer has
more effect on knowledge than the local cooperative union
officer. This suggests the existence of an interaction
effect between message content and source credibility but
its determination is deferred until two-way analysis of
variance is performed later in this chapter.

In the case of the dependent variable attitude,
irrespective of the level of message content, the high
credibility source (agricultural officer) has higher im-
pact on attitude change than the low credibility source
(local cooperative union officer). That is, whether we
look at those groups which received coffee-fertilizer
news, general farming news, or national development news
those groups which received pamphlets from the agricultural
officer obtained higher mean score changes (.761, .710,
1.633) than those groups which received circulars from
local cooperative union officer (.252, -.690 and -1.262
respectively). However, since the one-way analysis of
variance (Table IV-22) has an F which is not significant
at .05 level this conclusion is tentative, as mentioned
above, pending performance of two-way analysis of variance

Two-Way Analyses of Variance

The problem with one-way analysis of variance as repeatedly mentioned above, is that when the research

~ ₁ incorporates two or more factors and the F-ratio is significant, it is difficult to say whether it is Factor A or Factor B or their interaction that influences the post scores. Similarly, when the F-ratio is insignificant one of the factors may still have a significant impact on the dependent variable only that its effect may be suppressed by the effect of the other factor in the one-way analysis of variance.[11] Therefore, to disentangle the effects of message content, source credibility, and that of their interaction, if any, a two-way analysis of variance is necessary. Hence, the rationale for carrying out two-way analyses of variance in this study.

Before doing that, however, a brief discussion on the nature of cell-sizes is needed. At the beginning of the experiment all cells had an equal number of respondents fifty. However, due to mortality and some non-usable responses on the dependent variable usage per acre (such as "don't know"), the cell sizes were unequal "after" the

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[11] J.P. Guildford, Fundamental Statistics in Psychology and Education, (New York: McGraw-Hill Book Company, 3rd Edition, 1956), p. 269.

experiment as shown in Table IV-24.

TABLE IV-24

CELL-FREQUENCIES AFTER THE EXPERIMENT

A. Knowledge and Attitude:

Message Level

		High	Moderate	Low
Source Credibility	High	38	39	39
	Low	43	44	41

B. Usage Per Acre:

Message Level

		High	Moderate	Low
Source Credibility	High	17	21	25
	Low	18	40	29

There are two methods of handling this problem of unequal cell sizes. The first method involves the use of a "least squares" solution which entails working with weighted means. This method is also called the exact method solution. The second method involves working

with "unweighted" means. The Data Text Program for two-way analysis of variance uses the second method and substitutes the harmonic mean for all the cell-frequencies. That is, instead of working with the N's in Table IV-24 the program sums up those n's and computes the mean - harmonic mean - by dividing by six (the number of cells). This mean replaces all the N's in the table.[12]

The authors of Data Text argue that "the method (of unweighted means) results in approximate significance tests, but they are good approximations as long as the cell N's are not too unequal (no worse than a 4 to 1 ratio or so)".[13] They add, as a footnote, that the advantage of the unweighted means method is that it preserves independence of all main and interaction effects whereas a "least squares" solution confounds the effects.[14]

Bennett and Franklin also argue that the unweighted method of handling the problem of unequal cell-sizes pro-

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[12] Harmonic mean is given by

$$h = \frac{k}{\frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3} + \cdots + \frac{1}{n_6}}$$

where k = number of groups and ni = cell-observations.

[13] David J. Armor and Arthur S. Couch, _Data-Text Primer: An Introduction to Computerized Social Data Analysis_, (New York: The Free Press, 1972), p. 112.

[14] _Ibid._, p. 119.

vides "significance tests which, although approximate, are unlikely to lead to misinterpretation of the results unless a substantial proportion (e.g. 20%) of the data is missing".[15] The method of unweighted means has received further support from Bancroft who concludes that:

> If the subclass frequencies do not vary
> too much among themselves, then this
> method gives quite accurate results.
> Its precision decreases as the subclass
> frequencies vary more and more.[16]

The literature is not very clear as to when the method of unweighted means should be used. While Armor and Couch talk in terms of a ratio of 4 to 1, Bennett and Franklin give a figure of 20% differential in the cell-frequencies and Bancroft leaves the question open. Since in case of Table IV-24A the largest cell is 44 and the smallest is 38, there is a difference of 6 units or 16 percent which is smaller than Bennett and Franklin's 20 percent. On the other hand, in case of Table IV-24B the smallest cell has 17 units and the largest 40 units - a difference of 23

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[15] Carl A. Bennett and Norman L. Franklin, Statistical Analysis in Chemistry and the Chemical Industry, (New York: John Wiley and Sons, Inc., 1954), P. 382.

[16] T.A. Bancroft, Topics in Intermediate Statistical Methods, (Ames: The Iowa State University Press, Volume I, 1968), p. 35.

units. Therefore, the method of unweighted means - the Data Text Program - was used to carry out the two-way analyses of variance in case of knowledge and attitude but the "least squares" solution was used in case of usage per acre.

The Effects of the Message and Source Credibility on Knowledge

The results for two-way analyses of variance can now be discussed. The cell mean scores for the three dependent variables are as shown in Table IV-25 which is a reproduction of Table IV-16 except that the layout has been

TABLE IV-25

TWO-WAY POST MEAN SCORES FOR THE DEPENDENT VARIABLES

		Knowledge Source Credibility		Attitude Source Credibility		Usage/Acre Source Credibility	
		High	Low	High	Low	High	Low
Message Level	High	6.632	7.023	50.787	51.694	7.366	5.429
	Mod.	6.000	6.750	50.966	50.992	9.425	30.964
	Low	7.026	6.195	51.377	50.860	14.340	13.710

modified to reflect the two-way statistics. A discussion of these mean scores was given earlier in this chapter. Therefore, suffice it to say that although they are visually different it is not advisable to start interpreting them

without first testing whether the results are significant-
ly different. Hence, the necessity of carrying out two-
way analysis of variance and performing F-tests. The
results of two-way analysis of variance for the dependent
variable knowledge are given by Table IV-26.

TABLE IV-26

TWO-WAY ANALYSIS OF VARIANCE
FOR POST SCORES IN KNOWLEDGE

Source of Variation	MS	DF	F-Test	Signif.
Message	4.152	2	2.577	0.079
Source	0.654	1	0.406	Over .500
Message X Source	13.922	2	8.641***	Under .001
Error	1.611	238		

The results of this table suggest that the message con-
tent and source credibility interact to influence knowledge.
However, the influence of message content and source
credibility taken separately is statistically insignificant
at .05 level. But when the interaction effect is signif-
icant, it is difficult to determine the exact impact of each
factor separately because the effect of one factor changes
at different levels of the other factor. Therefore, the
main effects of the two factors must be interpreted with

caution.[17] This can be clearly seen in Figure IV-1 which shows simple effects of message content at the two levels of source credibility.

The figure indicates that <u>moderate information content</u> <u>(general farming news) and high information content (coffee-</u> <u>fertilizer news) are more effective when they originate from</u> <u>low source credibility (local cooperative union officer)</u> <u>than when they emanate from high source credibility</u> <u>(agricultural officer)</u>. But when <u>low information content</u> <u>(National Development news) is disseminated by high source</u> <u>credibility</u> (the agricultural officer) it is more effective on knowledge than when it emanates from low source credibility.

On the other hand, Figure IV-2 graphically shows simple effects of source credibility for the three levels of message content. The figure suggests that high source credibility is most effective when message content is low and least effective when message content is moderate. Low source credibility is most effective when message content is high, <u>and least effective when message content is low</u> <u>(National Development news)</u>.

It is, therefore, clear that the effects of message

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[17] Winer, "Statistical Principles in Experimental Design", pp. 243-244.

FIGURE IV-1

PROFILES OF SIMPLE EFFECTS FOR
MESSAGE CONTENT ON KNOWLEDGE

FIGURE IV-2

PROFILES OF SIMPLE EFFECTS FOR
SOURCE CREDIBILITY ON KNOWLEDGE

content on knowledge are influenced by the level of source credibility under consideration and the effects of source credibility on knowledge are, by the same token, dependent on the level of message content under consideration. The effect of message is highest when content is low (National Development news) and when it emanates from high credibility source; it is lowest when it is moderate (general farming news) and when it originates from high credibility source (agricultural officer). On the other hand, the effect of source credibility is highest when message content is low (National Development news) and lowest when message content is moderate (general farming news). The levels of the two factors are, therefore, compensating each other.

A more revealing analysis is perhaps the one involving changes in knowledge scores because the "before" mean scores were merely not significantly different rather than being identical. The relevant mean scores of changes in knowledge and the corresponding two-way analysis of variance are presented in tables IV-27 and IV-28. The mean score changes are in the same pattern as those of table IV-25 differing only in magnitude as expected. Again the two-way analysis of variance results indicate that message content interacts with source credibility in influencing knowledge. The graphical representation of simple effects of either factor will resemble the shape of Figure IV-1 or Figure IV-2

TABLE IV-27

MEAN SCORES OF CHANGES IN
KNOWLEDGE BY CELL

		Message		
		High	Mod	Low
Source	High	0.605	-0.256	0.564
	Low	0.721	-.545	-0.220

TABLE IV-28

TWO-WAY ANALYSIS OF VARIANCE FOR
CHANGES IN SCORES OF KNOWLEDGE

Source of Variation	DF	MS	F-Test	Signific.
Message	2	6.901	2.838	.060
Source	1	0.121	0.050	Over .500
Message X Source	2	12.818	5.272**	0.006
Error	238	2.431		

respectively and need not be drawn again.

This concludes the discussion of the effects of message content (the three experimental circulars) and source credibility (the agricultural officer and the local cooperative union officer) on the dependent variable

knowledge. The effects of these treatment variables on attitude are discussed next.

The Effects of Message Content and Source Credibility on Attitude

The results of one-way analyses of variance for adjusted post attitude scores (Table IV-18) and adjusted mean score changes (Table IV-22) have both given F's in the one way analysis of variance which are not statistically significant. This suggests that either the two experimental variables (message content and source credibility) do not have a significant effect on attitude or that one of the variables may have a positive effect that is neutralized by a counteracting effect of the other factor. The first issue is concerned with the problem of ceiling effect and the second issue is concerned with the problem of one-way analysis of variance. First, the issue of ceiling effect will be discussed.

Experimental factors are not likely to have any effect where there is a problem of ceiling effect. That is, where there is no "room" for attitude change, none will occur. This problem appears to exist in the present study as revealed by close examination of the "before" attitude frequence distribution (Table IV-29). On the basis of this table it is obvious there was a "ceiling effect" problem.

TABLE IV-29

FREQUENCY DISTRIBUTION OF
"BEFORE" SCORES IN ATTITUDE

Score	Frequency:	Frequency %	Cumulative Percentage
29	1	.29%	.29%
30	1	.29	.57
31	1	.29	.86
35	1	.29	1.14
36	1	.29	1.43
37	4	1.14	2.57
39	1	.29	2.86
40	5	1.43	4.29
41	2	.57	4.86
43	1	.29	5.14
44	5	1.43	6.57
45	10	2.86	9.43
46	10	2.86	12.29
47	13	3.71	16.00
48	17	4.86	20.86
49	29	8.29	29.14
50	55	15.71	44.86
51	26	7.43	52.29
52	22	6.29	58.56
53	18	5.14	63.71
54	25	7.14	70.86
55	73	20.86	91.71
56	8	2.29	94.00
57	4	1.14	95.14
58	4	1.14	96.29
59	6	1.71	98.00
60	7	2.00	100.00
	350		

For instance, 7 respondents (2%) obtained the maximum score
of 60 before the experiment started. Therefore, at least
for these individuals the treatment variables could not
bring about any positive attitude change. Again, 102
respondents (29%) had only five or fewer "steps" to move

to get to the ceiling of the attitude "ladder". That is,
they scored between 55 and 60 points. If nine "steps" are
allowed it is found that 248 respondents (71%) of the sample
had only nine or fewer "steps" to get to the ceiling.
Given the narrowness of attitude change opportunity, it is
not surprising that the F-tests of one-way analyses of
variance are insignificant.

It should not, however, be concluded from the above
discussion that neither of the two variables (message and
source credibility) had an impact on attitude. The above
F-tests were results of one-way analysis of variance which
does not disentangle the effects of the treatment variables,
if any. Therefore, two-way analyses of variance are needed
when the experimental design incorporates more than one
treatment variable. Table IV-30 contains the results of
two-way analysis of variance for post attitude scores
adjusted for environmental effects. Once again, the F's are
not statistically significant but since absolute post scores
are being analyzed the ceiling effect is still operative.
For this reason it is appropriate to perform two-way analysis
of variance for mean score changes. The results of this
analysis are presented in Table IV-31. The F-test results
of this table indicate that source credibility has a signif-
icant effect but that message content and interaction of
source and message are not statistically significant. Given

TABLE IV-30

TWO-WAY ANALYSIS OF VARIANCE FOR POST MEAN SCORES OF ATTITUDE ADJUSTED FOR ENVIRONMENTAL EFFECTS

Source of Variation	DF	MS	F-Test	Signific.
Source	1	1.166	0.174	Over .500
Message	2	1.388	0.207	Over .500
Source X Message	2	10.467	1.562	.212
Error	238	6.700		

TABLE IV-31

TWO-WAY ANALYSIS OF VARIANCE FOR ATTITUDE MEAN SCORE CHANGES ADJUSTED FOR ENVIRONMENTAL EFFECTS

Source of Variation	DF	MS	F-Test	Signific.
Source	1	155.956	5.925*	.016
Message	2	5.140	0.195	Over .500
Source X Message	2	29.478	1.120	0.328
Error	238	26.321		

this situation, it is now appropriate to examine the mean score changes (Table IV-32). An examination of these means

TABLE IV-32

TWO-WAY MEAN SCORE CHANGES OF ATTITUDE ADJUSTED FOR ENVIRONMENTAL EFFECTS

| | | Message Level | | |
		High	Mod	Low
Source Credibility Level	High	.761	.710	1.633
	Low	.252	-.690	-1.262

reveals that <u>irrespective of the level of the message content, high source credibility (agricultural officer) has a greater effect on respondents' attitude than low source credibility (local cooperative union officer)</u>. That is, if the objective is to change smallholders' attitude toward fertilizers the agricultural officer should be the origin of all circulars irrespective of their level of information content. The data, however, also reveal that the agricultural officer is most effective when low information content (National Development news) is the one to be distributed and the local cooperative union officer is most effective when coffee fertilizer news' circulars are to be distributed. But the effect of the local cooperative union officer is still less than that of the agricultural officer

even when coffee-fertilizer news' circulars are to be distributed.

An alternative and perhaps better method of handling mean score changes when ceiling effect exists is to divide the scores into high, moderate, and low categories and perform a two-way analysis of variance for each group. The grouping was accomplished by categorizing all those subjects whose attitude score changes were above one-standard deviation of the mean as high change score group; those whose score changes were within one-standard deviation on either side of the mean as moderate change score group; and those whose score changes were less than one-standard deviation below the mean as low change score group. The resulting cell-mean score changes for the high, moderate, and low categories are presented in Table IV-33. To help interpret these mean scores the results of two-way analyses of variance are needed and are contained in Table IV-34. The table shows that in case of high attitude change message content has a significant impact. An examination of the mean scores (Table IV-33) reveal that irrespective of source credibility level low message content (National Development News) has the highest impact on attitude change followed by coffee-fertilizer news and general farming news in that order. That is, irrespective of whether the circulars emanate from the agricultural officer or the local

TABLE IV-33

ATTITUDE MEAN SCORE CHANGES GROUPED
BY HIGH, MODERATE, AND LOW LEVELS

Group Number	High Change Mean Score	Moderate Change Mean Score	Low Change Mean Score
1 (HH)	7.930	-.613	-5.427
2 (HM)	4.576	.987	-4.280
3 (HL)	9.127	.343	-3.448
4 (LH)	5.120	.254	-3.401
5 (LM)	4.454	-.313	-3.668
6 (LL)	5.387	.087	-3.059

TABLE IV-34

RESULTS OF TWO-WAY ANALYSES OF VARIANCE FOR
HIGH, MODERATE, AND LOW CATEGORIES FOR
ATTITUDE CHANGE

Source of Variation	DF	MS	F-Test	Signif.
High:				
Source Credibility	1	61.409	3.008	NS .
Message	2	73.616	3.606*	.05
Source X Message	2	20.713	1.015	NS
Error	69	20.413		
Moderate:				
Source Credibility	1	.700	.561	.458
Message	2	1.291	1.034	.363
Source X Message	2	5.197	4.163*	.021
Error	53	1.248		
Low:				
Source Credibility	1	26.706	8.426**	.005
Message	2	11.989	3.783*	.026
Source X Message	2	6.893	2.175	.119
Error	104	3.169		

cooperative officer, National Development news yields the largest mean change scores followed by coffee-fertilizer news and general farming news.

However, given moderate attitude change there is a significant interaction effect. This means that message content and source credibility operate jointly in influencing attitude change. The relevant profiles of simple effects for message and source credibility are diagrammatically represented by Figure IV-3 and Figure IV-4. The former implies that general farming news circulars are more effective when they emanate from the agricultural officer; coffee-fertilizer news circulars when they originate from local cooperative union officer; and National Development news circulars when disseminated by the agricultural officer. The latter (Figure IV-4) gives the mirror-image of the above effects. For instance, given high source credibility (the agricultural officer) it is more effective to disseminate general farming news and given low source credibility (local cooperative union) it is more effective to distribute coffee-fertilizer news if the objective is to change attitude.

With respect to low attitude change both the source and message are significantly effective but the interaction is not. An examination of mean scores reveals that attitude

FIGURE IV-3

PROFILES OF SIMPLE EFFECTS OF
MESSAGE CONTENT ON ATTITUDE

FIGURE IV-4

PROFILES OF SIMPLE EFFECTS OF
SOURCE CREDIBILITY ON ATTITUDE

change was <u>negative</u> for all the six groups.[18]   This
suggests that if treatment variables (message content and
source credibility) try to influence individuals (who
already have favorable attitude) to develop favorable
attitude toward an innovation there is a "boomerang" effect.
That is, the individuals end up by developing unfavorable
attitude toward the product.   In terms of the mean scores
(Table IV-33 last column) <u>given high source credibility</u>
<u>(the agricultural officer) the higher the information</u>
<u>content the larger the negative effect and given low source</u>
<u>credibility (local cooperative union officer)</u> the moderate
message content (general farming news) has the greatest
negative effect followed by high information content (coffee-
fertilizer news) and low information content (National
Development news) in that order.   But <u>irrespective of the</u>
<u>level of message content the agricultural officer has greater</u>
<u>negative effect than the local cooperative union officer.</u>
Apparently, it is necessary to first measure attitudes
before deciding upon a "best" strategy for attitude change.

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[18]This also explains why the F-tests for the experimental
groups taken together were statistically insignificant
at .05 level.

The Effects of Message Content and Source Credibility on Fertilizer Usage Per Acre.

The one-way analysis of variance for adjusted "after" mean scores (Table IV-19) for fertilizer usage resulted in an empirical F value which was highly significant (.002). This suggests that the treatment variables had a substantial impact on usage. However, the F-test for usage mean score changes (Table IV-23) was not statistically significant at .05 level. Therefore, as noted earlier, the results of one-way analyses of variance are not conclusive.

To determine whether message, source, or their inter-action had a significant effect on usage per acre, two-way analysis of variance is a must. Since the cell-sizes are very unequal (Table IV-24b) the least squares method was used to carry-out the two-way analysis of variance.[19] The per-tinent results of this analysis are contained in Table IV-35. The results of this table indicate that message content had a significant effect on usage per acre and that source credibility and interaction were not statistically effective. Examination of the relevant mean scores (Table IV-36) reveals that given high source credibility, the higher the level of information content the lower the effect of message on usage

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[19]See Appendix D-7 for a full computational procedure.

TABLE IV-35

TWO-WAY ANALYSIS OF VARIANCE RESULTS FOR POST FERTILIZER USAGE PER ACRE

Source of Variation	DF	MS	F	Signif.
Source Credibility	1	2048.627	2.466	NS
Message Content	2	2974.592	3.581*	.05
Source X Message	2	2188.872	2.635	NS
Error	144	830.644		

TABLE IV-36

CELL-MEAN SCORES OF ADJUSTED "AFTER" USAGE PER ACRE

		Message		
		High	Mod	Low
Source				
	High	7.366	9.425	14.340
	Low	5.429	30.964	13.720

per acre, but given low source credibility moderate message has the highest effect followed by low and high message in that order. This finding tends to suggest existence of an interaction effect although the relevant F is not statistically significant. However, before this conclusion is accepted further analysis is in order.

It is appropriate to analyze changes in usage scores as was done for the other two dependent variables. Tables IV-37 and IV-38 contain usage mean score changes and the results of two-way analysis of variance respectively. Examination of the results of Table IV-38 reveals that

TABLE IV-37

CELL-MEAN SCORE CHANGES
OF USAGE PER ACRE

		Message		
Source		High	Mod.	Low
	High	13.712	12.063	21.839
	Low	9.200	18.412	8.336

TABLE IV-38

RESULTS OF TWO-WAY ANALYSIS OF VARIANCE
FOR MEAN SCORE CHANGES OF USAGE PER ACRE

Source of Variation	DF	MS	F-Test	Signif.
Source	1	417.439	.205	NS
Message	2	381.537	.094	NS
Source X Message	2	4552.500	2.237	NS
Error	125	2034.681		

neither the message nor the source had significant impact on changes in fertilizer usage. However, since message content was found to have a significant effect (Table IV-35) in the post scores, it is possible that there is a significant effect on some groups but not on others. To check for this possibility the score changes were split into high, moderate, and low as was previously done in case of attitude changes. The high change score group comprised all those respondents whose change in usage scores lay beyond one standard deviation above the mean, the low change score group was composed of those whose score changes lay beyond one standard deviation below the mean, and moderate change score group comprised the remaining subjects. The resulting mean scores for each of these groups (high, moderate and low) are contained in Table IV-39 and the corresponding two-way analyses of variance are presented in Table IV-40.

The F-tests of the above table indicate that all the results were insignificant except in the case of the moderate group where the interaction effect was significant. The profiles of simple effects of message and those of source credibility are depicted in Figures IV-5 and IV-6 respectively. An examination of the relevant mean scores (Table IV-39) and the shapes of Figures IV-5 and IV-6 indicate that <u>given high credibility (the agricultural officer)</u> <u>the lower the information content the higher the changes in</u>

TABLE IV-39

MEANS OF SCORE CHANGES OF USAGE PER ACRE GROUPED BY HIGH, MODERATE AND LOW LEVELS

Group Number	Experimental Treatment	High Mean Changes	Moderate Mean Changes	Low Mean Changes
1	HH	52.083	17.500	-9.167
2	HM	46.875	19.467	-31.250
3	HL	47.500	25.000	-15.500
4	LH	50.000	25.000	-1.700
5	LM	77.601	19.444	-30.147
6	LL	50.000	19.333	-15.278

TABLE IV-40

RESULTS OF TWO-WAY ANALYSIS OF VARIANCE FOR HIGH, MODERATE, AND LOW USAGE PER ACRE CHANGES

Source of Variation	DF	MS	F-Test	Signif.
High				
Source	1	426.990	.386	over .500
Message	2	275.190	.249	over .500
Source X Message	2	416.956	.377	over .500
Error	26	1105.710		
Moderate				
Source	1	2.909	.095	over .500
Message	2	20.235	.660	over .500
Source X Message	2	116.071	3.785*	.036
Error	28	30.669		
Low				
Source	1	114.903	.082	over .500
Message	2	2889.273	2.054	.138
Source X Message	2	69.684	.050	over .500
Error	59	1406.576		

FIGURE IV-5

PROFILES OF SIMPLE EFFECTS OF
MESSAGE CONTENT ON USAGE PER ACRE

FIGURE IV-6

PROFILES OF SIMPLE EFFECTS OF
SOURCE CREDIBILITY ON USAGE PER ACRE

demographic and socioeconomic variables (Table IV-5) indicate that the seven groups were only different in three out of twelve variables. That is, they were different in their scores of the number of coffee trees owned, size of farm in acres, and cosmopolitanism. However, as Table IV-6 shows the simple regression results of these variables and the dependent variables knowledge and usage per acre had only two significant beta coefficients - for the size of farm in acres and the number of coffee trees owned. The latter was, therefore, used to adjust usage per acre.

Needless to say, although the groups did not score differently in the other demographic and socioeconomic factors, it is still possible for these factors to influence scores on the three dependent variables. To assess whether this was the case a series of simple regression analyses were performed. The results for the dependent variable knowledge are contained in Table IV-41. These results indicate that out of twelve independent variables only three were statistically significant. This means that income, education, and literacy (number of words read) significantly influenced the dependent variable knowledge. Since the signs of the beta coefficients are positive, the implication of the finding is that <u>the higher the level of education, income and literacy the higher the score on knowledge.</u> This conclusion is also deducible from Appendix E, Tables E-1, E-5 and E-6.

usage per acre for moderate usage change and given that source credibility is low (local cooperative union officer) the more informative the message the higher the mean score changes. That is, to be effective coffee-fertilizer news' circulars should emanate from local cooperative union officers and national development news' circulars should originate from agricultural officers. The effectiveness of general farming news' circulars is about the same whether they are distributed by the agricultural officer or local cooperative union officer.

This concludes the examination of the effects of treatment variables on the three dependent variables. The following section of this chapter is devoted to an assessment of the relationship between selected receiver variables and the dependent variables.

The Relationship Between Selected Receiver Variables and the Dependent Variables

Chapter II reviewed the theoretical and empirical relationships between several receiver variables and innovative behaviour. It was shown there that the literature has conflicting results. Therefore, it was appropriate to check these relationships in the population of the present study.

The results of one-way analyses of variance for selected

TABLE IV-41

RESULTS OF SIMPLE REGRESSION ANALYSES BETWEEN KNOWLEDGE AND SELECTED DEMOGRAPHICS

	Coefficient	t-Test	DF	Signif.
Age	-0.036	-0.71	348	.479
Constant	6.423			
R^2	0.001			
Income	0.0761	2.43[a]	348	.016
Constant	5.901			
R^2	0.017			
Education	0.1725	2.28[a]	348	.024
Constant	6.144			
R^2	0.015			
# of Children	0.037	1.79	348	.075
Constant	6.121			
R^2	0.009			
Size of Farm	0.0298	0.73	348	.466
Constant	6.203			
R^2	0.002			
Literacy	0.0268	1.99[a]	348	.048
Constant	6.156			
R^2	0.011			
# Coffee Trees Owned	-0.000	-0.76	348	.446
Constant	6.340			
R^2	0.002			
Media Exposure	0.0119	1.51	348	.133
Constant	6.310			
R^2	0.006			
Sex of Respondent	-0.0791	-0.60	348	over .500
Regression Constant	6.416			
R^2	.001			
Opinion Leadership	0.0177	1.02	348	.311
Regression Constant	6.304			
R^2	.003			
Cosmopolitanism	-0.0064	-0.25	348	over .500
Regression Constant	6.341			
R^2	0.000			
Number of Wives	-0.1296	-1.19	348	.235
Regression Constant	6.463			
R^2	0.004			

Those t-tests marked "a" are significant at .05 level.

However, it is possible that these three variables - income, education and literacy - are themselves related. That is, income may be a function of literacy and education. Therefore, it was deemed necessary to carry out a multiple regression analysis with income, education, and literacy as the independent variables and knowledge as the dependent variable. The results of this analysis are contained in Table IV-42 and show that only income has a significant impact on knowledge. It can, therefore, be concluded that

TABLE IV-42

MULTIPLE REGRESSION RESULTS OF THE
DEPENDENT VARIABLE KNOWLEDGE

Variable	Coefficient	t-Test	DF	Signif.
Income	0.0701	2.23*	346	.027
Education	0.1192	1.14	346	.255
Literacy	0.0099	0.53	346	over .500
Regression Constant	5.766			
Multiple Corr. Squared	0.030			

out of twelve receiver variables incorporated in the present study only income influences knowledge scores but it does not influence them differently across the seven groups.

With respect to the dependent variable attitude, as Table IV-43 shows, the receiver variables with significant beta coefficients are education, number of children, literacy, and number of wives. Again, the beta coefficients of education, number of children, and literacy have positive signs indicating that the higher the level of education, literacy, and number of children the more favorable the attitude toward fertilizer. On the other hand the beta co- efficient of number of wives is negative suggesting that the higher the number of wives the less favorable the respondent's attitude is toward fertilizer.

The question is why should the number of children be positively related to attitude toward fertilizer. A partial answer to this question may lie in the discussion given in Chapter 1. It was mentioned there that the farmers' holdings are pathetically small and therefore any increase in yield (harvest) would have to depend, by and large, on the adoption of agricultural technology in general. Fertilizer is only one possibility out of many. The smallholders may, therefore, be favorably inclined toward fertilizers in general because it is their only hope of feeding an increasing number of mouths. This fact was alluded to by O'Connor when he stated that the Kikuyu seem more keen than most tribes to develop

TABLE IV-43

RESULTS OF SIMPLE REGRESSION ANALYSES
BETWEEN ATTITUDE AND SELECTED DEMOGRAPHICS

	Coefficient	t-Test	DF	Signif.
Age	-0.3534	-1.77	348	.001
Constant	52.217			
R^2	0.009			
Income	0.1178	0.94	348	.347
Constant	50.436			
R^2	0.003			
Education	1.1612	3.94[c]	348	under .001
Constant	49.971			
R^2	0.043			
# of Children	0.1883	2.30[a]	348	.022
Constant	50.123			
R^2	0.015			
Size of Farm	0.1340	0.83	348	.407
Constant	50.599			
R^2	0.002			
Literacy	0.1805	3.43[c]	348	.001
Constant	50.057			
R^2	0.033			
# of Coffee Trees Owned	0.0003	1.77	348	.079
Constant	50.747			
R^2	0.009			
Media Exposure	0.0461	1.48	348	.141
Constant	51.080			
R^2	0.006			
Sex of Respondent	-0.5838	-1.11	348	.266
Regression Constant	51.874			
R^2	0.004			
Opinion Leadership	-0.1132	-1.65	348	.101
Regression Constant	51.072			
R^2	0.008			
Cosmopolitanism	0.1878	1.91	348	.058
Regression Constant	50.029			
R^2	0.010			
Number of Wives	-0.9088	-2.12[a]	348	.035
Regression Constant	52.166			
R^2	0.013			

Those t-tests marked "a" are significant at .05 level.
Those t-tests marked "c" are significant at .001 level.

new farming techniques, stimulated perhaps by pressure on the land .....[20] He goes on to say that the cultivation of two crops a year is an essential element in supporting the high density of rural population in districts such as Kiambu and Muranga in Kenya.

So far as the number of wives is concerned the possible reason for the negative beta is that the more wives a respondent has the more likely he is to be against modernization since monogamy is a western concept which has only recently been introduced in Kenya. Therefore, number of wives may be an indicator of traditionalism.

While literacy, education, number of unmarried children and number of wives have proved significant as factors influencing attitude, it is again possible that they are related among themselves. To check for this possibility a multiple regression similar to that of knowledge was computed with literacy, education, number of unmarried children, and number of wives as the independent variables and attitude as the dependent variable (Table IV-44). The results of this table indicate that literacy, number of children, and number of wives no longer significantly influence the dependent variable attitude. That is, only education is a significant variable at .001 level. It can therefore be concluded that

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[20] O'Connor, "An Economic Geography of East Africa", p. 19.

TABLE IV-44

MULTIPLE REGRESSION RESULTS FOR THE DEPENDENT VARIABLE ATTITUDE

Variable	Coefficient	t-Test	DF	Signif.
Education	1.0904	3.68	347	under .001
# of Unmarried Children	0.1499	1.85	347	.065
Literacy[a]	-			
# of Wives[a]	-			
Regression Constant	49.289			
R^2	0.052			

"a" - did not enter the final step of the regression because they added less than .010 to R-squared.

among the twelve receiver variables included in this study attitude is only significantly influenced by education although not differently across the seven groups.

Finally, as far as usage per acre is concerned, out of twelve receiver variables only one - number of wives - significantly influenced the dependent variable (Table IV-45). Since the sign of the beta coefficient is negative, it means that the larger the number of wives the less the fertilizer usage per acre. This is a surprising finding considering the many studies which have either advanced theoretical

TABLE IV-45

RESULTS OF SIMPLE REGRESSION ANALYSES
BETWEEN USAGE PER ACRE AND SELECTED DEMOGRAPHICS

	Coefficient	t-Test	DF	Signif.
Age	1.5428	0.93	267	.353
Constant	-5.093			
R^2	0.003			
Income	0.0697	0.07	267	over .500
Constant	-0.385			
R^2	0.000			
Education	3.3405	1.35	267	.117
Constant	-3.141			
R^2	0.007			
# of Children	0.3643	0.54	267	over .500
Constant	-1.844			
R^2	0.001			
Size of Farm	-0.6490	-0.49	267	over .500
Constant	2.266			
R^2	0.001			
Literacy	-0.4929	-1.13	267	.261
Constant	2.728			
R^2	0.005			
# Coffee Trees Owned	-0.000	-0.01	267	over .500
Constant	-0.000			
R^2	-0.000			
Media Exposure	-0.1957	-0.75	267	.454
Constant	-0.044			
R^2	0.002			
Sex of Respondent	-3.098	-0.71	267	.479
Regression Constant	4.215			
R^2	0.002			
Opinion Leadership	0.5152	0.88	267	.378
Regression Constant	-0.082			
R^2	0.003			
Cosmopolitanism	-0.7147	-0.88	267	.381
Regression Constant	3.992			
R^2	0.003			
Number of Wives	-7.701	-2.31[a]	267	.022
Regression Constant	9.436			
R^2	0.020			

The t-test marked "a" is significant at .05 level.

relationships between innovative behaviour and several other receiver variables or have found significant relationships in empirical studies as reviewed in Chapter II. But this may be because nearly all studies in the diffusion literature concern themselves with the dependent variable innovativeness which has either been operationalized in terms of *time* of adoption and/or the number of pertinent innovations which have been adopted by a specific date rather than the intensity of usage of an innovation.

The overall conclusion pertaining to the relationships between selected receiver variables and the three dependent variables is that contrary to what the literature suggests the receiver variables in the population studied did not, by and large, emerge significant. In case of knowledge only income was found to have a significant relationship; education was the only variable that had a significant beta so far as attitude is concerned; and number of wives was the only variable that significantly influenced usage per acre. However, none of these variables influenced the groups differently.

Testing the Hypotheses

The results discussed in the preceding sections of this chapter are now used to test the null hypotheses which were outlined at the end of Chapter III.

Hypothesis 1a: The null hypothesis to be tested is

        Ho: that coffee-fertilizer news, general
             farming news and national development
             news explain equal amounts of varia-
             tion in the dependent variable know-
             ledge.

This hypothesis was derived from the theoretical frame-
work described in Chapter II which proposes that different
levels of information content result in different effects
on the dependent variable knowledge. Whether or not this
proposition is supported by the results of this study is the
issue in question. It must be noted that since the "before"
mean score differences were statistically rendered insignif-
icant (Tables IV-10 and IV-11) any significant differences
in the "after" mean scores may be attributed to either
message content, source credibility, or interaction of the
two.

The results of one-way analyses of variance for post
knowledge scores (Table IV-17) and for changes in scores
(Table IV-21) indicate that the treatment variables had
statistically significant effect (under .001 and .012
respectively). An examination of post mean scores (Table
IV-16) and change scores in knowledge (Table IV-20) reveal
that when all the three circulars originate from the
agricultural officer, national development news has the
highest mean score followed by coffee-fertilizer news and

general farming news. But when the circulars are from local cooperative union officer, coffee-fertilizer news has the highest mean score followed by general farming news and national development news. Therefore, <u>the results of one-way analyses of variance failed to support the null hypothesis that coffee-fertilizer news, general farming news, and national development news explain equal amounts of variation on the dependent variable knowledge.</u>

The results of one-way analyses of variance and the subsequent conclusions are corroborated by those of two-way analyses of variance. These results, contained in Table IV-26 (for post mean scores) and Table IV-28 (for mean score changes), have an interaction effect which is significant at .001 level and .006 respectively. Therefore, the hypothesis that coffee-fertilizer news, general farming news and national development news explain equal amounts of variation on knowledge is not supported by the results of the present study.

An examination of the shapes of Figure IV-1, which diagrammatically represents simple effects of message content, reveal that when all circulars emanate from the <u>local cooperative union officer, coffee-fertilizer news has the highest mean score followed by general farming news and national development news.</u> This agrees with the alternative hypothesis that the higher the information content the greater

the effect (explained variance) of the message on the
dependent variable knowledge. On the other hand, when all
the three newsletters originate from the agricultural officer,
coffee-fertilizer news has the highest mean score change on
knowledge followed by national development news and general
farming news. Again, this means that the null hypothesis is
rejected. The effect of the message content is therefore
partly a function of high source credibility.

It can be concluded on the basis of the above discuss-
ion that the null hypothesis is rejected and two alternative
hypotheses supported. The first supported alternative hypo-
thesis is that given high source credibility (the agricultural
officer) coffee fertilizer news has the highest positive
effect (mean score change) followed by national development
news and general farming news in that order. The second
supported alternative hypothesis is that given low source
credibility (the local cooperative union officer) the higher
the message content the higher the message effect on the
dependent variable knowledge. These conclusions are
summarized in Table IV-46.

TABLE IV-46

RANKING OF LEVELS OF MESSAGE CONTENT
ON BASIS OF THEIR EFFECTS ON KNOWLEDGE

AFTER MEAN SCORES

High Credibility Source (Agricultural Officer)	Low Credibility Source (Local Cooperative Officer)
1st: National Development News	1st: Coffee Fertilizer News
2nd: Coffee Fertilizer News	2nd: General Farming News
3rd: General Farming News	3rd: National Development News

CHANGE IN SCORES*

High Credibility Source (Agricultural Officer)	Low Credibility Source (Local Cooperative Officer)
1st: Coffee-Fertilizer News	1st: Coffee-Fertilizer News
2nd: National Development News	2nd: General Farming News
3rd: General Farming News	3rd: National Development News

*The author feels that mean score changes tell a more accurate story than absolute "after" mean scores.

Hypothesis 1b: The null hypothesis to be tested here is

    Ho: that coffee-fertilizer news, general
           farming news, and national development
           news explain equal amounts of varia-
           tion in the dependent variable
           attitude.

Again this hypothesis was derived from the theoretical
framework of Chapter II which postulates that the higher the
information content the higher the positive magnitude of
attitude change. That is, it was hypothesized that the more
relevant information an individual acquires about an innova-
tion the more likely he is to evaluate the innovation
favorably. It may be argued that the more an individual
knows about an innovation the more unfavorably he may
evaluate it. While this may be so it does not detract from
the fact that one cannot develop an attitude toward an object
he or she does not know. For instance, the smallholders
cannot be expected to have an attitude toward, say, a
microwave-oven. This appliance was not available for pur-
chase at the time and place of this study. Hence, the
hypothesis that information content in the message facili-
tated development (or change) of attitude, be it favorable
or unfavorable, toward an innovation is plausible.

The results of one-way analyses of variance for post
attitude scores (Table IV-18) and attitude change scores
(Table IV-22) have F's which are not statistically significant.
On the basis of these results it would appear that message

content did not have a significant impact on attitude. This phenomenon was explained in the last section by ceiling effect (Table IV-29). That is, a treatment variable cannot be expected to change those individuals who are already very high on attitude scale before the experiment starts.

The problem of ceiling effect is also discernible in the results of two-way analyses of variance (Tables IV-30 and IV-31) where F-tests for the effect of message content are statistically insignificant. However, since it is possible for message to influence some categories of respondents positively and others negatively an analysis of mean score changes by high, moderate, and low categories was deemed appropriate (Table IV-33). The rationale behind this analysis is that it was possible for those who scored low and moderately in the before measurements to be influenced by message content positively and those who initially scored very high to be influenced negatively.

The results of Table IV-34 reveal that message effect was statistically significant both at the high and low categories of attitude score changes at .05 or higher level and the interaction effect was significant for both moderate and low categories at .05 or better. This means that message content had a significant effect on attitude score changes when the latter are split into high, moderate and low categories.

An examination of the mean score changes (Table IV-33) indicates that those who had high attitude score changes were positively influenced by the message content while those who had low score changes were negatively influenced. As for the moderate attitude score changes category, some mean scores were positive while others were negative. The existence of influences of message content with opposite signs explain why the F-tests for the overall experimental group were not significant.

The conclusion to be made with respect to those with high attitude change scores is that irrespective of the level of source credibility the national development news had the highest positive effect (mean scores) followed by coffee-fertilizer news and general farming news. Therefore, the F-test for high attitude change category rejects the null hypothesis. On the other hand, with respect to moderate attitude change category, given high source credibility general farming news has the highest effect (mean score) followed by national development news and coffee-fertilizer news but given low source credibility coffee-fertilizer news has the highest impact (mean score) followed by national development news and general farming news. That is, message level interacts with source credibility level in influencing attitude.

Finally, with respect to <u>low attitude change</u> category message content has negative effect (mean scores) on attitude. One explanation for this would be that giving information about an innovation to which the smallholders are already highly favorably inclined is likely to create cognitive dissonance. Since the individuals cannot move up the attitude scale they move down. The conclusion to be drawn here then is that <u>given high source credibility national development news has the least negative effect (mean score) followed by general farming news and coffee fertilizer news but given low source credibility national development news has the least negative effect followed by coffee fertilizer news and general farming news.</u> That is, as in case of <u>moderate attitude change category</u>, there is an interaction effect between message and source credibility.

In view of the above discussion the overall conclusion that can be made is that <u>the null hypothesis is rejected by the research evidence and the alternative hypothesis that is supported is partly dependent on the level of initial attitude toward an innovation and partly on the crecibility of the source from which the circulars are emanating.</u> The above results are summarized in Table IV-47. The results suggest that initial measures of attitude must be taken before any campaign to alter attitude is begun.

TABLE IV-47

RANKING OF LEVELS OF MESSAGE CONTENT
ON BASIS OF THEIR EFFECTS ON ATTITUDE

High Attitude Scores

High Credibility Source (Agricultural Officer)	Low Credibility Source (Local Cooperative Officer)
1st: National Development News	1st: National Development News
2nd: Coffee Fertilizer News	2nd: Coffee Fertilizer News
3rd: General Farming News	3rd: General Farming News

Moderate Attitude Changes

High Credibility Source (Agricultural Officer)	Low Credibility Source (Local Cooperative Officer)
1st: General Farming News	1st: Coffee Fertilizer News
2nd: National Development News	2nd: National Development News
3rd: Coffee Fertilizer News	3rd: General Farming News

Low Attitude Changes*

High Credibility Source (Agricultural Officer)	Low Credibility Source (Local Cooperative Officer)
1st: Coffee Fertilizer News	1st: General Farming News
2nd: General Farming News	2nd: Coffee Fertilizer News
3rd: National Development News	3rd: National Development News

*Note that these are negative changes. That is, in the first quadrangle coffee fertilizer news had the largest negative mean change and national development news had the smallest negative mean change. The second quadrangle is interpreted in the same manner.

<u>Hypothesis lc</u>: The null hypothesis to be tested is

> Ho: that coffee fertilizer news, general
> farming news and national development
> news explain equal amounts of varia-
> tion on the dependent variable usage
> of fertilizer per acre.

In terms of the conceptual framework of Chapter II the alternative hypothesis asserts that those who received a more informative message used more fertilizer per acre than those who received a less informative message. Examination of pertinent results will reveal whether this null hypothesis is supported or not.

The results of one-way analysis of variance for "after" mean scores (Table IV-19) suggest that the treatment variables had a significant effect on usage since F is highly significant (.002). This means that at least two means of Table IV-16 are statistically different. But one-way analysis of variance for score changes in usage per acre (Table IV-23) results in an F that is not statistically significant suggesting that either the treatment variables are not effective or that one is significantly effective but its impact is neutralized by opposite effects of the other experimental variable. Hence, the necessity of examining the results of two-way analysis of variance.

The results of a two-way analysis for post usage scores are contained in Table IV-35. The table shows that message

content has an F value which is statistically significant at .05 level. The relevant mean scores are contained in Table IV-36 and an examination of their magnitudes suggests that given high source credibility the lower the message content the greater is the usage per acre mean score. That is, given that all circulars originate from the agricultural officer, national development news are the most effective (highest mean score) followed by general farming news and coffee fertilizer news in that order. This finding, therefore, fails to support the null hypothesis that the three levels of message content explain equal amounts of variation in the dependent variable usage per acre.

On the other hand, given low source credibility the relationship between message content and usage per acre is an inverted U. That is general farming news' circulars (moderate information content) has the greatest impact on usage per acre followed by national development news' circulars (low information content) and coffee fertilizer news' circulars (high information content). This finding neither supports the null hypothesis nor the alternative hypothesis of the higher the information content the higher the proportion of explained variation on the dependent variable. That is, the relationship between message content and usage per acre is tempered by the level of source credibility under consideration.

The interaction effect is discernible when change scores in usage per acre are split into high, moderate, and low levels and two-way analysis of variance is performed for each level (Table IV-40). The results of this table indicate that the interaction effect is significant at .036. The conclusion that may be made here is that <u>the relationship</u> <u>between message content and usage per acre is influenced by</u> <u>the credibility of the source of that message</u>. A summary of the above conclusions is contained in Table IV-48.

TABLE IV-48

RANKING OF LEVELS OF MESSAGE CONTENT ON BASIS OF THEIR EFFECTS ON USAGE PER ACRE

"After" Mean Scores

High Credibility Source (Agricultural Officer) "1"	Low Credibility Source (Local Cooperative Officer) "2"
1st: National Development News	1st: General Farming News
2nd: General Farming News	2nd: National Development News
3rd: Coffee Fertilizer News	3rd: Coffee Fertilizer News

Moderate Score Changes*

High Credibility Source (Agricultural Officer) "3"	Low Credibility Source (Local Cooperative Officer) "4"
1st: National Development News	1st: Coffee Fertilizer News
2nd: General Farming News	2nd: General Farming News
3rd: Coffee Fertilizer News	3rd: National Development News

*The treatments had no significant results with respect to high and low change scores in attitude.

Hypothesis 2a: The null hypothesis to be tested is

> Ho: that the Agricultural Officer and the
> Local Cooperative Union Officer explain
> equal amounts of variation on the
> dependent variable <u>knowledge</u>.

The above hypothesis has been developed from theoretical materials advanced by laboratory experimenters as reviewed in Chapter II.   Laboratory experiments have concluded that source credibility influences the responses of subjects. That is, circulars having identical messages will be attended to differently if they purport to originate from sources of differing credibility.   Chapter III discussed the fact that the smallholders accord the agricultural officer higher credibility that the local cooperative union officer.   The question then is whether those who received circulars from the agricultural officer obtained higher mean scores than those who received identical circulars from the local cooperative union officer.   The relevant data for answering this question are contained in the same tables as those of hypothesis la although the line of argument is different.

As mentioned earlier, the results of one-way analyses of variance for post knowledge scores (Table IV-17) and changes in knowledge scores (Table IV-21) indicate that the treatment variables had significant effect (under .001 and .012 respectively).   A close look at the post mean scores (Table IV-16) and mean change scores (Table IV-20) reveal

that given high message content (coffee-fertilizer news circulars) and moderate information content (general farming news circulars) low source credibility (local cooperative union officer) is more effective (higher mean scores) than the high source credibility (agricultural officer). However, given low message content (national development news) the agricultural officer influences the respondents' knowledge more than the local cooperative union officer. This finding therefore tends to reject the null hypothesis that the agricultural officer and local cooperative union officer explain equal amounts of variation on the dependent variable knowledge.

Since the conclusion of low message content is opposite of high and moderate message content it appears there is an interaction between source credibility and message content. This is borne out by the results of two-way analyses of variance for post mean scores (Table IV-26) and for mean score changes on knowledge (Table IV-28). The interaction effect is significant at under .001 level and .006 respectively. The relevant mean scores are contained in Tables IV-25 and IV-27. Again, the patterns of these mean scores indicate that given coffee fertilizer news and general farming news the agricultural officer has less impact (mean scores) than the local cooperative union officer but given national development news the agricultural officer is more

influential than the local cooperative officer.

These simple effects of source credibility are diagrammatically represented in Figure IV-2. As the diagram indicates given national development news circulars it is more effective to attribute their origin to an agricultural officer but given coffee fertilizer news' circulars and general farming news' circulars it is more rewarding so far as knowledge is concerned to attribute their source as the local cooperative union officer. In view of this it can be concluded that whether the agricultural officer is more effective as a source of message than the local cooperative union officer depends on the level of information content under consideration. That is, source credibility is not in this case entirely independent of message content. The pertinent conclusions are summarized in Table IV-49.

TABLE IV-49

RANKING OF LEVELS OF SOURCE CREDIBILITY
ON BASIS OF THEIR EFFECTS ON KNOWLEDGE

AFTER MEAN SCORES	MEAN SCORE CHANGES
Coffee Fertilizer News	Coffee Fertilizer News
1st: Local Cooperative Officer	1st: Local Cooperative Officer
2nd: Agricultural Officer	2nd: Agricultural Officer
General Farming News	General Farming News
1st: Local Cooperative Officer	1st: Local Cooperative Officer
2nd: Agricultural Officer	2nd: Agricultural Officer
National Development News	National Development News
1st: Agricultural Officer	1st: Agricultural Officer
2nd: Local Cooperative Officer	2nd: Local Cooperative Officer

Hypothesis 2b: The null hypothesis to be tested is

      Ho: that the agricultural officer and the
            local cooperative union officer explain
            equal amounts of variation on the
            dependent variable <u>attitude.</u>

Most of the laboratory studies involving source credibility have used <u>attitude</u> or <u>opinion</u> change as their dependent variable. The relevant literature was reviewed in Chapter II in the section termed "source effects". The implications of these laboratory experiments are that the higher the credibility of the source, the higher the attitude or opinion change. Whether this is so in case of field studies pertaining to agricultural innovations will be assessed by testing the above hypothesis. The relevant data for testing this hypothesis are contained in the same tables and figures as those which tested hypothesis 1b but the information extracted from each table is different.

As we explained earlier, the results of one-way analyses of variance for attitude post scores (Table IV-18) and attitude score changes (Table IV-22) have F-tests which are not statistically significant. Similarly, the two-way analysis of variance for post scores (Table IV-30) yielded an F values which were not significant at .05 level. The reason for this nonsignificance was shown to be the problem of ceiling effect which prevents respondents from positively

changing their attitude toward fertilizers.

Table IV-31 which contains the results of a two-way analysis of variance for attitude change scores gives an F-value of source credibility which is significant at .05 level. This points to the fact that in one-way analysis of variance (Table IV-22) the impact of source credibility was neutralized by the counteracting effect of message content. An examination of the relevant mean change scores (Table IV-32) indicates that the high source credibility means for each message are numerically higher than those of low source credibility. That is, irrespective of the level of message content the agricultural officer is more effective in changing attitude than the local cooperative union officer. But with respect to the three levels of message the agricultural officer is most effective when he disseminates national development news circulars and least effective when he distributes general farming news' circulars. On the other hand the local cooperative union officer is most effective when he is the origin of coffee fertilizer news and least effective when he originates national development news. These findings are not supportive of the null hypothesis.

Another piece of evidence pertaining to the effect of source credibility on attitude is provided by the results of two-way analyses of variance for high, moderate, and low categories of attitude change (Table IV-34). The results

indicate that for the high attitude change category source credibility is ineffective. Since message content for this category is significant at .05 level, it appears that those people who are initially low in attitude scores are more concerned with acquisition of useful information without regard to its source. For the moderate attitude change category both the message and the source are important since the interaction effect is significant at .021 level. Finally, with respect to low attitude change category both the source and the message are significant at .005 and .026 level respectively but the effects are negative as discussed below.

An examination of the mean scores where source credibility and/or the interaction is statistically significant indicates that for the moderate attitude change category the agricultural officer has highest effect when he circulates general farming newsletters and least effective when he distributes coffee-fertilizer newsletters. But given the same category of attitude change, the local cooperative union officer is most effective when he distributes coffee-fertilizer newsletters and least effective when he distributes general farming newsletters. On the other hand, given low attitude change category the agricultural officer has more negative impact on attitude than the local cooperative union officer when he distributes coffee fertilizer and

national development news' pamphlets but has less negative
effect when he distributes general farming newsletters. It
can, therefore, be concluded that the effects of the source
on attitude is partly a function of its credibility as well
as the level of message content and partly a function of the
initial attitude toward fertilizer. The conclusions reached
above are summarized in Table IV-50.

TABLE IV-50

RANKING OF LEVELS OF SOURCE CREDIBILITY ON
BASIS OF THEIR EFFECTS ON ATTITUDE

MEAN SCORE CHANGES	BY HIGH, MODERATE & LOW CATEGORIES OF ATTITUDE CHANGE
Coffee Fertilizer News	High
1st: Agricultural Officer 2nd: Local Coop. Officer	F-tests not significant at .05 level.
General Farming News	Moderate
1st: Agricultural Officer 2nd: Local Coop. Officer	For general and national dev. news the agricultural officer is more effective but for coffee fertilizer news the local coop. officer is more effective.
National Development News	Low
1st: Agricultural Officer 2nd: Local Coop. Officer	For all levels of message content, the agricultural officer has a more negative effect than the local coop. officer.

Hypothesis 2c: The null hypothesis to be tested is

> Ho: that the agricultural officer and the
> local cooperative union officer explain
> equal amounts of variation in the
> dependent variable fertilizer usage per
> acre.

The theory advanced in Chapter II proposes that there
is a relationship between source credibility and fertilizer
usage behaviour. Specifically, the theory hypothesizes
that the higher the credibility of the source the higher the
fertilizer usage per acre. That is, if the objective of a
change agent is to increase smallholders' usage of coffee-
fertilizers then he must ensure that the source of the
message enjoys high credibility in the eyes of the small-
holders. The tenability of this hypothesis is discussed
next.

Since the results of one-way analysis of variance for
"after" usage mean scores (Table IV-19) have an F value
which is significant at .002 level, it appears reasonable to
conclude that the treatment variables influenced fertilizer
usage. But it has already been established that message
content had a significant impact on the dependent variable.
Therefore, the results of two-way analyses of variance must
be examined before concluding that source credibility is
also significantly effective.

An examination of the results of two-way analyses of variance

for post fertilizer usage (Table IV-35) and for usage change scores (Table IV-38) reveal that source credibility has an insignificant effect on the dependent variable usage per acre. Given that both F-tests for source credibility are statistically insignificant, it appears justifiable to conclude that source credibility does not influence usage behaviour.

As a final check the results of two-way analyses of variance for changes in usage were examined when split into high, moderate and low usage (Table IV-40). The results show that none of the treatment variables is effective both at the high and low usage change categories, but that at the moderate level of usage change the interaction effect is significant at .036. That is, at the moderate usage change level the source and the message interact to influence usage behaviour. However, since all the other tests proved insignificant it appears plausible to conclude that the significant F-value in this case could have occurred by chance. Therefore, the final conclusion is that the null hypothesis that the agricultural officer and the local cooperative union officer explain equal amounts of variation on the dependent variable fertilizer usage per acre is supported by the present study.

Hypothesis 3:   The null hypothesis to be tested is

> Ho: that the beta coefficients of selected
>   receiver variables are equal and
>   insignificant so far as their influence
>   on knowledge, attitude and usage per
>   acre are concerned.

The rationale for this hypothesis was delinerated in Chapter I and II. It was briefly mentioned in the former that communication researchers particularly Schramm[21] argue that demographic and socioeconomic factors such as age, income and education are likely to influence audience responses. In the latter chapter a lengthy discussion on the receiver variables which are hypothesized to influence innovative behaviour was given. Interested readers were also referred to Rogers' summary of conflicting pertinent empirical results.[22] Given such a conflict in the empirical findings the author deemed it useful to test the above hypothesis.

With respect to knowledge the results of Table IV-41 indicate that when simple regression analyses of knowledge are performed on selected demographics and socioeconomic factors income, education, and literacy emerge significant.

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[21] Schramm, "Age, Education, Economic Status: Factors in Newspaper Reading", pp. 149-59.

[22] Rogers, "Communication of Innovations", Appendix A.

That is, these variables taken individually have some influence on knowledge. However, when a multiple regression analysis is performed only <u>income</u> emerges significant. Therefore, the null hypothesis that <u>the beta coefficients of receiver variables are equal and insignificant so far as knowledge is concerned is supported except with respect to income</u>.

In case of the dependent variable attitude Table IV-43 indicates that education, number of unmarried children, literacy, and number of wives individually have significant influence on the respondents' scores of attitude. But when a multiple regression is performed (Table IV-44) only education has a significant t-value. Therefore, on basis of this evidence it can be concluded that <u>the receiver variables</u>, <u>except education, have insignificant impact on attitude and the null hypothesis is by and large supported</u>.

Finally, with respect to usage per acre the results of Table IV-45 indicate that out of the twelve receiver variables included in this study only number of wives had a significant beta coefficient. Given this finding, it may be concluded that <u>the receiver variables, with the exception of number of wives, do not significantly influence the intensity of fertilizer usage and as such the null hypothesis cannot be rejected</u>.

Hypothesis 4:   The final null hypothesis to be tested here
is

>   Ho: that the correlation coefficients
>   between knowledge and usage per acre
>   and between attitude and usage are
>   equal.

This hypothesis was deduced from the adoption process
model discussed in Chapter II which stipulates that know-
ledge (information) precedes attitude (evaluation) and
attitude precedes usage per acre (overt behaviour). The
implication of this sequence is that there is a stronger
relationship between attitude and usage behaviour than
between knowledge and usage. If this proposition is correct
then the correlation coefficient between knowledge and usage
per acre should be smaller than the one between attitude and
usage.

The Pearson Product-Moment correlation coefficents
between score changes in each pair of the dependent vari-
ables are presented in Table IV-51. The table reveals that
the correlation coefficient between knowledge and attitude
changes (.354) is smaller than the correlation coefficient
between knowledge and usage per acre (.435) and the latter
is in turn smaller than the correlation coefficient between
attitude and usage per acre (.510). That is, there appears
to be a stronger relationship between changes in attitude

TABLE IV-51

CORRELATION COEFFICIENTS BETWEEN
PAIRS OF THE DEPENDENT VARIABLES

Knowledge	1		
Attitude	.354	1	
Usage/Acre	.435	.510	1

and changes in usage than there is between knowledge and usage changes.

Statistical tests[23] of these correlation coefficients reveal that they are all significant under .001 level. The difference between the last two correlations coefficients .075 (.510 - .435) is not statistically significant with 128 degrees of freedom. This finding suggests that the relationship between attitude and usage per acre is not statistically stronger than the relationship between knowledge and usage per acre. Thus, it can be concluded that having more favorable attitudes toward fertilizer does not necessarily make smallholders use more fertilizer than does having higher level of knowledge.

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[23] The t-tests are performed by use of $t = r\sqrt{\dfrac{N-2}{1-r^2}}$ and the standard error of difference between the two correlation coefficients is given by $\sigma dz = \dfrac{1}{\sqrt{\dfrac{1}{N-3} + \dfrac{1}{N-3}}}$. See, Guildford, "Fundamentals of Statistics in Psychology and Education", p. 194.

CHAPTER V

SUMMARY, CONCLUSIONS AND IMPLICATIONS

Summary

The primary objective of the study reported here was to explore the effects of message content and source credibility on the adoption process in a developing environment. The two communications variables have earlier been found to have significant effects on general attitudinal and behavioral changes, particularly in laboratory experiments. However there are practically no field studies which have attempted to assess their impact on the adoption process. To assess this impact the author first pieced together the relevant theoretical and empirical evidence from both the diffusion and the communication literatures. This evidence was then used to delineate the hypotheses outlined at the end of Chapter II.

Second, a research design which incorporated a before-and-after experiment was used to gather data on changes in knowledge, attitude, and fertilizer usage per acre. Once these data were obtained, they were subjected to one-and-two way analyses of variance. The conclusions of these analyses are discussed next.

Conclusions

The conclusions of the present study are summarized in Table V-1A and B. It is evidently clear from this table that with respect to the dependent variable knowledge the coffee-fertilizer news circulars are the most influential irrespective of source credibility. That is, whether the information circulars emanate from the agricultural officer or from the local cooperative union officer, coffee-fertilizer news circulars' respondents obtained the highest mean score changes on knowledge. This finding was congruent to theoretical expectations since coffee-fertilizer news circulars represented the highest level of technical information content. However, the second highest knowledge mean score changes depend on the level of source credibility. That is, given the agricultural officer (relatively high credibility source), the National Development news circulars (relatively low information content) are more effective than general farming news circulars (relatively high information content) but given the local cooperative union officer (relatively low source credibility) the general farming news circulars are more influential than the National Development news circulars. This conclusion is also discernible in the results of hypothesis 2a where given the coffee-fertilizer news circulars and the general farming news circulars, the local cooperative union officer is more influential than the agricultural officer but given the

Independent Variables \ Dependent Variables	Changes In Knowledge		Changes In Attitude		Changes In Usage Per Acre	
	Agricultrual Officer	Local Coop. Officer	Agricultural Officer	Local Coop Officer	Agricultural Officer	Local Coop. Ofc.
Hyp. 1a: Effects of message content on knowledge	1. Coffee fertilizer news 2. National Dev. news 3. Gen. farming news	1. Coffee fertilizer news 2. Gen. farming news 3. National Dev. news				
Hyp: 1b: Effects of message on attitude			**High** 1. National Dev. news 2. Coffee fertilizer news 3. Gen. farming news **Moderate** 1. Gen. farming news 2. National Dev. news 3. Coffee fertilizer news **Low** 1. Coffee fertilizer news 2. Gen. farming news 3. National Dev. news	**High** 1. National Dev. news 2. Coffee fertilizer news 3. Gen. farming news **Moderate** 1. Coffee fertilizer 2. National Dev. news 3. Gen. farming news **Low** 1. Gen. farming news 2. Coffee fertilizer news 3. National Dev. news	**High*** 1. Coffee fertilizer 2. National Dev. news 3. Gen. farming news **Moderate** 1. National Dev. news 2. Gen. farming news 3. Coffee fertilizer news **Low*** 1. Coffee fertilizer news 2. National Dev. news 3. Gen. farming news	**High*** 1. National Dev.news 2. Coffee fertilizer news Gen. farming news **Moderate** 1. Coffee fertizer news 2. Gen. farming news 3. National Dev. news **Low *** 1. Coffee fertilizer news 2. National Dev.news 3. Gen. farming news
Hyp: 1c: Effects of message on usage per acre						
	Coffee fertilizer news	General farming news	National Dev. news	Coffee fertilizer news	General farming news	National Dev. news
Hyp. 2: Effects of source credibility on the dependent variable	1. Local coop. officer 2. Agricultural Officer	1. Local coop. officer 2. Agricultural Ofc.	1. Agricultural Ofc. 2. Local Coop Ofc.	1. Agricultural Officer 2. Local Coop. Officer	1. Agricultural Ofc. 2. Local Coop. Ofc.	1. Agricultural Officer 2. Local Coop. Officer	Effects of source on Usage Per Acre For moderate usage change the source interacts with message to change usage. For high and low levels of change; the effect of source is not statistically significant.
Hyp. 3: Effects of receiver variables	Income		Education		Number of Wives	
Hyp. 4: Relationships among the dependent variables	The correlation coefficient between attitude and usage per acre is numerically larger than the correlation coefficient between knowledge and usage per acre but the difference is not statistically significant.					

*The F-tests of two-way analyses of variance are not significant. This may be because of the smallness of the experimental cells. The smallest cell has 1

TABLE V-13

SCHEMATIC RANKING OF MESSAGE AND SOURCE EFFECTS

CHANGES IN KNOWLEDGE:

	M1	M2	M3
S1	2	6	3
S2	1	4	5

CHANGES IN ATTITUDE:

	M1	M2	M3
S1	2	3	1
S2	4	5	6

CHANGES IN USAGE/ACRE:

	M1	M2	M3
S1	3	5	1
S2	4	2	6

Note: The results summarized in Table V-1A and B suggest
that while the S-M-R-C-E model implies only additive
effects, there is in fact an interaction effect
between source and message content.

National Development news circulars the latter has a higher impact than the former. The general conclusion pertaining to the impact of message content and source credibility on the dependent variable knowledge is that <u>a relatively high level of one variable can offset the otherwise small influence of a relatively low level of the other variable.</u>

The conclusions pertaining to the dependent variable <u>attitude</u> are more complicated than those pertaining to knowledge. Here the impact of message content partly depends on the initial attitude scores and partly on the particular combination of the treatments. The first conclusion to be drawn from the results of the present study is that <u>irres-pective of source credibility level, given high attitude changes (low initial attitude scores) the National Develop-ment News' circulars have the highest impact followed by coffee fertilizer news and general farming news' circulars in that order.</u> This conclusion is contrary to what was expected since the National Development News Circulars were assumed to contain the lowest level of information content. However, the finding appears logical if general as opposed to technical information content is considered. The National Development news circulars may contain high general informa-tion content but low technical information content. If the former is sufficient to change attitudes, as appears to be true in the present population, then National Development news circulars which contain high <u>general</u> information content

should be expected to have highest impact on attitude.

The second conclusion pertaining to the dependent variable attitude is that given moderate and low attitude score changes (moderate and high initial attitude scores), the impact of the treatment variables depends on the treatment combination in question. That is, there is interaction between the message and the source of that message. For instance, given the local cooperative union officer and moderate initial scores, coffee-fertilizer news circulars have the highest impact but given the agricultural officer general farming news circulars are the most influential. However, given the agricultural officer and high initial attitude scores coffee fertilizer news circulars have the greatest effect. This suggests that the effect of message content on attitude is a function of the initial attitude as well as the level of source credibility. That is, to design a message content that will have a high impact on attitude toward a product the strategy designer must not only consider the level of source credibility but must also measure the initial attitude.

The impact of source credibility, unlike that of message content, is straightforward because irrespective of the initial attitude and the message content, the agricultural officer is more influential than the local cooperative union officer when the entire attitude change score distribution is considered.

That is, when the attitude score distribution is not split
into high, moderate, and low categories, the agricultural
officer has greater impact on attitude than the local coop-
erative union officer.

The impact of message content on fertilizer usage per
acre is also complex. In the case of moderate usage per acre
change, given the agricultural officer, the National Develop-
ment news has the highest impact followed by general farming
news and coffee fertilizer news circulars in that order.
But given the local cooperative union officer, coffee-fer-
tilizer news circulars have the highest effect followed by
general farming news and National Development news circulars.
The former ordering of effect was unexpected but the latter
was congruent to theoretical expectation. It appears that
when the agricultural officer who represents a higher trusted
authority (the country's president) is the origin of circulars
with different levels of technical information content, the
circular with the lowest level will be the most effective in
increasing the intensity of fertilizer usage. But when the
local cooperative union officer who does not represent a
trusted higher authority disseminates the same circulars, the
one with the highest level of technical content is the most
effective. There is, therefore, an interaction effect between
message content and source credibility.

In the case of high and low usage per acre changes,

the research findings suggest that neither message content nor source credibility has a significant impact. However, this does not mean that the experimental variables have no effect on usage per acre. Whether a given usage per acre change is significant or not partly depends on the magnitude of the change and partly on the cell-sizes. With respect to the former the experimental duration of ten weeks may not have been long enough to allow the treatment variables to impart their full effect. That is, the full effect of the exper- imental variables may not have taken place by the time the "after" data were collected. If this was the case, then only partial impact was assessed in the present study.

With respect to the problem of cell-sizes, the issue concerns the degrees of freedom that are used to carry out the relevant tests. In the present study due to mortality rate and the subdivision of changes in usage per acre into high, moderate and low categories, the smallest cell in the two- way analysis had one subject and the largest had eighteen subjects. Given cells with these kinds of frequencies, it is not surprising that the scores for high and low categories of fertilizer usage per acre were not statistically significant. Therefore, it may be concluded that the message content and source credibility were effective but this effect was not statistically significant.

The impact of demographic and socioeconomic variables on the three dependent variables was puzzling. Contrary to theoretical and empirical findings in the literature, multiple regression analyses revealed that Knowledge was only statistically influenced by income; Attitude by education; and Usage per acre by number of wives but the experimental groups did not score differently on these independent variables. Therefore, it appears that while several demographic and socioeconomic variables may explain the earliness-lateness dimension of innovative behavior, as the literature suggests, they do not substantially influence the intensity of the adoption process.

The final conclusion of the present study is that although the correlation coefficient between Attitude and Usage per acre is numerically larger than the one between knowledge and usage, the difference is not statistically significant. That is, the relationship between changes in knowledge and changes in usage per acre is not any weaker than the one between changes in attitude and changes in usage per acre. It, therefore, appears correct to conclude that changing knowledge may directly lead to changes in usage without having first to change the attitude.

Implications for the Marketers and the Government

The results of the present study, as reported in the

previous chapter, provide useful insights to all those who
are involved in "selling" new products and/or ideas to
smallholders. First, the finding that given the local coop-
erative union officer (relatively low source credibility)
the higher the technical information content the
higher the knowledge changes has a useful implication for
the marketers of both agricultural inputs and consumer pro-
ducts. It implies that since the salesmen are even perceived
less credible than the local cooperative union officer, they
should carry with them high technical information content
printed in the dialect of the sales district. That is, the
message content should be relevant to the needs and goals
of the smallholders in their role as producers or consumers
depending on the product in question. While this may sound
obvious, it must be noted that since most of the marketing
organizations in Kenya are subsidiaries of Multinational
corporations, their advertisements and personal communications
tend to carry messages that were designed for farmers or consumers
in developed countries. These messages are, therefore,
largely irrelevant to the needs and goals of the smallholders
in a developing country such as Kenya. Hence, when the
marketers' objective is to increase the smallholders' product
knowledge level, the printed message must be high in technical
content since the salesman is perceived as a low credibility
source.

The finding pertaining to attitude shows that the source interacts with the initial attitude to determine the effect of the message content on attitude change. That is, when the objective of the marketers is to positively shift the small-holders' attitudes toward their products, the initial attitudes must first be measured and, depending on the result, messages designed which will maximize attitude change given the low credibility of the salesmen. This implies that given low initial attitude scores (which means there is ample "room" for positive attitude change) high general information should be disseminated. But given moderate and high initial attitude scores the best strategy is to disseminate high technical information content and moderate technical information content respectively.

Similarly, the finding pertaining to the intensity of fertilizer usage suggests that when moderate[1] product usage is the goal of the marketer, high technical information should be disseminated. However, the results found in this study are not decisive since the effect of message content was not statistically significant for high and low categories of fertilizer usage per acre. As explained in the previous section, this may be because of the smallness of the cell-sizes and/or because of the shortness of the experimental period. Therefore, further research is needed before a clear-cut managerial recommendation is made.

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[1] It must be noted that high product usage change is not always a good thing. For instance, excessive application of fertilizer or weed-control chemicals may end up spoiling the plants. Similarly, heavy usage of some consumer products is harmful and if so the marketer may not benefit in the long run.

The results of the present study have also some implications for the Kenya Government. As discussed in Chapter I, the Government is seriously committed to the task of raising the standards of living of the rural dwellers. To realize this goal, the government must "sell" its new ideas to the smallholders who constitute over seventy-five per cent of the population. Such ideas pertain to family planning, new agricultural technology, health practices, and education. These modernization facets should be communicated to the smallholders since "change from the traditional to the more modern necessarily involves the communication and acceptance of new ideas."[2]

The finding that given the agricultural officer (relatively high credibility source) to increase smallholders' knowledge high technical information should be disseminated implies that the Government should always combine high source credibility and high information content in communicating with the rural dwellers. But if the objective is to positively change their attitude toward an innovation, the initial attitudes should first be measured. If they turn out to be low then given a relatively high credibility source (the agricultural officer) high general information content should be disseminated. Should they turn out to be moderate, moderate information content should be distributed; and if

[2] Rogers, "Modernization Among Peasants," p. 186.

they turn out to be high, high general information content should be disseminated.

The government may also find it more useful to operate through local cooperative union officers since these are more numerous than the agricultural officers. If this option is used, then when initial attitudes are high, high general information content (National Development news) should be distributed.

With regard to fertilizer usage per acre, given that the Government has decided to operate through the agricultural officer, the higher the level of general information content the more effective the communication will be. However, if the Government decides to operate through the local cooperative union officer, the higher the level of technical information, the higher the effect of communication. Thus, the strategy to be used depends on the credibility of the source and the level of message content. Again, this implication is not decisive because the F-tests for high and low categories of usage per acre changes are not statistically significant. Further research evidence is needed before the "managerial" application suggested here can be decisively used.

Theoretical Implications and Directions for Future Research

The present study represents an initial test of the

adoption process graphically depicted in Figure II-9. The
results presented in Chapter IV show that, holding the
channel of communication and the receiver variables constant,
the adoption process is a function of the message content
and source credibility. Future research should therefore be
directed at discovering the effects of communication on the
adoption process when all the communication variables (message,
source, channel and the receiver variables) are allowed to
vary.

The research design used in this study has incorporated
many features of an ideal experiment advanced by Haskins.[3]
The inclusion of two control groups one of which is measured
only after the experiment permitted the assessment of the
impact of the measurement process and of the environmental
factors. The factorial features of the experiment facili-
tated the determination of the effects of separate communi-
cation variables but it was assumed on an a priori basis
that distributing the Kikuyu pamphlets and conducting inter-
views in the Kikuyu language would provide more accurate
results than if any other language was used. Future
research should therefore be directed at finding out whether
the language of the message content makes a difference.
This can be accomplished by incorporating language in the

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[3] Haskins, "How to Evaluate Mass Communications."

research design. That is, making it a treatment variable.
In the population studied here the two levels of language
treatment may be Kikuyu and Swahili since the two languages
are fairly well-known though the former is more widely used.

In all the three types of information circulars, the
message was one-sided and the sender, rather than the receiver,
drew the conclusion. There is, therefore, the unanswered
question as to what the impact of the message content and
source credibility would have been if the messages were two-
sided and the receivers were allowed to draw their own
conclusions. Future research should be directed at answering
this question.

The study reported here did not try to tap any impact
of interpersonal communication that might have followed
exposure to the information circulars. It is likely that
after receiving the information circulars, the respondents
subsequently discussed the message content with smallholders
some of whom were not included in the sample. If so, the
impact of the circulars was more pervasive than could be
assessed by the research instrument of the present study.
For this reason, future studies in this area should try to
assess the extent to which interpersonal communication,
following exposure to the information circulars, affects the
adoption process.

APPENDICES

APPENDIX A

ENGLISH AND CORRESPONDING

KIKUYU QUESTIONNAIRES

Note: The Kikuyu Questionnaires were used to collect
        the Data.

UNIVERSITY OF NAIROBI   SEPTEMBER. 1977

COFFEE SMALLHOLDERS SURVEY
IN CENTRAL KIAMBU, KENYA

GROUP NUMBER

INTERVIEWER'S NAME ....

1	2	3	4	5	6

RESPONDENT'S NAME..............................

RESPONDENT'S ADDRESS:

INTERVIEW CHECKED

    Village or Nearest Trading Centre.............

Supervisor	Yes	No
Researcher		

    Sublocation..................................

Time taken ....

Number of visits before Interview was granted .....

Number of people present during interview.........

Date ....

PART I: INTRODUCTION AND BEHAVIORAL QUESTIONS

Introduction:

Good morning/afternoon.............
My Name is....................... and I am from Research Bureau Ltd.
Today we are carrying out a survey on the various crops people plant
on their farms.

Q.1.   In which year did you first plant Coffee?

	Col.
	44-45

Q.2.   How many Coffee trees did you plant in that year?
(year given at Q.1)

	Col.
	46-49

Q.3.   How many Coffee trees do you now have?

	Col.
	50-54

Q.4.   How many of these Coffee trees (mentioned in Q.3)
are less than 3 years old?

	Col.
	55-58

Q.5.   Considering the last three years
has your annual harvest of Coffee berries
been increasing, constant, or decreasing
in quantity?

Col. 59

increasing	1
constant	2
decreasing	3

Q.6.   How many kilograms of each of the
following grades of Coffee berries
did you harvest in 1976?

	Kilos	Col
Grade 1		Col. 60-64
Grade 2		Col. 65-69
Grade 3		Col. 70-74

Q.7.   How many kilograms of each of..... (each grade mentioned at Q.6)
did you harvest during the short rains (September to November 1976?)

	Kilos	
Grade 1		Col. 75-80
Grade 2		Col. 7-11
Grade 3		Col. 12-15

(N.B.: the number of kilos reported here must be equal to or less than Q.6.)

Q.8. What do you use to make your farm fertile?
and how often do you use it?

DO NOT PROMPT	Never	Once every 2 years	Once a year	Twice a year	Cols.
Animal manure	0	1	2	3	16
Compost manure	0	1	2	3	17
Fertilizer	0	1	2	3	18
Mulching	0	1	2	3	19
Others (specify)	0	1	2	3	20

IF FERTILIZER NOT USED, GO TO Q.14

FERTILIZER USERS ONLY (at Q.8), ASK:

Q.9. In which year did you first use fertilizer on your farm?

	Col.
	21-22

Q.10 In which year did you first use it on Coffee?

	Col.
	23-24

Q.11. Did you use fertilizer on your
Coffee farm last year (1976)?

Col. 25

Yes	1
No	2	→GO TO Q.14.

Q.12. How many kilograms of fertilizer did you use on your Coffee farm
last year (1976)?

Kilos

	Col.
	26-29

Q.13. How many kilograms of fertilizer did you use on your Coffee farm during
the 1976 short rains (September - November)?

Kilos

	Col.
	30-32

(N.B. the figure cannot be greater than that of Q.12.)

ASK ALL:

Q.14. Did you use fertilizer to grow other crops?

Col. 33

Yes	1
No	2	← GO TO Q.17.

Q.15. How many kilograms of fertilizer did you use to grow other crops
in 1976?

Kilos

	Col.
	34-37

Q.16. How many <u>kilograms</u> of fertilizer did you use on other crops
during the short rains (September – November) in 1976?

Kilos

	Col.
	38-40

(N.B. the figure cannot be greater than that of Q.15)

<u>ASK ALL:</u>

Q.17. Have you ever received a pamphlet
from anybody explaining <u>how</u> and <u>why</u>
Coffee – fertilizer should be applied?

Col. 41

Yes	1
No	2 ——GO TO Q.19.

Q.18. What was the name of the pamphlet?
and who was the <u>publisher</u>?

Pamphlet		Publisher	
	Col.		Col.
	42		43

Q.19. During the coming short rains (September – November 1977) how many kilograms
of fertilizer are you planning to use for Coffee and other crops?

Kilos

		Col.
Coffee		44-47
Other crops		Col. 48-51

<u>ASK ALL:</u>

Q.20. Which of the following items do you <u>now</u> have?

<u>READ OUT:</u>

	Yes	No	
Coffee-spray pump	1	2	Col. 52
Donkeys	1	2	Col. 53
Grade cows	1	2	Col. 54
Plough	1	2	Col. 55
Water pump (any kind)	1	2	Col. 56
Motor car	1	2	Col. 57
Irrigation equipment	1	2	Col. 58

Q.21. How often do you use or seek each of the following?

	Never	Once Every 2 years	Once a year	Once every 6 months	Once every 2 months	More than once a month	Cols.
Mobile bank facilities	0	1	2	3	4	5	59
Bank in a permanent building	0	1	2	3	4	5	60
Agriculture Training Centres	0	1	2	3	4	5	61
Artificial Insemination services	0	1	2	3	4	5	62
Hired plough services	0	1	2	3	4	5	63
Dairy facilities	0	1	2	3	4	5	64
Advice from Agricultural officers	0	1	2	3	4	5	65
Advice from Veterinary officers	0	1	2	3	4	5	66

PART 2

SECTION A: KNOWLEDGE ABOUT FERTILIZER

Q.1. There are several kinds of fertilizers that have been recommended for coffee by the Ministry of Agriculture. Please name three of them.

DO NOT PROMPT

	Mentioned	Not mentioned	
CAN	1	2	Col. 67
ASN	1	2	Col. 68
SA	1	2	Col. 69
Urea	1	2	Col. 70
Diammonium	1	2	Col. 71
Other (specify)	1	2	Col. 72
Other (specify)	1	2	Col. 73

Q.2.. What is the one necessary ingredient (substance) must all the fertilizers recommended for coffee have?

	Col.
	74-75

Q.3. Do you think all coffee plants should have the same amount of fertilizer applied to them in a year?

Col. 76

Yes	1 --→ GO TO Q.5
No	2 --→ GO TO Q.4
D.K.	8 --→ GO TO Q.5

Q.4. On what basis do you think the farmer decides how much fertilizer to apply to each coffee plant?

	Col. 77-78
	Col. 79-80

Q.5. Do you think you can use the same fertilizer for all crops?

Col. 7   Card 3

Yes	1
No	2
D.K.	8

Q.6. When do you think is the right time to apply fertilizer on your coffee plants?

Col. 8

Wet season	1
Dry season	2
Other (specify)	3

Q.7. How many times a year do you
think fertilizer should be
applied to coffee plants?

	Col. 9
Once	1
Twice	2
Three times	3
Other (specify)	4

Q.8. Which are the three months of the year duing which fertilizer
should be applied to coffee plants in Kiambu District?

	Col. 10-15

Q.9. In this location from what sources can a farmer obtain fertilizer?

	Mentioned	Not mentioned	
Coffee factory	1	2	Col. 16
Retail stockist	1	2	Col. 17
KFA stores	1	2	Col. 18
Others (specify)	1	2	Col. 19

Q.10. How do you think fertilizer should be stored to prevent it from
getting damaged?

	Col. 20
In a wet place	1
In a dry and cool place	2
In a dry and hot place	3
Others (specify)	4

Q.11. Why do you think farmers are urged by the Ministry of Agriculture to
apply fertilizer to all their crops?
DO NOT PROMPT:

	Mentioned	Not mentioned	
Fertilizer application increases quantity of harvest	1	2	Col. 21
Fertilizer application increases quality of harvest	1	2	Col. 22
Fertilizer application makes crops grow faster	1	2	Col. 23
Others (specify)	1	2	Col. 24

Q.12. How many kilo/bag sizes of fertilizer do you know?

	Col. 25

Q.13. What is the <u>current</u> price of a 50 kilo/bag size of .... (READ OUT)

	Price	
		Cols.
C.A.N.		26-30
S.A.		31-35
A.S.N.		
Diammonium		41-45

Q.14. What is the right method of fertilizer application to a coffee plant?
DO NOT PROMPT:

	Col. 46
Spread fertilizer in a circle of 60 cms from the base of the tree and on the bare soil	4
Spread fertilizer in a radius of four feet on the soil itself not on the mulching	3
Spread fertilizer in the soil without regard to distance from the stem	2
Other (specify)	1

B. ATTITUDES TOWARDS USE OF FERTILIZER:

Interviewer: Ask the respondent whether he agrees or disagrees with
each of the following statements. After he/she takes a position ask
him/her whether he/she <u>agrees somewhat, agree, agree strongly</u> or
<u>disagrees somewhat, disagree, strongly disagree</u>. Then check the appro-
priate column below.

		Strongly Agree	Agree	Somewhat Agree	Disagree Somewhat	Disagree	Strongly Disagree	Cols.
1.	A farmer increases his annual harvest by using fertilizer	6	5	4	3	2	1	47
2.	Fertilizer makes the soil lose moisture	6	5	4	3	2	1	48
3.	Fertilizer application improves the quality of crops	6	5	4	3	2	1	49
4.	Farms get more weeds when fertilizer is used than when manure is used	6	5	4	3	2	1	50
5.	Fertilizer makes crops grow faster than animal manure	6	5	4	3	2	1	51
6.	Fertilizer costs so much money that it is not worth it	6	5	4	3	2	1	52
7.	To increase farm incomes all crops should be planted with fertilizer	6	5	4	3	2	1	53
8.	Fertilizer is easier to apply on crops than animal manure	6	5	4	3	2	1	54
9.	Application of fertilizer is only beneficial to large farmers	6	5	4	3	2	1	55
10.	Only farmers without animals should use fertilizer	6	5	4	3	2	1	56

PART 3:   MEASUREMENTS OF VARIOUS INDEPENDENT VARIABLES

SECTION A: OPINION LEADERSHIP:

Q.1.   Do people come to you for information
or advice?

	Col. 57
Yes	1
No	2

→ go to Q.3

Q.2.   In general, do you think people
come to you for information or
advice more often than they go
to others?

	Col. 58
Yes	1
No	2

Q.3.   During the past three months have
you advised anybody on new farming
methods?

	Col. 59
Yes	1
No	2

Q.4.   During the last six months how
often have you talked to somebody
about the following?

	Very Often	Often	Some-times	Not at all	Cols.
Grading and sorting coffee berries	4	3	2	1	60
Artificial insemination of cattle	4	3	2	1	61
Fertilizer application	4	3	2	1	62
Coffee - prices	4	3	2	1	63
The efficiency/inefficiency of coffee Co-operative Societies	4	3	2	1	64
Agricultural training facilities	4	3	2	1	65

Q.5.   Considering your overall experience
of coffee growing, would you say
you....(READ OUT: record only one
answer)

	Col. 66
Know everything about coffee growing	1
Know some aspects of coffee growing	2
Know very little about coffee growing	3

Q.6.   In your Sub-location would you
consider yourself a leader or
a follower with respect to
adopting new farming techniques?

	Col. 67
Leader	1
Follower	2
No. opinion	3

SECTION B: MEDIA EXPOSURE AND COSMOPOLITANISM

Q.1.   During the last one month how many times did you
        listen to the radio?

	Col.
	68-70

If never, GO TO Q. 4

Q.2.   Where do you usually listen to the radio?

	Col. 71
In my house	1
At a friend's/relative's house	2
In a restaurant (Bar/Store)	3
In a motor car	4
Others (specify)	5

Q.3.   What times of the day do you normally listen to the radio?

	Mentioned	Not mentioned	Cols.
Morning (6 a.m. to 12 noon)	1	2	72
Afternoon (12.01 to 5 p.m.)	1	2	73
Evening (5.01 p.m. to 11 p.m.)	1	2	74

Q.4.   About how many movies did you see last year?

	Col.
	75-77

Q.5.   How many times did you read each of the following daily newspapers
        during the last one month?

	None	1-10 times	11-20 times	More than 20 times	Cols.
Daily Nation	1	2	3	4	78
The Standard	1	2	3	4	79
Taifa Leo	1	2	3	4	80

Q.6.   During the last one month how many times did you have somebody else
        read the following daily newspaper for you?

CARD 4

	None	1-10 times	11-20 times	More than 20 times	Cols.
Daily Nation	1	2	3	4	7
The Standard	1	2	3	4	8
Taifa Leo	1	2	3	4	9

Q.7.   During the <u>last three months</u> how many times did you read each of the
       following weekly newspapers?

	None	1-5 times	6-10 times	More than 10 times	Cols.
Sunday Nation	1	2	3	4	10
Baraza	1	2	3	4	11
Taifa Weekly	1	2	3	4	12
Target	1	2	3	4	13

Q.8.   During the <u>last three months</u> how many times did you read each of the
       following weekly magazines?

	None	1-5 times	6-10 times	More than 10 times	Cols.
Weekly Review	1	2	3	4	14
Safari Magazine	1	2	3	4	15
Kenya Gazette	1	2	3	4	16

Q.9.   During the last <u>six months</u> how many times did you read each of the
       following monthly magazines?

	None	1-3 times	More than 3 times	Cols.
Kenya Farmer	1	2	3	17
Nyota	1	2	3	18
Mshiriki wa Kenya	1	2	3	19
Drum	1	2	3	20
Trust	1	2	3	21
Joe	1	2	3	22
Trade and Industry	1	2	3	23
Viva	1	2	3	24

Q.10. During the <u>last three months</u> about how many visits did you make to
    . the following places?

	None	1-10 times	11-20 times	More than 20 times	Cols.
Kiambu Township	1	2	3	4	25
Divisional Headquarters	1	2	3	4	26
Waruhiu Farmers Institute	1	2	3	4	27
Muguga Research Station	1	2	3	4	28
Coffee Research Station (Jacaranda)	1	2	3	4	29
Nairobi City	1	2	3	4	30
Local Coffee Factory	1	2	3	4	31

SECTION C: SOURCE CREDIBILITY:

Interviewer: Listed below are various combinations of six sources of agricultural news. Such news include information about fertilizers, insecticides, spray-pumps and good planting methods. For every combination of two sources ask the respondent to tell you which source in his/her opinion, gives the farmer more truthful information and write 1 or 2 in the space provided.

			More truthful source	Cols.
1.	Newspapers	Vs. Radio		32
2.	Neighbours	Vs. Local Coop. Union officers		33
3.	Salesmen	Vs. Agricultural officers		34
4.	Agricultural officers	Vs. Local Coop. Inion officers		35
5.	Salesmen	Vs. Neighbours		36
6.	Local Coop. Union officers	Vs. Salesmen		37
7.	Agricultural officers	Vs. Neighbours		38
8.	Newspapers	Vs. Salesmen		39
9.	Agricultural officers	Vs. Newspapers		40
10.	Local Coop. Union officers	Vs. Newspapers		41
11.	Newspapers	Vs. Neighbours		42
12.	Neighbours	Vs. Radio		43
13.	Radio	Vs. Salesmen		44
14.	Agricultural officers	Vs. Radio		45
15.	Radio	Vs. Local Coop. Union officers		46

PART 3: DEMOGRAPHICS:

AGE	Col. 7
Under 30 years	1
31-44 years	2
45-54 years	3
55-64 years	4
65 +	5
D.K.	8

ANNUAL INCOME	Col.8
Under Sh. 1,000	1
Sh.1,000 - 1,999	2
Sh.2,000 - 3,999	3
Sh.4,000 - 5,000	4
Sh.6,000 - 7,999	5
Sh.8,000 - 9,999	6
Sh.10,000 +	7
D.K.	8
Refused	9

CARD 01

OTHER SOURCES OF INCOME (EXCLUDING FARMING)

	Col. 9
Teaching	1
Running a business	2
Operating a business vehicle	3
Employed by Govt. or Company	4
Others (specify)	5
NONE	0

NO. OF YEARS OF FORMAL SCHOOLING COMPLETED

	Col.10
None	0
1-4 years	1
5-8 years	2
9-10 years	3
11-12 years	4
13-14 years	6

NO. OF WIVES/NO. OF WIVES HUSBAND HAS

	Col.11
None	0
One	1
Two	2
Three	3
Others (specify)	4

NUMBER OF UNMARRIED CHILDREN

	Col. 12-13
None	0
One	1
Two	2
Three	3
Four	4
Five	5
Six	6
Seven	7
Eight	8
Nine	9
Ten	10
More than 10	11

NO. OF BOYS AND GIRLS CURRENTLY
IN THE FOLLOWING CLASSES

	BOYS		GIRLS	
Standard 1-4		14-15		16-17
Standard 5-7		18-19		20-21
High School (form 1-4)		22-23		24-25
Beyond Form 4		26-27		28-29

NO. OF UNMARRIED BOYS AND GIRLS
IN PAID EMPLOYMENT

BOYS		Cols 30-31
GIRLS		Cols 32-33

SIZE OF FARM(S)
IN ACRES
Col. 34

Less than 1 acre	1
1-2 acres	2
3-4 acres	3
5-6 acres	4
7-8 acres	5
9-10 acres	6
Over 10 acres	7

NO. OF ACRES PLANTED
WITH COFFEE CROP
Col. 35

Less than 1 acre	1
1-2 acres	2
3-4 acres	3
5-6 acres	4
7-8 acres	5
9-10 acres	6
Over 10 acres	7

TYPES OF HOUSE SEEN
Col. 36

Mud-house	1
Stone-house	2
Timber-house	3
Others (spec.)	4

Q.1. Do you have a member of the family
who has the following:

	Yes	No	
Tractor	1	2	Col. 37
Irrigation equipment	1	2	Col. 38
A Coffee Factory	1	2	Col. 39
10 or more employees	1	2	Col. 40

IF YES TO ANY OF THE ABOVE ASK: Q. 2

Q.2. Have you ever visited his farm?

Col. 41

Yes	1
No	2
Q.N.A.	7

ASK ALL:

Please read this card for me:

No. of words read:

	Col. 42-43

SEPTEMBER 1977

U N I V E R S I T Y   O F   N A I R O B I

COFFEE SMALL-HOLDERS SURVEY IN THE KIAMBU DISTRICT, KENYA.

GROUPS 1 - 7 ONLY

1	2	3	4	5	6	7

Ritwa ria muria wa ciuria_____

Ritwa ria mucokia wa ciuria_____

Andrethi cia mucokia wa ciuria_____

Itura kana nduka iria ikuhiriirie_____

Sablokishoni_____

Lokishoni_____

Muigana wa ihinda riria riratumirirwo kuria na gucokia ciuria_____

Maita maria marathirwo mbere ya gucokerio ciuria_____

Muigana wa andu aria marari ho ciuria igicokio_____

Tariki ya gucokia ciuria_____

Ukuru	Col.
Thi wa miaka 30	1
Miaka 31-44	2
Miaka 45 - 54	3
Miaka 55 - 64	4
Miaka makiria ya 65	5
Ndiui	6

Muigana wa mbeca iria wonaga o mwaka	Col.
Thi wa Sh.1000	1
Shs.1,000-1,999	2
Shs.2,000-3,999	3
Shs.4,000-5,999	4
Shs.6,000-7,999	5
Shs.8,000-9,000	6
Makiria ma Shs.10,000	7
Ndiui	8
Muregi kuga	9

Ihumo ingi cia mbeca tiga urimi	Col.
Guthomithia	1
Kwendia nduka kana mukawa/mbaa	2
Gukorwo na ngari ya mbiacara	3
Kwandikwo ni kambuni kana Thirikari	4
Undu ungi (eretha)	5
Gutiri kihumo kingi	6

Miaka iria wathomire	Col.
Ndiathomire ona hanini	0
Mwaka 1 - 4	1
Miaka 5 - 8	2
Miaka 9 - 10	3
Miaka 11 - 12	4
Miaka 13 - 14	5
Makiria ya 14	6

Atumia aria winao/ Atumia aria muthurigwo enao.	Col.
Gutiri ona umwe	0
Umwe	1
Eri	2
Atatu	3
Muigana ungi (andika namba)	4

Ciana iria winacio itaguranite/kuhika	Col.
Hatiri	0
Umwe	1
Eri	2
Atatu	3
Ana	4
Atano	5
Atandatu	6
Mugwanja	7
Anana	8
Kenda	9
Ikumi	A
Makiria ya 10	B

Muigana wa tuhii na tuiritu turia turi irathi ici

	Boys	Col.	Girls	Col
Standard 1 - 4				
Standard 5 - 7				
High School Form 1-4				
Makiria ya Form 4				

Muigana wa tuii na tuiritu
turia tutahikite na
twandikitwo wira wa mucara

Tuhii	Col.
Tuiritu	Col

Thaithi ya mugunda waku uthimitwo na ika

	Col.
Nimunyinyi kwi ika	1
Ika 1 - 2	2
Ika 3 - 4	3
Ika 5 - 6	4
Ika 7 - 8	5
Ika 9 - 10	6
Makiria ya ika 10	7

Muigana wa mugunda uria
uhanditwo kahua na indo ta icio

	Col.
Unyihiire ika imwe	1
Ika 1 - 2	2
Ika 3 - 4	3
Ika 5 - 6	4
Ika 7 - 8	5
Ika 9 - 10	6
Makiria ma ika 10	7

Muthemba wa nyumba kuringana na uria
uroneka

	Col.
Nyumba ya ndoro	1
Nyumba ya mibaibu	2
Nyumba ya mbau	3
Nyumba ya mahiga	4
Ingi (eretha)	5

Q. 1. Ni uri na mundu wa nyumba yanyu wina indo ici........
(Thoma)

	ii	Aca	Col
Karagita/murau	1	2	
Machini cia guita mai mugunda	1	2	
Githii gia kahua	1	2	
Makiria ya aruti a wira ikumi	1	2	

Angikorwo anja ni ii kuri imwe cia Q.1 uria Q.2.

Q. 2. Niuri wathii gucera mugunda-ini ucio wake?

	Col.
ii	1
Aca	2
QNA	0

Uria mundu o wothe.

Wetikira thoma karatathi gaka

Namba ya ciugo iria athoma wega.

	Col

PART I: INTRODUCTION AND BEHAVIORAL QUESTIONS:

INTRODUCTION:

     Nikwega rucini/miarahuko.   Njitagwo_____
na nyumite kwa Research Bureau Ltd. Umuthi ni tureka Survey ya mimera iria
andu mahandaga migundaini yao.

Q. 1. Ni mwaka uriku wahandire kahua ka mbere?

	Col.

Q. 2. Wahandire miti iigana atia mwakaini ucio?

	Col.

Q. 3. Kahua gaku riu ni miti iigana atia gegothe?

	Col.

Q. 4. Nimiti iigana atia ya kahua inyihiire miaka itatu?

	Col.

Q. 5. Kuringana na miaka itatu iria ithirite magetha maku ma kahua
       makoretwo makiongerereka, mategucenjia, kana makinyiha muigana?

	Col.

Q. 6. Ni kilo cigana cia o ngirindi ya kahua wagethire mwakaini wa
       1976?

	Kilos	Col.
Grade 1		
Grade 2		Col.
Grade 3		Col.

Q. 7. Ni kilo cigana cia o ngirindi ya kahua iria wagweta hau rugongo
       wagethire kimera kia mwere (September to November 1976)?

	Kilos	Col.
Grade 1		
Grade 2		Col.
Grade 3		Col.

Q. 8. Niki uhuthagira mugunda-ini waku wakahua nigetha uikare wimunoru na uhuthagira maita maigana?

	Ndiri Ndahuthira	Rita rimwe o miaka iiri	Rita rimwe o mwaka	Maita meri mwaka	Col.
Thumu wa nyamu cia mucii	0	1	2	3	
Thumu wa mborera	0	1	2	3	
Fatalaisa	0	1	2	3	
Mushing'i	0	1	2	3	
Indo ingi (gweta)	0	1	2	3	

Uria ahuthiri a fatalaisa oiki: Uria.

Q. 9. Ni mwaka uriku wa mbiriirie kuhuthira fatalaisa?

	Col

Q. 10. Ni mwaka uriku wambiriirie kuhuthira fatalaisa kahua-ini?

	Col.

Q. 11. Ni waitire fatalaisa kahuaini mwaka ucio urathirire (1976)?

	Col.
ii	1
Aca	2

Q. 12. Ni kilo cigana cia fatalaisa waitire kahua-ini mwaka-ini ucio urathirire (1976)?

Kilos

	Col.

Q. 13. Ni kilo cigana cia fatalaisa waitire kahua-ini hindi ya kimera kia mwere kia mwaka ucio urathirire (September-November 1976)?

Kilos

	Col.

Q. 14. Ni wahuthirire fatalaisa gukuria indo ingi mwakaini ucio urathirire

	Col.
ii	1
Aca	2

Q. 15. Ni kilo cigana cia fatalaisa wahuthirire gukuria indo ingi
mwakaini ucio urathirire (1976)?

Kilos

	Col.

Q. 16. Ni kilo cigana cia fatalaisa wahuthirire gukuria indo ingi
kimera-ini kia mwere kia mwaka ucio urathirire (September-November
1976)?

Kilos

	Col.

Ask all:

Q. 17. Niuri wanyita karatathi kana kabuku kuma kwi mundu ona uriku
gagukweretha __uria__ kana gitumi gia kuhuthira fatalaisa kahua-ini?

Col.	
ii	
Aca		Go to Q.19
Ndiraririkana	

Q. 18. Karatathi kana kabuku kau getagwo atia na kandikitwo nuu?

Karatathi kana kabuku		Mwandiki
	Col	Col

Q. 19. Kimera giki giguka kia mwere (September to November 1977) ugwiciria
ukahuthira kilo cigana atia cia fatalaisa kahua-ini na gukuria indo
icio ingi?

Kilos

	Col.
Kahua	
Indo icio ingi	Col

Q. 20. Ni indo iriku ici ihaha muhuru winacio?

Thoma

	ii	Aca	
Mbombo ya kuhuhira kahua	1	2	Col.
Ndigiri	1	2	Col.
Ng'ombe cia ngirindi	1	2	Col.
Murau	1	2	Col.
Mbombo ya mai o yothe	1	2	Col.
Mutoka o wothe	1	2	Col.
Machini cia guita mai mugunda-ini	1	2	Col.

Q. 21. Ni maita maigana uhuthagira kana ucaragia indo ici ihaha muhuro:
Thoma:

	Ndiri ndahu-thira	Rita rimwe miaka iiri	Rita rimwe mwaka	Rita rimwe o mieri itanda-tu	Rita rimwe o mieri iiri	Makiria ya rita rimwe o mweri	Col.
Bengi ya mutokaa-ini	O	1	2	3	4	5	
Bengi thiini wa nyumba ya wira ucio	O	1	2	3	4	5	
Centres cia guthomithania urimi	O	1	2	3	4	5	
Kuhaicithia ng'ombe na mubira	O	1	2	3	4	5	
Gukombora murau wa kurima	O	1	2	3	4	5	
Kundu gwa kwendia iria (ndiri)	O	1	2	3	4	5	
Motari kuma kwi ngirigaca	O	1	2	3	4	5	
Motari kuma kwi vetinari	O	1	2	3	4	5	

P A R T   2

KNOWLEDGE ABOUT FERTILIZER:

SECTION A:

Q. 1. Kwina mithemba miingi ya fatalaisa iria igathiriirio kuhuthirwo
kahua-ini ni Ministry ya Urimi.wahota kungwetera mithemba itatu yayo?

DO NOT PROMPT:

	Mentioned	Not mentioned	
CAN	1	2	Col.
ASN	1	2	Col.
SA	1	2	Col.
UREA	1	2	Col.
DIAMMONIUM	1	2	Col.
Other (Specify)	1	2	Col.

Q. 2. Ni kindu kiriku kiagiriitwo nigukorwo thiini wa fatalaisa iria
ihuthagirwo kahua-ini?

	Col

Q. 3. Niugwiciria miti yothe ya kahua niyagiriirwo ni gwikirwo fatalaisa o mwaka?

ii	1	Go to Q. 5
Aca	2	Go to Q. 4
Ndiui	3	Go to Q. 5

Q. 4. Ugwiciria murimi amenyaga atia fatalaisa iria yagiriirwo ni gwikirwo o kihua-ini kwa mwaka?

	Col.
	Col.

Q. 5. Niugwiciria no uhuthire fatalaisa ya muthemba umwe na mimera o yothe?

	Col.
ii	1
Aca	2
Ndiui	3

Q. 6. Ugwiciria ni ihinda ririku riega ria gwikira fatalaisa kahua-ini?

	Col.
Hindi ya mbura	1
Hindi ya riua	2
Hindi ingi (Gweta)	3

Q. 7. Ugwiciria ni maita maigana thiini wa mwaka wagiriirwo ni guita fatalaisa kahua-ini?

	Col.
Rita rimwe	
Maita meri	
Maita matatu	
Maita maingi (Gweta)	

Q. 8. Ni mieri iriku thiini wa mwaka iria wagiriirwo ni guita fatalaisa kahua-ini thiini wa District ya Kiambu?

	Col.

Q. 9.   Wahota kungwetera kundu kuria murimi angigira fatalaisa?

Do not prompt:	Mentioned	Not mentioned	Col.
Ithiini cia kahua	1	2	Col.
Matukaini	1	2	Col.
K.F.A. Stores	1	2	Col.
Ingi (gweta)	1	2	Col.

Q. 10. Ugwiciria fatalaisa yagiriirwo ni kuigwo atia nigetha ndigathuke kana irehe hathara mucii?

	Col.
Handu haigu	1
Handu homu na hatari na urugari muno	2
Handu homu na hena urugari muingi	3
Handu hangi (Eretha)	4

Q. 11. Ugwiciria Ministry ya Urimi itaraga andu mahuthire fatalaisa gukuria mimera yothe niki?

	Mentioned	Not mentioned
Kuhuthira fatalaisa ni kuingihagia maciaro	1	2
Kuhuthira fatalaisa ni kwagiragia maciaro	1	2
Kuhuthira fatalaisa ni gutumaga mimera ikure na ihenya	1	2
Undu ungi (Eretha)	1	2

Q. 12. Ni thaithi cigana cia mihuko ya fatalaisa uui?

	Col

Q. 13. Thogora wa ikunia ria kilo 50 ria fatalaisa ya muthemba wa_____ (Read out) ni uriku?

THOGORA	
CAN	Col.
SA	Col
ASN	Col.
DIAMMONIUM	Col.

Q. 14. Ni njira iriku njega ya guita fatalaisa kihua-ini?

DO NOT PROMPT:	Col.
Kwaragania fatalaisa ithiururukiirie kihua handu ha centimeter 60 kuma gitinaini kia muti na iguru ria tiri guo mwene	4
Kwaragania fatalaisa handu ha fiti inya kuma kuri gitina kia muti na iguru ria tiri no ti iguru ria mushing'i	3
Kwaragania fatalaisa iguru ria tiri utegwiciria uhoro wigwii uraihu kuma gwi gitina gia kihua	2
Undu ungi (eretha)	1

ATTITUDE TOWARD USE OF FERTILIZER

Interviewer:

Uria micokia wa ciuria kana ni egwitikania kana ni ekuregana na maundu maya mehaha muhuro.

Arikia kuga haria arugamiire murie kana egwitikira hanini, niegwitikira, kana niegwitikira makiria, kana ekurega hanini, kana niekurega makiria. (Thutha wa uguo cheka column iria yagiriire).

	Gwitikira makiria	Gwitikira	Gwitikira Hanini	Kurega hanini	Kurega	Kurega makiria
1. Murimi niongagirira maciaro ni undu wa kuhuthira fatalaisa	6	5	4	3	2	1
2. Fatalaisa ni itumaga tiri ute uigu	6	5	4	3	2	1
3. Fatalaisa ni itumaga maciaro magire makiria	6	5	4	3	2	1
4. Fatalaisa ni itumaga migunda igie ria makiria	6	5	4	3	2	1
5. Fatalaisa ni itumaga mimera ikure na ihenya gukira thumu wa nyamu cia mucii.	6	5	4	3	2	1
6. Fatalaisa niumaga goro makiria na kwoguo hatiri bata wa kumihuthire	6	5	4	3	2	1
7. Nigetha mbeca cia kuma mugunda ciongerereke, mimera yothe yagirii- rwo ni kuhandwo na fatalaisa	6	5	4	3	2	1
8. Fatalaisa ii raithi guita mugundaini gukira thumu wa nyamu cia mucii	6	5	4	3	2	1
9. Uiti wa fatalaisa ugunaga o arimi aria mena migunda minene .	6	5	4	3	2	1'
10. Fatalaisa yagirii- rwo ni kuhuthirwo ni arimi aria matari na ng'ombe kana mburi	6	5	4	3	2	1

P A R T 3.

MEASURES OF VARIOUS INDEPENDENT VARIABLES:

SECTION A: OPINION LEADERSHIP

Q. 1. Andu ni mokaga kuriwe kuhoya uhoro kana utari?

	Col.
ii	1
Aca	2

Q. 2. Ni ugwiciria andu ni mokaga kuri we ni undu wa kuhoya uhoro kana utari makiria mauria mathiaga kwa andu aria angi?

	Col.
ii	1
Aca	2
Ndiui	3

Q. 3. Thiini wa mieri itatu iria mihituku ni utarite mundu o uriku maundu-ini makonii urimi?

	Col.
ii	1
Aca	2
Ndirariri-kana	3

Q. 4. Thiini wa mieri itandatu iria mihituku ni maita maigana waritie na mundu ungi iguru ria maundu maya mehaha.......(Thoma).

	Ndiri ndaria	Maita mamwe-na mamwe	Maita maingi	Maita maingi makiria	Col.
Uthuri na ucaguri wa kahua	1	2	3	4	
Kuhaicithia ng'ombe na mubira	1	2	3	4	
Uhuthiri wa fatalaisa	1	2	3	4	
Mathogora ma kahua	1	2	3	4	
Mithiire miega na miuru ya ithii cia kahua	1	2	3	4	
Kundu gwa guthomithanirio uhoro wa urimi	1	2	3	4	

Q.   5.   Kuringana na Umenyi waku wa ukuria wa kahua-ri ugwiciria
ni _____ (Read out:record only one answer)

	Col.
Niuui maundu mother megii ukuria wa kahua	1
Niuui maundu mamwe na mamwe ma ukuria wa kahua	2
Maundu manyinyi muno megii ukuria wa kahua	3

Q.   6.   Thiini wa Sublocation ino yanyu ugwiciria ukoragwo wi wambere
wa kuhuthira indo iria njeru cioima ta fatalaisa, mbombo ya
kuhura kahua ndawa   uri wa thutha-ini?

	Col.
Mutongoria	1
Murumiriri	2
Ndingimenya	3

B.   MEDIA EXPOSURE AND COSMOPOLITENESS:

Q.   1.   Thiini wa mweri ucio urathirire ri ni maita maigana wa
          thikiriirie kameme?

	Col.

Q.   2.   Maita maingi uthikagiriria kameme ku?

	Col.
Thiini wa nyumba yakwa	1
Thiini wa nyumba ya murata wakwa/mundu wa rurira	2
Thiini wa mukawa/kinyuiro kia njohi kana nduka-ini	3
Thiini wa ngari	4
Kundu kungi (eretha)	5
Q.N.A.	0

Q.   3.   Ni mahinda mariku ma muthenya umenyerete guthikiriria kameme?

	Mentioned	Not mentioned	Q N A	Col.
Rucini (6.a.m. to 12 noon)	1	2	0	
Miarahuko(12.01 to 5 p.m.)	1	2	0	
Hwaini (5.01 to 11 p.m.)	1	2	0	

Q.   4.   Nita thenema cigana atia weroreire mwaka ucio urathirire (1976)?

	Col

Q.   5.   Ni maita maigana urathomire ngathiti ici ihaha mweri-ini ucio
          urathirire (Thoma)

	Ndinathoma on rimwe	Rita rimwe kinya 10	Maita 11-20	Makiria ya maita 20	Column
Daily Nation	0	1	2	3	Column
Standard	0	1	2	3	Column
Taifa Leo	0	1	2	3	Column

Q. 6. Thiini wa mweri ucio urathirire-ri ni maita maigana
ururirie mundu aguthomere ngathiti ici ihaha muhuro? (Thoma)

	Ndiathomeirwo ona rimwe	Rita rimwe kinya ikumi	Maita 11-20	Makiria ya maita 20	Column
Daily Nation	O	1	2	3	Col.
Standard	O	1	2	3	Col.
Taifa Leo	O	1	2	3	Col.

Q. 7. Thiini wa mieri itatu ithirite -ri ni maita maigana wathomire
ngathiti ici ihaha muhuro iria icabagwo o kiumia rita rimwe?
(Thoma)

	Ndiri ndathoma	Rita rimwe kinya matano	Maita 6-10	Makiria ya maita 10	Col.
Sunday Nation	O	1	2	3	Col.
Taifa Weekly	O	1	2	3	Col.
Baraza	O	1	2	3	Col.
Target	O	1	2	3	Col.

Q. 8. Thiini wa mieri itatu ithirite-ri ni maita maigana wathomire magacini
ici ihaha muhuro iria icabagwo o kiumia rita rimwe? (Thoma)

	Ndiri ndathoma	Rita rimwe kinya matatu	Maita 4-6	Makiria ya maita 6	Col.
Weekly Review	O	1	2	3	Col.
Kenya Gazette	O	1	2	3	Col.
Safari Magazine	O	1	2	3	Col.

Q.   9.   Thiini wa <u>mieri itandatu</u> ithirite ri ni maita maigana
            wathomire magacini ici ihaha muhuro iria ciumaga o mweri
            rita rimwe? (Thoma)

	Ndiri ndathoma	Rita rimwe kinya matatu	Makiria ya maita matatu	Col.
Kenya Farmer	0	1	2	Col.
Nyota	0	1	2	Col.
Mshiriki wa Kenya	0	1	2	Col.
Drum	0	1	2	Col.
Trust	0	1	2	Col.
Joe	0	1	2	Col.
Trade & Industry	0	1	2	Col.
Viva	0	1	2	Col.

Q.   10.   Thiini wa mieri itatu ithirite ri ni ta maita maigana
            wathire kundu guku_____(Thoma)

	Ndiathire on rimwe	Maita 1-10	Maita 11-20	Makiria ya 20	Col.
Kiambu Township	0	1	2	3	
Divisional Headquarters	0	1	2	3	
Waruhiu Farmers Institute	0	1	2	3	
Muguga Research Station	0	1	2	3	
Coffee Research Station (Jacaranda)	0	1	2	3	
Nairobi	0	1	2	3	
Local Coffee Factory	0	1	2	3	

D.   SOURCE CREDIBILITY:

Interviewer:

Haha muhuro handikitwo minyitanio miingi ya ihumo
ithathatu cia mohoro makonii urimi. Mohoro maya ni ta ma fatalaisa,
ndawa ciakuraga tugunyu, mbombo cia kuhuhira na mohoro ma mihandire
ya mimera. Kuri o munyitanio wa ihumo, uria mucokia wa ciuria akwire
egwiciria ni kihumo kiriku kiheyaga murimi uhoro wa ma gukira kiria kingi.
Arikira gukwira andika "A" kana "B" kuringana na kihumo kiria oiga ni kiama
makiria (write only one of them in each row).

KIHUMO "A"		KIHUMO "B"	KIHUMO KIRIA KIAMA MAKIRIA	COL.
1. Ngathiti	vs.	Kameme		
2. Andu aria murigainie	vs.	Obithaa a Cop Society yanyu		
3. Endia a indo	vs.	Ngirigaca		
4. Ngirigaca	vs.	Obithaa a Co-op. Society yanyu		
5. Obitha a Co-op.	vs.	Endia a indo		
6. Obitha a Co-op. Society yanyu	vs.	Endia a indo		
7. Ngirigaca	vs.	andu aria murigainie		
8. Ngathiti	vs.	Endia a indo		
9. Ngirigaca	vs.	Ngathiti		
10. Obithaa a Co-op	vs.	Ngathiti		
11. Ngathiti	vs.	Andu aria murgainie		
12. Andu aria murgainie	vs.	Kameme		
13. Kameme	vs.	Endia a indo		
14. Ngirigaca	vs.	Kameme		
15. Kameme	vs.	Obithaa a co-op. Society yanyu.		

DECEMBER, 1977

UNIVERSITY OF NAIROBI

COFFEE SMALL-HOLDERS SURVEY IN THE
KIAMBU DISTRICT - KENYA

(For Group 1 - 7 only)

Interviewer's Name:....................................

1	2	3	4	5	6	7

Respondent's Name: ....

Respondent's Address:.................................

INTERVIEW CHECKED

	YES	NO
BY SUPERVISOR		
BY RESEARCHER		

Village or nearest Trading Centre:.....................

Sub-Location:...

Location:...

Time Taken:.....................

INTERVIEWER: PLEASE ASK ALL QUESTIONS IN THIS QUESTIONNAIRE:

PART I : INTRODUCTION AND BEHAVIOURAL QUESTIONS   CARD 01

Introduction:

Good morning/afternoon....... My name is........ and I am from Research
Bureau Ltd. Some time back I visited you and asked you some questions
concerning various crops that you grow. Today I want to ask you some
questions about coffee growing.

Q.1. How many kilograms of each of the following grades
of coffee berries have you harvested between
September and end-November, 1977?

	Cols.
Grade 1	37/
Grade 2	38/
Grade 3	39/

Q.2. Did you use fertilizer on your coffee farm
during the 1977 short rains (September to
November)?

Col.40

Yes	1
No	2	→ GO TO Q.4.

Q.3. How many kilograms of fertilizer did you
use on your coffee farm during the 1977
short rains (September to November)?

Kilos	Col.
	41/

Q.4. During the 1977 short rains (September to
November), did you use fertilizer to grow
other crops?

Col.42'

Yes	1
No	2	→ GO TO Q.6.

Q.5. How many kilograms of fertilizer did you
use to grow other crops during the 1977
short rains (Sepbember to November)?

Kilos	Col.
	43/

Q.6. Have you ever received a pamphlet from anybody explaining how and why coffee fertilizer should be applied?

	Col.44	
Yes	1	
No	2	⟹ GO TO Q.8.
Can't remember	6	⟹ GO TO Q.8.

Q.7. What was the name of the pamphlet and who was the publisher?

Name	Col.	Publisher	Col.
	45/		46/

SHOW RELEVANT PAMPHLET TO EACH GROUP
(SHOW FERTILIZER NEWS PAMPHLET TO GROUP 7)

Q.8. Have you ever received this pamphlet?

	Col.47	
Yes	1	
No	2	⟹ GO TO PART 2
Can't remember	6	⟹ GO TO PART 2

Q.9. How many times did you receive this pamphlet during September to December 1977 period?

Number of Times	Col.
	48/

PART 2 :

SECTION A :   KNOWLEDGE ABOUT FERTILIZERS

Q.1. There are several kinds of fertilizers that have been recommended for coffee by the Ministry of Agriculture. Please name three of them:

DO NOT PROMPT

	Mentioned	Not Mentioned	
CAN	1	2	Col.49
ASN	1	2	Col.50
SA	1	2	Col.51
UREA	1	2	Col.52
Diammonium	1	2	Col.53
Others (Specify)	1	2	Col.54
Others (Specify)	1	2	Col.55

Q.2. What is the one necessary ingredient (Substance) must all the fertilizers recommended for coffee have?

	Col.
	56/

Q.3.   Do you think all coffee plants should
       have the same amount of fertilizer
       applied to them in a year?

	Col.57	
Yes	1	→ GO TO Q.5.
No	2	→ GO TO Q.4.
D.K.	8	→ GO TO Q.5.

       IF NO, ASK:

Q.4.   On what <u>basis</u> do you think the farmer decides how much fertilizer to
       apply to each coffee plant?

	Cols.
	58/
	59/

Q.5.   Do you think you can use the same fertilizer
       for all crops?

	Col.60
Yes	1
No	2
D.K.	8

Q.6.   When do you think is the right time to
       apply fertilizer on your coffee plants?

	Col.61
Wet season	1
Dry season	2
Others (specify)	3

Q.7.   How many times a year do you think
       fertilizer should be applied to
       coffee plants?

	Col.62
Once	1
Twice	2
Three times	3
Others (specify)	4

Q.8.   Which are the three months of the year
       during which fertilizer should be applied
       to coffee plants in Kiambu District?

       <u>DO NOT PROMPT</u>

	Mentioned	Not Mentioned	
Coffee Factory	1	2	Col.64
Retail Stockist	1	2	Col.65
K F A Stores	1	2	Col.66
Others (specify)	1	2	Col.67

Q.10. How do you think fertilizer should be
       stored to prevent adverse consequences?

	Col.68
In a wet place	. 1
In a dry and cool place	2
In a dry and hot place	3
Others (specify)	4

Q.11. Why do you think farmers are urged by the Ministry of Agriculture
to apply fertilizer to all their crops?

DO NOT PROMPT:	Mentioned	Not Mentioned	
Fertilizer application increases quantity of harvest	1	2	Col.69
Fertilizer application increases quality of harvest	1	2	Col.70
Fertilizer application makes crops grow faster	1	2	Col.71
Others (specify)	1	2	Col.72

Q.12. How many kilo/bag sizes of fertilizer do you know?

	Col.
	73/

Q.13. What is the current price of 50 kilo/bag size of..............(READ OUT)

	Price	Cols.
C.A.N.		74/
S.A.		75/
A.S.N.		76/
DIAMMONIUM		77/

Q.14. What is the right method of fertilizer application to a coffee plant?
DO NOT PROMPT:

	Col. 78
Spread fertilizer in a circle of 60 cms. from the base of the tree and on bare soil	4
Spread fertilizer in a radius of four feet on the soil itself not on the mulching	3
Spread fertilizer in the soil without regard to distance from the base of the tree	2
Others (Specify)	1

SECTION B: ATTITUDE TOWARDS USE OF FERTILIZER

Interviewer:

Ask the respondent whether he agrees or disagrees
with each of the following statements. After he/
she takes a position ask him/her whether he/she:

- Agrees somewhat;
- Agree;
- Agree strongly;
or Disagree somewhat;
- Disagree;
- Strongly disagree.

(Then check the appropriate column below).

		Strongly Agree	Agree	Somewhat Agree	Disagree Somewhat	Disagree	Strongly Disagree	Cols.
1.	A farmer increases his annual harvest by using fertilizer	6	5	4	3	2	1	79
2.	Fertilizer makes the soil lose moisture	6	5	4	3	2	1	80
3.	Fertilizer application improves the quality of crops	6	5	4	3	2	1	7
4.	Farms get more weeds when fertilizer is used	6	5	4	3	2	1	8
5.	Fertilizer makes crops grow faster than animal manure	6	5	4	3	2	1	9
6.	Fertilizer costs so much money that it is not worth it	6	5	4	3	2	1	10
7.	To increase farm income all crops should be planted with fertilizer	6	5	4	3	2	1	11
8.	Fertilizer is easier to apply on crops than animal manure	6	5	4	3	2	1	12
9.	Application of fertilizer is only beneficial to large farmers	6	5	4	3	2	1	13
10.	Only farmers without animals should use fertilizer	6	5	4	3	2	‹ 1	14

CARD 02 (spanning rows 3–4, between Strongly Disagree and Cols.)

U N I V E R S I T Y   O F   N A I R O B I

SECOND SURVEY OF COFFEE SMALLHOLDERS IN CENTRAL KIAMBU, K E N Y A.

GROUP

1	2	3	4	5	6	7

Ritwa ria muria wa ciuria _____

Ritwa ria mucokia wa ciuria _____

Andirethi cia mucokia wa ciuria _____

_____

Itura kana nduka iria ikuhiriirie _____

Lokishoni _____

Muigana wa ihinda riria riratumirirwo kuria na gucokia ciuria ____

_____

Maita maria marathirwo mbere ya gucokerio ciuria _____

Muigana wa andu aria marari ho ciuria igicokio _____

Tariki ya gucokia ciuria _____

Part 1:   Introduction and Behavioral Questions

Introduction:

Ni kwega rucini/miarahuko?

Njitagwo _____na nyumite kwa Research Bureau Ltd.
Kahinda kanini gathirite ni ndagucereire na ngikuria ciuria ikonainie
na mimera miingi iria ukuragia. Umuthi ningukuria oringi ciuria
nyingi ciigii ukuria wa kahua.

Q. 1.   Ni kilo cigana cia o ngirindi ya kahua uragethire kuuma mweri
          wa kenda kinya muthia-ini wa mweri wa ikumi na umwe mwaka-ini uyu
          wa 1977?

	Col.
Grade 1	37 /
Grade 2	Col. 38 /
Grade 3	Col. 39 /

Q. 2.   Ni uraitire fatalaisa kahua-ini gaku kimera-ini giki kia mwere
          (September to November 1977)?

	Col. 40	
ii	1	
Aca	2	Go to Q.4

Q. 3.   Ni kilo cigana atia cia fatalaisa waitire kahua-ini gaku
          kimeraini kia mwere kia 1977 (September to November)?

Kilos

Col.
41

Q. 4.   Kimera-ini kia mwere kia 1977 (September to November) ni wahuthirire
          fatalaisa gukuria mimera ingi?

	Col. 42	
ii	1	Go to Q.6
Aca	2	

Q. 5.   Ni kilo cigana atia cia fatalaisa wahuthirire gukuria mimera ingi
          kimera-ini kia mwere (September to November 1977)?

Kilos

Col.
43 /

Q. 6. Ni uri wa nyita karatathi kana kabuku kuuma kwi mundu ona uriku gagukweretha _uria_ kana gitumi gia kuhuthira fatalaisa kahua-ini?

Col.44

11	1	
Aca	2	Go to Q.8
Ndiraririkana	0	Go to Q.8

Q. 7. Karatathi kana kabuku kau getagwo atia na kandikitwo nuu?

Karatathi Kana kabuku   Mwandiki

	Col. 45 /	Col. 46 /

Q. 8. Niuri wanyita karatathi gaka (onia mucokia wa ciuria karatathi karia kagiriire kuringana na ngurubu yake. Onia andu a control groups karatathi ga "Coffee Fertilizer News")

Col.47

ii	1	
Aca	2	Go to Part 2.
Ndiraririkana	0	Go to Part 2.

Q. 9. Ni maita maigana atia wanyitire karatathi gaka kuuma mweri wa kenda kinyagia mweri wa ikumi na iri (September to December 1977)?

Maita

	Col. 48 /

P A R T   2

<u>SECTION A:</u>   <u>KNOWLEDGE ABOUT FERTILIZER:</u>

Q.   1.   Kwina mithemba miingi ya fatalaisa iria igathiriirio kuhuthirwo
      kahua-ini ni Ministry ya urimi, wahota kungwetera mithemba itatu yayo?

<u>DO NOT PROMPT:</u>

	Mentioned	Not mentioned	
CAN	1	2	Col.
ASN	1	2	Col.
SA	1	2	Col.
UREA	1	2	Col.
DIAMMONIUM	1	2	Col.
Other (Specify)	1	2	Col.

Q.   2.   Ni kindu kiriku kiagiriirwo nigukorwo thiini wa fatalaisa iria
      ihuthagirwo kahua-ini?

	Col.

Q.   3.   Niugwiciria miti yothe ya kahua niyagiriirwo ni gwikirwo
      fatalaisa iiganaine o mwaka?

ii	1	Go to Q.5
Aca	2	Go to Q.4
Ndiui	3	Go to Q.5

Q.   4.   Ugwiciria murimi amenyaga atia fatalaisa iria yagiriirwo ni
      gwikirwo o kihua-ini kwa mwaka?

	Col.
	Col.

Q.   5.   Niugwiciria no uhuthire fatalaisa ya muthemba umwe na
      mimera o yothe?

	Col.
ii	1
Aca	2
Ndiui	3

Q. 6. Ugwiciria ni ihinda ririku riega ria gwikira fatalaisa kahua-ini?

	Col.
Hindi ya mbura	1
Hindi ya riua	2
Hindi ingi (Gweta)	3

Q. 7. Ugwiciria ni maita maigana thiini wa mwaka wagiriirwo ni guita fatalaisa kahua-ini?

	Col.
Rita rimwe	
Maita meri	
Maita matatu	
Maita maingi (Gweta)	

Q. 8. Ni mieri iriku thiini wa mwaka iria wagiriirwo ni guita fatalaisa kahua-ini thiini wa District ya Kiambu?

	Col.

Q. 9. Wahota kungwetera kundu kuria murimi angigura fatalaisa?

Do not prompt:	Mentioned	Not mentioned	
Ithiini cia kahua	1	2	Col.
Matukaini	1	2	Col.
K.F.A. Stores	1	2	Col.
Ingi (Gweta)	1	2	Col.

Q. 10. Ugwiciria fatalaisa yagiriirwo ni kuigwo atia nigetha ndigathuke kana irehe hathara mucii?

	Col.
Handu haigu	1
Handu homu na hatari na urugari muno	2
Handu homu na hena urugari muingi	3
Handu hangi (Eretha)	4

Q. 11. Ugwiciria Ministry ya urimi itaraga andu mahuthire fatalaisa gukuria mimera yothe niki?

	Mentioned	Not mentioned
Kuhuthira fatalaisa ni kuingihagia machiaro	1	2
Kuhuthira fatalaisa ni kwagiragia maciaro	1	2
Kuhuthira fatalaisa ni gutumaga mimera ikure na ihenya	1	2
Undu ungi (Eretha).	1	2

Q. 12. Ni thaithi cigana cia mihuko ya fatalaisa uui?

	Col.

Q. 13. Thogora wa ikunia ria kilo 50 ria fatalaisa ya muthemba wa _____ (Read out) ni uriku?

THOGORA

CAN	Col.
SA	Col
ASN	Col.
Diammonium	Col.

Q. 14. Ni njira iriku njega ya guita fatalaisa kihua-ini?

DO NOT PROMPT:	Col.
Kwaragania fatalaisa ithiururukiirie kihua handu ha centimeter 60 kuma gitinaini kia muti na iguru ria tiri guo mwene	4
Kwaragania fatalaisa handu ha fiti inya kuma kuri gitina kia muti na iguru ria tiri no ti iguru ria mushing'i	3
Kwaragania fatalaisa iguru ria tiri utegwiciria uhoro wigii uraihu kuma gwi gitina gia kihua	2
Undu ungi (Eretha)	1

ATTITUDES TOWARD USE OF FERTIZER:

Interviewer:

Uria mucokia wa ciuria kana ni egwitikania kana ni ekuregana na maundu maya mehaha muhuro.

Arikia kuga haria arugamiire murie kana egwitikira hanini, niegwitikira, kana niegwitikira makiria, kana ekurega hanini, kana niekurega makiria. (Thutha wa uguo cheka column iria yagiriire).

	Gwitikira makiria	Gwitikira	Gwitikira Hanini	Kurega Hanini	Kurega	Kurega Makiria
1. Murimi niongagirira maciaro ni undu wa kuhuthira fatalaisa	6	5	4	3	2	1
2. Fatalaisa ni itumaga tiri ute uigu	6	5	4	3	2	1
3. Fatalaisa ni itumaga maciaro magire makiria	6	5	4	3	2	1
4. Fatalaisa ni itumaga migunda igie ria makiria	6	5	4	3	2	1
5. Fatalaisa ni itumaga mimera ikure na ihenya gukira thumu wa nyamu cia mucii	6	5	4	3	2	1
6. Fatalaisa niumaga goro makiria na kwoguo hatiri bata wa kumihuthira	6	5	4	3	2	1
7. Nigetha mbeca cia kuma mugunda cio-ngerereke mimera yothe yagiriirwo ni kuhandwo na fatalaisa	6	5	4	3	2	1
8. Fatalaisa ii raithi guita mugundaini gukira thumu wa nyamu cia mucii	6	5	4	3	2	1
9. Uiti wa fatalaisa ugunaga o arimi aria mena migunda minene	6	5	4	3	2	1
10. Fatalaisa yagirii-rwo ni kuhuthirwo ni arimi aria matari na ng'ombe kana mburi	6	5	4	3	2	1

UNIVERSITY OF NAIROBI   DECEMBER, 1977

COFFEE SMALLHOLDERS SURVEY IN
CENTRAL KIAMBU DISTRICT, KENYA

INTERVIEWER'S NAME....................................   GROUP 8 ONLY

RESPONDENT'S NAME....................................   INTERVIEW CHECKED

RESPONDENT'S ADDRESS:

	Yes	No
Supervisor		
Researcher		

   Village or Nearest Trading Centre....................

   Sublocation...

   Location..

INTERVIEWER: PLEASE ASK ALL QUESTIONS IN THIS QUESTIONNAIRE

PART I: INTRODUCTION AND BEHAVIORAL QUESTIONS

Introduction:

        Good morning/afternoon ....

        My name is......................... and I am from Research Bureau Ltd.

        Today we are carrying out a survey on the various crops people plant on
        their farms.

Q.1.   In which year did you first plant Coffee?

	Col.
	32/

Q.2.   How many Coffee trees did you plant in that year?
        (year given at Q. 1)

	Col.
	33/

Q.3.   How many Coffee trees do you now have?

	Col.
	34/

Q.4.   How many of these Coffee trees (mentioned in Q.3.)
        are less than 3 years old?

	Col.
	35/

Q.5. Considering the last three years
has your annual harvest of Coffee berries
been increasing, constant, or decreasing
in quantity?

Col. 36	
increasing	1
constant	2
decreasing	3

Q.6. How many kilograms of each of the
following grades of Coffee berries
did you harvest in 1976?

Kilos	
Grade 1	Col. 37/
Grade 2	Col. 38/
Grade 3	Col. 39/

Q.7. How many kilograms of each..... (each grade mentioned at Q.6)
did you harvest during the short rains (September to November 1976?)

Kilos	
Grade 1	Col. 40/
Grade 2	Col. 41/
Grade 3	Col. 42/

(N.B.: the number of kilos reported here must be equal to or less than Q.6)

Q.8. What do you use to make your farm fertile?
and how often do you use it?

DO NOT PROMPT

	Never	Once every 2 years	Once a year	Twice a year	Cols.
Animal manure	0	1	2	3	43
Compost manure	0	1	2	3	44
Fertilizer	0	1	2	3	45
Mulching	0	1	2	3	46
Others (specify)	0	1	2	3	47

IF FERTILIZER NOT USED, GO TO Q.14

FERTILIZER USERS ONLY (at Q.8), ASK:

Q.9. In which year did you first use fertilizer on your farm?

	Col. 48/

Q.10. In which year did you first use it on Coffee?

	Col. 49/

Q.11.   Did you use fertilizer on your
        Coffee farm last year (1976)?

	Col. 50
Yes	1
No	2 → GO TO Q.14
Q.N.A.	7

Q.12.   How many kilograms of fertilizer did you use on your Coffee farm
        last year (1976)?

Kilos	
	Col.
	51/

Q.13.   How many kilograms of fertilizer did you use on your Coffee farm
        during the 1976 short rains (September – November)?

Kilos	
	Col.
	52/

        (N.B. the figure cannot be greater than that of Q.12)

        ASK ALL:

Q.14   Did you use fertilizer to grow other
        crops?

	Col.53
Yes	1
No	2 → GO TO Q.17

Q.15.   How many kilograms of fertilizer did you use to grow other crops
        in 1976?

Kilos	
	Col.
	54/

Q.16.   How many kilograms of fertilizer
        did you use on other crops during
        the short rains (September –
        November) in 1976?

Kilos	Cols.
	55/

        (N.B. the figure cannot be greater than that of Q.15.)

Q.17.   How many kilograms of each of the
        following grades of Coffee berries
        have you harvested between September
        and November, 1977?

	Kilos	Cols.
Grade 1		56/
Grade 2		57/
Grade 3		58/

Q.18.   Did you use fertilizer on your
        Coffee farm during the 1977
        short rains (September to
        November, 1977)?

	Col. 59
Yes	1
No	2 → GO TO Q.22.

Q.19. How many <u>kilograms</u> of fertilizer did you use on your coffee farm during the 1977 short rains (September to November 1977)?

Kilos	Cols.
	60/

Q.20. During the 1977 short rains (September to November), did you use fertilizer to grow other crops.

	Col.61	
Yes	1	
No	2	→ GO TO Q.22.

Q.21. How many <u>kilograms</u> of fertilizer did you use to grow other crops during the <u>1977</u> short rains (September to November)?

Kilos	Cols.
	62/

Q.22. Have you ever received a pamphlet from anybody explaining <u>how</u> and <u>why</u> coffee fertilizer should be applied?

	Col.63	
Yes	1	
No	2	→ GO TO Q.24.
Can't remember	6	→ GO TO Q.24.

Q.23. What was the name of the pamphlet and who was the publisher?

Name	Cols.	Publisher	Cols.
	64/		65/

SHOW PAMPHLET ON FERTILIZER NEWS

Q.24. Have you <u>ever</u> received this pamphlet?

	Col.66	
Yes	1	
No	2	→ GO TO Q.26.
Can't remember	6	→ GO TO Q.26.

Q.25. How many <u>times</u> did you receive this pamphlet during September - December 1977 period?

Number of Times	Col.
	67/

ASK ALL:

Q.26. Which of the following items do you <u>now</u> have"
READ OUT:

	Yes	No	
Coffee-spray pump	1	2	Col. 68
Donkeys	1	2	Col. 69
Grade cows	1	2	Col. 70
Plough	1	2	Col. 71
Water pump (any kind)	1	2	Col. 72
Motor car	1	2	Col. 73
Irrigation equipment	1	2	Col. 74

Q.27. How often do you use or seek each of the following:

	Never	Once every 2 years	Once a year	Once every 6 months	Once every 2 months	More than once a month	Cols.
Mobile bank facilities	0	1	2	3	4	5	75
Bank in a permanent building	0	1	2	3	4	5	76
Agricultural Training Centres	0	1	2	3	4	5	77
Artificial Insemination services	0	1 ⁻	2	3	4	5	78
Hired plough services	0	1	2	3	4	5	79
Dairy facilities	0	1	2	3	4	5	80
Advice from Agricultural officers	0	1	2	3	4	5	CARD 02 7
Advice from Veterinary officers	0	1	2	3	4	5	8

PART 2

SECTION A: KNOWLEDGE ABOUT FERTILIZER

Q.1. There are several kinds of fertilizers that have been recommended for coffee by the Ministry of Agriculture. Please name three of them:

DO NOT PROMPT

	Mentioned	Not mentioned	
CAN	1	2	Col. 9
ASN	1	2	Col.10
SA	1	2	Col.11
Urea	1	2	Col.12
Diammonium	1	2	Col.13
Others (specify)	1	2	Col.14
Others (specify)	1	2	Col.15

Q.2. What is the one necessary ingredient (substance) must all the fertilizers recommended for coffee have?

	Col.
	16/

Q.3. Do you think all coffee plants should have the same amount of fertilizer applied to them in a year?

Col.17

Yes	1	→ GO TO Q.5
No	2	→ GO TO Q.4
D.K.	8	→ GO TO Q.5

IF NO, ASK:

Q.4. On what basis do you think the farmer decides how much fertilizer to apply to each coffee plant?

	Col. 18/
	Col. 19/

Q.5. Do you think you can use the same
fertilizer for all crops?

	Col. 20
Yes	1
No	2
D.K.	8

Q.6. When do you think is the right
time to apply fertilizer on
your coffee plants?

	Col. 21
Wet season	1
Dry season	2
Others (specify)	3

Q.7. How many times a year do you
think fertilizer should be
applied to coffee plants?

	Col. 22
Once	1
Twice	2
Three. times	3
Others (specify)	4

Q.8. Which are the three months of the year during which fertilizer should
be applied to coffee plants in Kiambu District?

	Col. 23/

Q.9. In this location from what sources can a farmer obtain fertilizer?

	Mentioned	Not mentioned	
Coffee factory	1	2	Col. 24
Retail stockist	1	2	Col. 25
KFA stores	1	2	Col. 26
Other farmers	1	2	Col. 27

Q.10. How do you think fertilizers should be stored to prevent adverse
consequences?

	Col. 28
In a wet place	1
In a dry and cool place	2
In a dry and hot place	3
Others (specify)	4

Q.11. Why do you think farmers are urged by the Ministry of Agriculture to
apply fertilizer to all their crops?

DO NOT PROMPT:

	Mentioned	Not mentioned	
Fertilizer application increases quantity of harvest	1	2	Col. 29
Fertilizer application increases quality of harvest	1	2	Col. 30
Fertilizer application makes crops grow faster	1	2	Col. 31
Others (specify)	1	2	Col. 32

Q.12.   How many kilo/bag sizes of fertilizer do you know?

	Col. 33/

Q.13.   What is the current price of 50 kilo/bag size
        of .... (READ OUT)

	Price	Cols.
C.A.N.		34/
S.A.		35/
A.S.N.	-	36/
Diammonium		37/

Q.14.   What is the right method of fertilizer application to a coffee plant?
        DO NOT PROMPT:

	Col. 38
Spread fertilizer in a circle of 60 cms from the base of the tree and on the bare soil	4
Spread fertilizer in a radius of four feet on the soil itself not on the mulching	3
Spread fertilizer in the soil without regard to distance from the base of the tree	2
Others (specify)	1

SECTION B: ATTITUDE TOWARDS USE OF FERTILIZER:

Interviewer: Ask the respondent whether he agrees or disagrees with
each of the following statements. After he/she takes
a position ask him/her whether he/she agrees somewhat,
agree, agree strongly or disagrees somewhat, disagree,
strongly disagree. (Then check the appropriate column
below)

		Strongly Agree	Agree	Somewhat Agree	Disagree Somewhat	Disagree	Strongly Disagree	Cols.
1.	A farmer increases his annual harvest by using fertilizer	6	5	4	3	2	1	39
2.	Fertilizer makes the soil lose moisture	6	5	4	3	2	1	40
3.	Fertilizer application improves the quality of crops	6	5	4	3	2	1	41
4.	Farms get more weeds when fertilizer is used	6	5	4	3	2	1	42
5.	Fertilizer makes crops grow faster than animal manure	6	5	4	3	2	1	43
6.	Fertilizer costs so much money that it is not worth it	6	5	4	3	2	1	44
7.	To increase farm incomes all crops should be planted with fertilizer	6	5	4	3	2	1	45
8.	Fertilizer is easier to apply on crops than animal manure	6	5	4	3	2	1	46
9.	Application of fertilizer is only beneficial to large farmers	6	5	4	3	2	1	47
10.	Only farmers without animals should use fertilizer	6	5	4	3	2	1	48

PART 3:   MEASUREMENTS OF VARIOUS INDEPENDENT VARIABLES

SECTION A: OPINION LEADERSHIP:

Q.1.   Do people come to you for
information or advice?

	Col.49
Yes	1
No	2

Q.2.   In general, do you think people come to
you for information or advice more often
than they go to others?

	Col.50
Yes	1
No	2

Q.3.   During the past three months have you
advised anybody on new farming
methods?

	Col.51
Yes	1
No	2

Q.4. During the <u>last six months</u> how often
      have you talked to somebody about the
      following?

	Very Often	Often	Some- times	Not at all	Cols.
Grading and sorting coffee berries	4	3	2	1	52
Artificial insemination of cattle	4	3	2	1	53
Fertilizer application	4	3	2	1	54
Coffee - prices	4	3	2	1	55
The efficiency/inefficiency of coffee Co-operative Societies	4	3	2	1	56
Agricultural training facilities	4	3	2	1	57

Q.5. Considering your <u>overall experience</u>
      of coffee growing, would you say you...
      READ OUT: (Record only one answer)

	Col.58
Know everything about coffee growing	1
Know some aspects of coffee growing	2
Know very little about coffee growing	3

Q.6. In your Sub-Location would you consider
      yourself a leader or a follower with respect
      to adopting new farming techniques?

	Col.59
Leader	1
Follower	2
No opinion	3

SECTION B: MEDIA EXPOSURE AND COSMOPOLITANISM

Q.1. During the last <u>one month</u> how many
      times did you listen to the radio?

	Col.
	60/

IF NEVER, GO TO Q.4.

Q.2. Where do you usually listen to
      the radio?

	Col.61
In my house	1
At a friend's/Relative's house	2
In a Restaurant (Bar/Store)	3
In a motor car	4
Others (specify)	5
O.N.A.	7

Q.3. What times of the day do you normally
      listen to the radio?

	Mentioned	Not Mentioned	Q.N.A.	Cols.
Morning (6 a.m. to 12 noon)	1	2	0	62
Afternoon (12.01 to 5 p.m.)	1	2	0	63
Evening (5.01 p.m. to 11 p.m.)	1	2	0	64

Q.4. About how many movies did you
      see last year?

	Col.
	65/

Q.5. How many times did you read each of the following daily newspapers
during the last one month.

	None	1-10 Times	11-20 Times	More Than 20 Times	Cols.
Daily Nation	1	2	3	4	66
The Standard	1	2	3	4	67
Taifa Leo	1	2	3	4	68

Q.6. During the last one month how many times did you have somebody else
read the following daily newspapers for-you?

	None	1-10 Times	11-20 Times	More Than 20 Times	Cols.
Daily Nation	1	2	3	4	69
The Standard	1	2	3	4	70
Taifa Leo	1	2	3	4	71

Q.7. During the last three months how many times did you read each of the
following weekly newspapers?

	None	1-5 Times	6-10 Times	More Than 10 Times	Cols.
Sunday Nation	1	2	3	4	72
Baraza	1	2	3	4	73
Taifa Weekly	1	2	3	4	74
Target	1	2	3	4	75

Q.8. During the last three months how many times did you read each of the
following weekly magazines?

	None	1-5 Times	6-10 Times	More Than 10 Times	Cols.
Weekly Review	1	2	3	4	76
Safari Magazine	1	2	3	4	77
Kenya Gazette	1	2	3	4	78

Q.9. During the last six months how many times did you read each of the
following monthly magazines?

	None	1-3 Times	More Than 3 Times	Cols.
Kenya Farmer	1	2	3	79
Nyota	1	2	3	80
Mshiriki wa Kenya	1	2	3	7
Drum	1	2	3	8
Trust	1	2	3	9
Joe	1	2	3	10
Trade and Industry	1	2	3	11
Viva	1	2	3	12

CARD 03

Q.10. During the <u>last three months</u> about how many visits did you make to the following places?

	None	1-10 Times	11-20 Times	More Than 20 Times	Cols.
Kiambu Township	1	2	3	4	13
Divisional Headquarters	1	2	3	4	14
Waruhiu Farmers Institute	1	2	3	4	15
Muguga Research Station	1	2	3	4	16
Coffee Research Station (Jacaranda)	1	2	3	4	17
Nairobi City	1	2	3	4	18
Local Coffee Factory	1	2	3	4	19

SECTION C: SOURCE CREDIBILITY

<u>Interviewer</u>: Listed below are various combinations of six sources of agricultural news. Such news include information about fertilizers, insecticides, spray-pumps and good planting methods. For every combination of two sources ask the respondent to tell you which source in his/her opinion, gives the farmer <u>more truthful information</u> and write <u>1</u> or <u>2</u> in the space provided.

	SOURCE 1		SOURCE 2	MORE TRUTHFUL SOURCE	Cols.
1.	Newspapers	Vs	Radio		20
2.	Neighbours	Vs	Local Co-Op. Union Officers		21
3.	Salesmen	Vs	Agricultural Officers		22
4.	Agricultural Officers	Vs	Local Co-Op. Union Officers		23
5.	Salesmen	Vs	Neighbours		24
6.	Local Co-Op. Union Officers	Vs	Salesmen		25
7.	Agricultural Officers	Vs	Neighbours		26
8.	Newspapers	Vs	Salesmen		27
9.	Agricultural Officers	Vs	Newspapers		28
10.	Local Co-Op. Union Officers	Vs	Newspapers		29
11.	Newspapers	Vs	Neighbours		30
12.	Neighbours	Vs	Radio		31
13.	Radio	Vs	Salesmen		32
14.	Agricultural Officers	Vs	Radio		33
15.	Radio	Vs	Local Co-Op. Union Officers		34

SECTION D. DEMOGRAPHICS AND SOCIOECONOMIC DATA:

<u>Interviewer</u>: Ask the respondent about the following: CARD 01

Q.1.

AGE	Col.7
Under 30 years	1
31-44 years	2
45-54 years	3
55-64 years	4
65 +	5
D.K.	8

Q.2.

ANNUAL INCOME	Col.8
Under Sh.1,000	1
Sh.1,000 - 1,999	2
Sh.2,000 - 3,999	3
Sh.4,000 - 5,999	4
Sh.6,000 - 7,999	5
Sh.8,000 - 9,000	6
Sh.10,000 +	8
Refused	9

Q.3. OTHER SOURCES OF INCOME

(EXCLUDING FARMING	Col.
Teaching	1
Running a business	2
Operating a business vehicle	3
Employed by Govt. or Company	4
Others (specify)	5
Nothing else	0

Q.4. NO. OF YEARS OF FORMAL SCHOOLING COMPLETED

	Col.10
None	0
1- 4 years	1
5- 8 years	2
9-10 years	3
11-12 years	4
13-14 years	5
Over 14 years	6

Q.5. NO. OF WIVES/NO. OF WIVES HUSBAND HAS

	Col.11
None	0
One	1
Two	2
Three	3
Others (specify)	4

Q.6. NO. OF UNMARRIED CHILDREN

	Col.12
None	0
One	1
Two	2
Three	3
Four	4
Five	5
Six	6
Seven	7
Eight	8
Nine	9
Ten	10
More than 10	11

Q.7. NO. OF BOYS AND GIRLS CURRENTLY IN THE FOLLOWING CLASSES

	BOYS	Cols.	GIRLS	Cols.
Standard 1-4		13/		14/
Standard 5-7		15/		16/
High School (form 1-4)		17/		18/
Beyond Form 4		19/		20/

Q.8. NO. OF UNMARRIED BOYS AND GIRLS IN PAID EMPLOYMENT

		Cols.
BOYS		21/
GIRLS		22/

Q.9. SIZE OF FARM(S) IN ACRES

	Col. 23
Less than 1 acre	1
1- 2 acres	2
3- 4 acres	3
5- 6 acres	4
7- 8 acres	5
9-10 acres	6

Q.10. NO. OF ACRES PLANTED WITH CASH COFFEE

	Col.24
Less than 1 acre	1
1- 2 acres	2
3- 4 acres	3
5- 6 acres	4
7- 8 acres	5
9-10 acres	6
Over 10 acres	7

Q.11. TYPES OF HOUSE

	Col.25
Mud-house	1
Stone-house	2
Timber-house	3
Others (spec.)	4

Q.12. SEX OF RESPONDENT   Col.

Q.13. Do you have a member of the family who has the following?

	YES	NO	Col.
Tractor			26
Irrigation Equipment			27
A Coffee Factory			28
10 Or More Employees			29

IF YES TO ANY OF THE ABOVE ASK Q.14.:

Q.14. Have you ever visited his farm:

	Col.30
Yes	1
No	2
NA	7

ASK ALL:

Q.15. Please read this card for me: Number of words Read

	Col.
	31

COFFEE SMALL-HOLDERS SURVEY IN THE KIAMBU DISTRICT, KENYA.

GROUP 8 ONLY.

Ritwa ria muria wa ciuria _____

Ritwa ria mucokia wa ciuria _____

Andrethi cia mucokia wa ciuria _____

Itura kana nduka iria ikuhiriirie _____

Sabulokishoni _____

Lokishoni _____

Muigana wa ihinda riria riratumirirwo kuria na gucokia ciuria _____

_____

Maita maria marathirwo mbere ya gucokerio ciuria _____

Muigana wa andu aria marari ho ciuria igicokio _____

Tariki ya gucokia ciuria _____

Ukuru	Col.
Thi wa miaka 30	1
Miaka 31-44	2
Miaka 45-54	3
Miaka 55-64	4
Miaka makiria ya 65	5
Ndiui	6

Muigana wa mbeca iria wonaga o mwaka	Col.
Thi wa Sh.1,000	1
Sh.1,000-1,999	2
Sh.2,000-3,999	3
Sh.4,000-5,999	4
Sh.6,000-7,999	5
Sh.8,000-9,000	6
Makiria ma Sh.10,000	7
Ndiui	8
Muregi kuga	9

Ihumo ingi cia mbeca tiga urimi	Col.
Guthomithia	1
Kwendia nduka kana mukawa/mbaa	2
Gukorwo na ngari ya mbiacara	3
Kwandikwo ni kambuni kana Thirikari	4
Undu ungi (eretha)	5
Gutiri kihumo kingi	6

Miaka iria wathomire	
Ndiathomire ona hanini	0
Mwaka 1-4	1
Miaka 5-8	2
Miaka 9-10	3
Miaka 11-12	4
Miaka 13-14	5
Makiria ya miaka	6

Atumia aria winao/ Atumia aria muthurigwo enao	Col.
Gutiri on umwe	0
Umwe	1
Eri	2
Atatu	3
Muigana ungi (andika namba)	4

Ciana iria winacio kana itaguranite/kuhika	Col.
Hatiri	0
Umwe	1
Eri	2
Atatu	3
Ana	4
Atano	5
Atandatu	6
Mugwanja	7
Anana	8
Kenda	9
Ikumi	A
Makiria ya 10	B

Muigana wa tuhii na tuiritu turia turi irathi ici

	Boys	Col.	Girls	Col.
Standard 1-4				
Standard 5-7				
High School From 1-4				
Makiria ya Form 4				

Muigana wa tuhii na tuiritu turia
tutahikite na twandikitwo wira wa
mucara

Tuhii	Col.
Tuiritu	Col.

Thaithi ya mugunda waku uthimitwo
na ika

	Col.
Nimunyinyi kwi ika	1
Ika 1-2	2
Ika 3-4	3
Ika 5-6	4
Ika 7-8	5
Ika 9-10	6
Makiria ya ika 10	7

Muigana wa mugunda uria uhanditwo
kahua na indo ta icio

	Col.
Unyihiire ika imwe	1
Ika 1 - 2	2
Ika 3-4	3
Ika 5-6	4
Ika 7-8	5
Ika 9-10	6
Makiria ma ika 10	7

Muthemba wa nyumba kuringana na uria
uroneka

	Col.
Nyumba ya ndoro	1
Nyumba ya mibaibu	2
Nyumba ya mbau	3
Nyumba ya mahiga	4
Ingi (eretha)	5

Q. 1. Ni uri na mundu wa nyumba yanyu wina indo ici_____

(Thoma)

	ii	Aca	Col.
Karagita/Murau	1	2	
Machini cia guita mai mugunda	1	2	
Githii gia kahuwa	1	2	
Makiria ya aruti a wira ikumi	1	2	

Angikorwo anja ni ii kuri imwe cia Q.1 uria Q.2.

Q. 2. Niuri wathii gucera mugunda-ini ucio wake?

	Col.
ii	1
Aca	2
QNA	0

Uria mundu o wothe.

Wetikira thoma karatathi gaka

Namba ya ciugo iria athoma wega.

	Col.

P A R T I: INTRODUCTION AND BEHAVIORAL QUESTIONS:

INTRODUCTION:

        Nikwega rucini/miarahuko. Njitagwo_____na nyumite

kwa Research Bureau Ltd. Umuthi ni tureka survey ya mimera iria andu mahandaga

migundaini yao.

Q.   1. Ni mwaka uriku wahandire kahua ka mbere?

Col

Q.   2. Wahandire miti iigana atia mwakaini ucio?

Col.

Q.   3. Kahua gaku riu ni miti iigana atia gegothe?

Col.

Q.   4. Nimiti iigana atia ya kahua inyihiire miaka itatu?

Col.

Q.   5. Kuringana na miaka itatu iria ithirite magetha maku ma kahua

        makoretwo makiongerereka, mategucenjia, kana makinyiha muigana?

Col.

Q.   6. Ni kilo cigana cia o ngirindi ya kahua wagethire mwakaini wa 1976?

	Kilos	Col
Grade 1		
Grade 2		Col
Grade 3		Col.

Q. 7. Nî kilo cigana cia o ngirîndi ya kahua iria wagweta hau
rugongo wagethire kimera kia mwere (September to November 1976)?

	Kilos	Col.
Grade 1		
Grade 2		Col.
Grade 3		Col.

Q. 8. Niki uhuthagira mugunda-ini wakũ wakahua nigetha uikare wimmoru
na uhuthagira maita maigana?

	Ndiri ndahuthira	Rita rimwe o miaka iiri	Rita rimwe o mwaka	Maita meri Mwaka	Col.
Thumu wa nyamu cia mucii	0	1	2	3	
Thumu wa mborera	0	1	2	3	
Fatalaisa	0	1	2	3	
Mushing'i	0	1	2	3	
Indo ingi (gweta)	0	1	2	3	

· Uria ahuthiri a fatalaisa oiki: Uria.

Q. 9. Ni mwaka uriku wa mbiriirie kuhuthira fatalaisa?

	Col.

Q. 10. Ni mwaka uriku wambiriirie kuhuthira fatalaisa kahua-ini?

	Col.

Q. 11. Ni waitire fatalaisa kahuaini mwaka ucio urathirire (1976)?

	Col.

Q. 12. Ni kilo cigana cia fatalaisa waitire kahua-ini mwaka-ini ucio
urathirire (1976)?

Kilos	
	Col.

Q. 13. Ni kilo cigana cia fatalaisa waitire kahua-ini hindi ya kimera kia mwere kia mwaka ucio urathirire (September to November 1976)?

Kilos	
	Col.

Q. 14. Ni wahuthirire fatalaisa gukuria indo ingi mwakaini ucio urathirire?

	Col.
ii	1
Aca	2

Q. 15. Ni kilo cigana cia fatalaisa wahuthirire gukuria indo ingi mwakaini ucio urathirire (1976)?

Kilos	Col.

Q. 16. Ni kilo cigana cia fatalaisa wahuthirire gukuria indo ingi kimera-ini kia mwere kia mwaka ucio urathirire (September to November 1976)?

Kilos	Col.

Q. 17. Ni kilo cigana cia ngirindi cia kahua wagethire kuma mweri wa kenda kinyagia muico wa mweri wa ikumi na umwe (September to end of November) wa 1977?

	Kilos	Col.
Grade 1		
Grade 2		
Grade 3		

Q. 18. Ni waitire fatalaisa kahua-ini gaku hindi ya kimera kia mwere kia mwaka uyu wa 1977?

	Col.
ii	1
Aca	2

Q. 19. Ni kilo cigana cia fatalaisa waitire kahua-ini gaku hindi ya kimera kia mwere kia 1977 (September to November)?

Kilos	Col.

Q. 20. Ni wahuthirire fatalaisa gukuria mimera ingi tiga kahua hindi
ya kimera kia mwere kia 1977 (September to November)?

	Col.
ii	1
Aca	2

Q. 21. Ni kilo cigana cia fatalaisa wahuthirire gukuria mimera ingi
tiga kahua hindi ya kimera kia mwere kia 1977 (September to November)?

Kilos	Col.

Q. 22. Ni uri wanyita karatathi kuuma kwi mundu ona uriku ga gukweretha
uria wagiriirwo na gitumi gia kuhuthira fatalaisa?

	Col.
ii	
Aca	
Ndirarrikana	

Q. 23. Karatathi kau getagwo atia na kandikitwo nuu?

Ritwa	Mwandiki	Col

Onania karatathi kegii "Fatalaisa Ya Kahua".

Q. 24. Ni uri wanyita karatathi gaka?

	Col.
ii	
Aca	
Ndiraririkana	

Q. 25. Ni maita maigana wanyitire karatathi gaka kuuma mweri wa
kenda kinyagia mweri wa ikumi na iri (September to December) 1977?

Maita	Col.

Q. 26. Ni indo iriku ici ihaha muhuro wina cio?

(Thoma)

	Yes	No	
Mbombo ya kahua	1	2	Col.
Ndigiri	1	2	Col.
Ng'ombe cia ngirindi	1	2	Col.
Mirau	1	2	Col.
Mbombo ya maii o yothe	1	2	Col.
Mutokaa	1	2	Col.
Machini ya guita mai mugunda	1	2	Col.

Q. 27. Ni maita maigana uhuthagira kana ucaragia indo ici ihaha muhuro:

(Thoma)

	Ndiri ndahu-thira	Rita rimwe miaka iiri	Rita rimwe mwaka	Rita rimwe o mieri itanda-tu	Rita rimwe o mieri iiri	Makiria ya rita rimwe o mweri	Col.
Bengi ya mutokaa-ini	0	1	2	3	4	5	
Bengi thiini wa nyumba ya wira ucio	0	1	2	3	4	5	
Centres cia guthomithania urimi	0	1	2	3	4	5	
Kuhaicithia ng'ombe na mubira	0	1	2	3	4	5	
Gukombora murau wa kurima	0	1	2	3	4	5	
Kundu gwa kwendia iria (ndiri)	0	1	2	3	4	5	
Motari kuma kwi ngirigaca	0	1	2	3	4	5	
Motari kuma kwi vetinari	0	1	2	3	4	5	

<u>P A R T 2</u>

<u>SECTION A:</u>   <u>KNOWLEDGE ABOUT FERTLIZER:</u>

Q.   1.   Kwina mithemba miingi ya fatalaisa iria igathiriirio kuhuthirwo

kahua-ini ni Ministry ya Urimi, wahota kungwetera mithemba itatu

yayo?

<u>DO NOT PROMPT:</u>

	Mentioned	Not mentioned	
CAN	1	2	Col.
ASN	1	2	Col.
SA	1	2	Col.
UREA	1	2	Col.
DIAMMONIUM	1	2	Col.
Other (Specify)	1	2	Col.

Q.   2.   Ni kindu kiriku kiagiriirwo nigukorwo thiini wa fatalaisa

iria ihuthagirwo kahuaini?

	Col.

Q.   3.   Niugwiciria miti yothe ya kahua niyagiriirwo ni gwikirwo

fatalaisa iiganaine o mwaka?

ii	1	Go to Q. 5
Aca	2	Go to Q. 4
Ndiui	3	Go to Q. 5

Q.   4.   Ugwiciria murimi amenyaga atia fatalaisa iria yagiriirwo ni gwikirwo

o kihua-ini kwa mwaka?

Col.
Col.

Q.   5.   Niugwiciria no uhuthire fatalaisa ya muthemba umwe na mimera

o yothe?

	Col.
ii	1
Aca	2
Ndiui	3

Q. 6. Ugwiciria ni ihinda ririku riega ria gwikira fatalaisa kahuaini?

	Col.
Hindi ya mbura	1
Hindi va riua	2
Hindi ingi (Gweta)	3

Q. 7. Ugwiciria ni maita maigana thiini wa mwaka wagiriirwo ni guita fatalaisa kahua-ini?

	Col.
Rita rimwe	
Maita meri	
Maita matatu	
Maita mangi (gweta)	

Q. 8. Ni mieri iriku thiini wa mwaka iria wagiriirwo ni guita fatalaisa kahua-ini thiini wa District ya Kiambu?

	Col.

Q. 9. Wahota kungwetera kundu kuria murimi angigira fatalaisa

Do not Prompt:

	Mentioned	Not mentioned	
Ithiini cia kahua	1	2	Col.
Matukaini	1	2	Col.
KFA Stores	1	2	Col.
Ingi (gweta)	1	2	Col.

Q. 10. Ugwiciria fatalaisa yagiriirwo ni kuigwo atia nigetha ndigathuke kana irehe hathara mucii?

	Col
Handu haigu	1
Handu homu na hatari na urugari muno	2
Handu homu na hena urugari muingi	3
Handu hangi (Eretha)	4

Q. 11. Ugwiciria Ministry ya Urimi itaraga andu mahuthire fatalaisa gukuria mimera yothe niki?

	Mentioned	Not mentioned
Kuhuthira fatalaisa ni kuingihagia maciaro	1	2
Kuhuthira fatalaisa ni kwagiragia maciaro	1	2
Kuhuthira fatalaisa ni gutumaga mimera ikure na ihenva	1	2
Undu ungi (eretha)	1	2

Q. 12. Ni thaithi cigana cia mihuko ya fatalaisa uui?

	Col.

Q. 13. Thogora wa ikunia ria kilo 50 ria fatalaisa ya muthemba

wa_____(Read out) ni uriku?

	THOGORA	
CAN		Col
SA		Cal
ASN		Col.
DIAMMONIUM		Col.

Q. 14. Ni njira iriku njega ya guita fatalaisa kihua-ini?

DO NOT PROMPT:	Col.
Kwaragania fatalaisa ithiururukiirie kihua handu ha centimeter 60 kuma gitinaini kia muti na iguru ria tiri guo mwene	4
Kwaragania fatalaisa handu ha fiti inya kuma kuri gitina kia muti na iguru ria tiri no ti iguru ria mushing'i	3
Kwaragania fatalaisa iguru ria tiri utegwiciria uhoro wigii uraihu kuma gwi gitina gia kihua	2
Undu ungi (eretha)	1

B.   ATTITUDES TOWARD USE OF FERTILIZER:

Interviewer:

Uria mucokia wa ciuria kana ni egwitikania kana ni ekuregana
na maundu maya mehaha muhuro.

Arikira kuga haria arugamire murie kana egwitikira hanini,
niegwitikira, kana niegwitikira makiria, kana ekurega hanini kana
niekurega makiria. (Thutha wa uguo cheka column iria yagiriire).

	Gwitikira makiria 6	Gwitikira 5	Gwitikira Hanini 4	Kurega Hanini 3	Kurega 2	Kurega Makiria 1
1. Murimi niongagirira maciaro ni undu wa kuhuthira fatalaisa	6	5	4	3	2	1
2. Fatalaisa ni itumaga tiri ute uigu	6	5	4	3	2	1
3. Fatalaisa ni itumaga maciaro magire makiria	6	5	4	3	2	1
4. Fatalaisa ni itumaga migunda igie ria makiria	6	5	4	3	2	1
5. Fatalaisa ni itumaga mimera ikure na ihenya gukira thumu wa nyamu cia mucii	6	5	4	3	2	1
6. Fatalaisa ni yumaga goro makiria na kwoguo hatiri bata wa kumihuthira	6	5	4	3	2	1
7. Nigetha mbeca cia kuma mugunda ciongerereke mimera yothe yagiriirwo ni kuhandwo na fatalaisa	6	5	4	3	2	1
8. Fatalaisa ii raithi guita mugundaini gukira thumu wa nyamu cia mucii	6	5	4	3	2	1
9. Uiti wa fatalaisa ugunaga o arimi aria mena migunda minene	6	5	4	3	2	1
10. Fatalaisa yagiriirwo ni kuhuthirwo ni arimi aria matari na ng'ombe kana mburi	6	5	4	3	2	1

P A R T 3.

MEASURES OF VARIOUS INDEPENDENT VARIABLES:

<u>SECTION A: OPINION LEADERSHIP</u>

Q. 1. Andu ni mokaga kuriwe kuhoya uhoro kana utari?

	Col.
ii	1
Aca	2

Q. 2. Ni ugwiciria andu ni mokaga kuri we ni undu wa kuhoya uhoro kana utari makiria mauria mathiaga kwa andu aria angi?

	Col.
ii	1
Aca	2
Ndiui	3

Q. 3. Thiini wa mieri itatu iria mihituku ni utarite mundu o uriku maundu-ini makonii urimi?

	Col.
ii	1
Aca	2
Ndirariri-kana	3

Q. 4. Thiini wa mieri itandatu iria mihituku ni maita maigana waritie na mundu ungi iguru ria maundu maya mehaha....... (Thoma).

	Ndiri ndaria	Maita mamwe-na mamwe	Maita maingi	Maita maingi makiria	Col.
Uthuri na ucaguri wa kahua	1	2	3	4	
Kuhaicithia ng'ombe na mubira	1	2	3	4	
Uhuthiri wa fatalaisa	1	2	3	4	
Mathogora ma kahua	1	2	3	4	
Mithiire miega na miuru ya ithii cia kahua	1	2	3	4	
Kundu gwa guthomithanirio uhoro wa urimi	1	2	3	4	

Q. 5. Kuringana na Umenyi waku wa ukuria wa kahua-ri ugwiciria
ni _____(Read out:record only one answer)

	Col.
Niuui maundu mother megii ukuria wa kahua	1
Niuui maundu mamwe na mamwe ma ukuria wa kahua	2
Maundu manyinyi muno megii ukuria wa kahua	3

Q. 6. Thiini wa Sublocation ino yanyu ugwiciria ukoragwo wi wambere
wa kuhuthira indo iria njeru cioima ta fatalaisa, mbombo ya
kuhura kahua ndawa   uri wa thutha-ini?

	Col.
Mutongoria	1
Murumiriri	2
Ndingimenya	3

B. MEDIA EXPOSURE AND COSMOPOLITENESS:

Q. 1. Thiini wa mweri ucio urathirire ri ni maita maigana wa thikiriirie kameme?

	Col.

Q. 2. Maita maingi uthikagiriria kameme ku?

Col.

Thiini wa nyumba yakwa	1
Thiini wa nyumba ya murata wakwa/mundu wa rurira	2
Thiini wa mukawa/kinyuiro kia njohi kana nduka-ini	3
Thiini wa ngari	4
Kundu kungi (eretha)	5
Q.N.A.	0

Q. 3. Ni mahinda mariku ma muthenya umenyerete guthikiriria kameme?

	Mentioned	Not mentioned	Q N A	Col.
Rucini (6.a.m. to 12 noon)	1	2	0	
Miarahuko(12.01 to 5 p.m.)	1	2	0	
Hwaini (5.01 to 11 p.m.)	1	2	0	

Q. 4. Nita thenema cigana atia weroreire mwaka ucio urathirire (1976)?

	Col

Q. 5. Ni maita maigana urathomire ngathiti ici ihaha mweri-ini ucio urathirire (Thoma)

	Ndinathoma onarimwe	Rita rimwe kinya 10	Maita 11-20	Nakiria ya maita 20	Column
Daily Nation	0	1	2	3	Column
Standard	0	1	2	3	Column
Taifa Leo	0	1	2	3	Column

Q.   6.   Thiini wa mweri ucio urathirire-ri ni maita maigana
            uroririe mundu aguthomere ngathiti ici ihaha muhuro? (Thoma)

	Ndiathomeirwo ona rimwe	Rita rimwe kinya ikumi	Maita 11-20	Makiria ya maita 20	Column
Daily Nation	O	1	2	3	Col.
Standard	O	1	2	3	Col.
Taifa Leo	O	1	2	3	Col.

Q.   7.   Thiini wa mieri itatu ithirite -ri ni maita maigana wathomire
            ngathiti ici ihaha muhuro iria icabagwo o kiumia rita rimwe?
            (Thoma)

	Ndiri ndathoma	Rita rimwe kinya matano	Maita 6-10	Makiria ya maita 10	Col.
Sunday Nation	O	1	2	3	Col.
Taifa Weekly	O	1	2	3	Col.
Baraza	O	1	2	3	Col.
Target	O	1	2	3	Col.

Q.   8.   Thiini wa mieri itatu ithirite-ri ni maita maigana wathomire magacini
            ici ihaha muhuro iria icabagwo o kiumia rita rimwe? (Thoma)

	Ndiri ndathoma	Rita rimwe kinya matatu	Maita 4-6	Makiria ya maita 6	Col.
Weekly Review	O	1	2	3	Col.
Kenya Gazette	O	1	2	3	Col.
Safari Magazine	O	1	2	3	Col.

Q. 9. Thiini wa <u>mieri itandatu</u> ithirite ri ni maita maigana
wathomire magacini ici ihaha muhuro iria ciumaga o mweri
rita rimwe? (Thoma)

	Ndiri ndathoma	Rita rimwe kinya matatu	Makiria ya maita matatu	Col.
Kenya Farmer	0	1	2	Col.
Nyota	0	1	2	Col.
Mshiriki wa Kenya	0	1	2	Col.
Drum	0	1	2	Col.
Trust	0	1	2	Col.
Joe	0	1	2	Col.
Trade & Industry	0	1	2	Col.
Viva	0	1	2	Col.

Q. 10. Thiini wa mieri itatu ithirite ri ni ta maita maigana
wathire kundu guku_____(Thoma)

	Ndiathire onirimwe	Maita 1-10	Maita 11-20	Makiria ya 20	Col.
Kiambu Township	0	1	2	3	
Divisional Headquarters	0	1	2	3	
Waruhiu Farmers Institute	0	1	2	3	
Muguga Research Station	0	1	2	3	
Coffee Research Station (Jacaranda)	0	1	2	3	
Nairobi	0	1	2	3	
Local Coffee Factory	0	1	2	3	

D.   SOURCE CREDIBILITY:

Interviewer:

Haha muhuro handikitwo minyitanio miingi ya ihumo
ithathatu cia mohoro makonii urimi. Mohoro maya ni ta ma fatalaisa,
ndawa ciakuraga tugunyu, mbombo cia kuhuhira na mohoro ma mihandire
ya mimera. Kuri o munyitanio wa ihumo, uria mucokia wa ciuria akwire
egwiciria ni kihumo kiriku kiheyaga murimi uhoro wa ma gukira kiria kingi.
Arikira gukwira andika "A" kana "B" kuringana na kihumo kiria oiga ni kiama
makiria (write only one of them in each row).

KIHUMO "A"	KIHUMO "B"	KIHUMO KIRIA KIAMA MAKIRIA	COL.
1. Ngathiti vs. Kameme			
2. Andu aria murigainie vs. Obithaa a Cop Society yanyu			
3. Endia a indo vs. Ngirigaca			
4. Ngirigaca vs. Obithaa a Co-op. Society yanyu			
5. Obitha a Co-op. vs. Endia a indo			
6. Obitha a Co-op. Society yanyu vs. Endia a indo			
7. Ngirigaca vs. andu aria murigainie			
8. Ngathiti vs. Endia a indo			
9. Ngirigaca vs. Ngathiti			
10. Obithaa a Co-op vs. Ngathiti			
11. Ngathiti vs. Andu aria murgainie			
12. Andu aria murgainie vs. Kameme			
13. Kameme vs. Endia a indo			
14. Ngirigaca vs. Kameme			
15. Kameme vs. Obithaa a co-op. Society yanyu.			

APPENDIX B

ENGLISH AND CORRESPONDING KIKUYU

PAMPHLETS (EXPERIMENTAL STIMULI)

COFFEE FERTILIZER NEWS:

SOURCE................

1. THE RECOMMENDED TYPES OF COFFEE FERTILIZERS:

There are several kinds of fertilizer that farmers can use but any fertilizer recommended for coffee must contain <u>nitrogen</u>. The three types of fertilizer which are recommended for coffee by the Ministry of Agriculture are:

    a. Calcium Ammonium Nitrate -- CAN;
    b. Ammonium Sulphate Nitrate -- ASN; and
    c. Sulphate of Ammonia -- SA.

2. THE CORRECT AMOUNT OF NITROGEN FERTILIZER TO BE USED IN A YEAR:

This depends on the quantity of coffee berries in the plant. If the coffee plants are expected to produce about 8 kilograms (about 16 pounds) of coffee berries each, then use the following amounts of fertilizer per year:

A. <u>Calcium Ammonium Nitrate (CAN)</u>

    (i) <u>With 26% of Nitrogen</u>: use 430 kilograms per hectare or 320 grams (380 pounds per acre or 11-12 ounces) per coffee tree per year.

    (ii) <u>With 23% Nitrogen</u>: use 480 kilograms per hectare or 360 grams (430 pounds per acre or 12 ounces) per coffee tree per year.

    (iii) <u>With 21% Nitrogen</u>: use 530 kilograms per hectare or 400 grams (470 pounds per acre or 14 ounces) per coffee plant per year.

B. <u>Ammonium Sulphate Nitrate (ASN)</u>

    <u>With 26% Nitrogen</u>: Use 430 kilograms per hectare of 320 grams (380 pounds per acre or 11-12 ounces) per plant per year.

C. <u>Sulphate of Ammonia</u>

    <u>With 21% Nitrogen</u> - use <u>530</u> kilograms per hectare or 400 grams per plant (470 pounds per acre or 14 ounces per plant) per year.

3. THE CORRECT TIME FOR FERTILIZER APPLICATION:

The fertilizers should be applied during each of the wet seasons. The farmer should therefore make three applications a year dividing the above recommended amounts of fertilizer into three applications. In Kiambu District these applications should be made in <u>April</u>, <u>May,</u> and <u>November</u>.

4. THE CORRECT METHOD OF FERTILIZER APPLICATION:

The fertilizer should be spread evenly on the bare soil and not on top of the mulching. Apply in a circle about 60 cms wide and do not apply closer than 30 cms to the base of the tree.

5. <u>THE RATIONALE FOR FERTILIZER APPLICATION</u>:

All plants require sufficient food nutrients in the soil but there is no soil with all the food nutrients required by the plants to enable them to yield good harvest year to year. Therefore, coffee plants without fertilizer continue to weaken as food nutrients are continuously exhausted from the soil. For this reason if a farmer wants to increase the quantity and quality of his harvest he must apply fertilizer.

6. <u>DISTRIBUTORS OF FERTILIZERS IN KIAMBU DISTRICT</u>:

Fertilizers in Kiambu District are distributed by:

    a. Cooperative coffee factories.
    b. Retail Stokists such as Kiambu Fertilizer Co. Ltd.
    c. KFA stores

7. <u>THE 1977 RETAIL PRICES OF A 50 KILO/BAG SIZE OF FERTILIZER</u>:

The price of a 50 kilo/bag size of fertilizer depends on the type of fertilizer in question. For the three recommended coffee fertilizers the prices are as follows.

    (a) C.A.N. -- Price per 50 kilo/bag = Sh 84.00
    (b) A.S.N. -- Price per 50 kilo/bag = Sh 89.00
    (c) S.A.   -- Price per 50 kilo/bag = Sh 60.00

8. <u>FERTILIZER STORAGE</u>:

If for any reason a farmer cannot use up all the fertilizer he has purchased and has therefore to store it until the <u>following rainy season</u>, it must be stored <u>in a dry cool place</u> which is not accessible to children.

<u>CONCLUSION</u>:

When a farmer follows the above instructions he is financially rewarded since he will have a higher and better yield from his farm.

UHORO WA FATALAISA YA KAHUA

Kuma Kuri_____

1. MITHEMBA YA FATALAISA YA KAHUA IRIA MIGATHIRIRIE:

    Nikuri na mithemba miingi ya fatalaisa iria arimi mangihuthira no

        fatalaisa iria igathagiririo cia kahua no muhaka ikorwo na

    Nitrogeni. Mithemba itatu ya fatalaisa iria igathiriirio ni

    ruhonge rwa thirikari rwa urimi (Ministry Ya Ngirigaca) ni :-

    (a) CAN (Calcium Ammonium Nitrate)

    (b) ASN (Ammonium Sulphate Nitrate); na

    (c) SA (Sulphate of Ammonia).

2. Muigana wa Nitrogeni Fatalaisa uria wagiriirwo ni kuhuthirwo
    kwa mwaka.

    Muigana uyu wagiriirwo ni ^{kuringithanio} na uingi wa mbegu cia

    kahua iria muti ugwiciririo ni uguciara. Angikorwo miti ya

    kahua igwiciririo iguciara kilo inyanya (kana ratiri ikumi na

    ithathatu) cia mbegu o muti, muigana wa fatalaisa uria

    wagiriirwo ni kuhuthira o mwaka uhana ta uu :-

    A. CAN- (Calcium Ammonium Nitrate)

        (i) Ina gichunji kia mirongo iri na ithathatu thiini
             wa igana   (26%) kia Nitrogeni: Huthira kilo 430 kwa

        hectare kana gramu 320 (ratiri 380 kwa iika kana aunji

        11-12) kwa o muti kwa mwaka.

        (ii) Ina gichunji kia mirongo iri na ithatu thiini wa igana
        (23%) kia nitrogeni: Huthira kilo 480 kwa hectare kana

        gramu 360 (ratiri 430 kwa iika kana aunji 12) kwa o muti kwa

        mwaka.

        (iii) Ina gichunji kia mirongo iri nemwe thiini wa igana
        (21%) kia nitrogeni: Huthira kilo 530 kwa hectare kana gramu

        400 (ratiri 470 kwa ika kana aunji 14) kwa o muti kwa mwaka.

B. <u>ASN (Ammonium Sulphate Nitrate)</u> Ina gichunji kia mirongo iri
na ithathatu <u>thiini</u> wa igana (26%) kia nitrogeni. Huthira kilo
430 kwa hectare kana gramu 320 (ratiri 380 kwa iika kana
aunji 11-12) kwa o muti kwa mwaka.

C. <u>SA (Sulphate of Ammonia)</u>: Ina gichunji kia mirongo iri na imwe
thiini wa igana (21%) kia nitrogeni. Huthira kilo 530 kwa hectare
kana gramu 400 (ratiri 470 kwa iika kana aunji 14) kwa o muti
kwa mwaka.

3. <u>Ihinda riria riega ria guita fatalaisa:</u>

Fatalaisa yagiriirwo ni guitwo hindi iria kwina <u>mbura.</u>
Kwauguo <u>murimi</u> agairiirwo ni guita fatalaisa maita matatu o mwaka
na agayanie muigana uria wa gathiririo haha rugongo maita matatu
niguo aite gicunji kimwe gia ithatu o thiini wa riita rimwe. Thiini
wa Kiambu District uiti uyu wa fatalaisa wagiriirwo ni gwikwo mweri
wa ina (April), itano (May), na wa ikumi na umwe (November).

4. <u>Uria fatalaisa yagiriirwo ni guitwo:</u>

Fatalaisa yagiriirwo ni kwaragnio iguru ria tiri guo mwene
no ti iguru ria muchingi. Ita fatalaisa uthiururukiirie gitina
kia muti handu ha cendimita 60 warii na ndugaite hakuhi na gitina-ini
kia muti makiria ya cendimita 30 (inji 12).

5. <u>Gitumi gia guita fatalaisa.</u>

no <u>tiri</u>
Mimera yoothe niyendaga irio kuma gwi tiri ndingihota gukorwo
na irio iria ciendagwo ni mimera kuma mwaka umwe nginya uria ungi.
ithiaga
Kwauguo, miti ya kahua ingiaga fatalaisa na mbere kuhinja o uria irio
ciayo iranyiha tiri-ini. Ni undu woguo murimi uria ukwenda kuongerera
wa
<u>uingi</u> na <u>wega</u> magetha make no muhaka ahuthire fatalaisa o mwaka.

6.   Kundu kuria ungigura fatalaisa thiini wa. Kiambu District.

Fatalaisa thiini wa Kiambu yiendagio :

(a)   Ithiini cia kahua
(b)   Matukaini mamwe na mamwe ta Kiambu Fertilizer Co. Ltd.
(c)   K.F.A. Stores (Kenya Farmers Association Stores).

7.   Mathogora ma ikunia ria Kilo 50 ria fatalaisa mwakaini wa 1977:

Thogora wa ikunia ria Kilo 50 ria fatalaisa rithiaga kuringana
na muthemba wa fatalaisa. Mathogora ma fatalaisa ithatu iria
ngathiririe mahanaga ta uu :-

(a)   CAN yari ciringi 84/- o   ikunia
(b)   ASN yari ciringi 89/- o   ikunia
(c)   SA yari ciringi 60/- o   ikunia.

8.   Uigi wa fatalaisa:

Angikorwo murimi ndanahota kuhuthira fatalaisa yake yothe
iria aragurite na no muhaka aige kinya kimera kia mbura kiria
kirumiriire agiriirwo ni kuiga matigari macio handu homu na hatari
na urugari na ciana itangihota gukinyira.

9.   Kurikiriria :

Murimi angirumirira maundumaya magwetwo haha rugongo no ahote
kwongerera utonga wake tondu wa kugia na magetha maingi na mega kuma
mugundaini wake.

GENERAL INFORMATION ABOUT FARMING:

SOURCE...............

1. INTRODUCTION: There are several sources of farming information. Some of these sources are readily available to farmers at no cost while others require parting with only a few cents or shillings. The purpose of this leaflet is to acquaint farmers with some of these sources of information. Needless to say, a leaflet of this size cannot give all the sources but it is hoped that it will arouse your curiosity to search for information that is likely to make you a better farmer.

2. PAMPHLETS: There are several pamphlets which contain information about farming. For instance, the Crop Production Pocket Book published by the Ministry of Agriculture and obtainable from its Information Centre describes in some detail what the farmer should do to increase the yield and quality of different crops. This information is related to growing crops such as maize, beans, and vegetables. In case of coffee the leaflet entitled coffee growing (leaflet No. 255) gives details of land preparation, planting, mulching, fertilizer application, weed control, pruning, and pest control so far as coffee is concerned. Other useful pamphlets are "Fatalaiza Kwa Kahawa" and "Pata pesa Kutoka Kwa Kahawa". The point you as a farmer should note is that whatever crops you grow, there are likely to be some leaflets in the information centre of the Ministry of Agriculture which can guide you in your growing of that crop.

3. AGRICULTURAL SHOWS: You do not have to be able to read to obtain some information about farming. A visit to an agricultural show such as the Central Kenya Show (Nyeri) or the Nairobi International Show can provide you with some valuable information. During these shows there are several farming demonstrations and one can learn a lot by just observing. This is particularly important in case of new farming equipment and agricultural inputs such as fertilizers, insecticides, and different kinds of seeds. The demonstrators will be more than willing to explain the workings and advantages of the things on display. Finally, a visit to the show also makes you aware of the success of other farmers and in that way you are likely to be motivated to achieve similar quality produce.

4. INFORMATION FROM THE RADIO: The radio is also an important source of farming news. The voice of Kenya has several programs which are directly concerned with farming. Perhaps the most important program is the one entitled "Sikio la Mkulima" which is broadcast daily except Sunday between 7:45 p.m. and 8:00 p.m. by the National Service. The same station broadcasts "Maisha ya Mkulima" on Saturdays between 8:45 p.m. to 9:00 p.m. Those who understand English can also listen to "Jembe To-day" which is aired by the General Service on Tuesdays between 8:30 p.m. and 9:00 p.m. and Saturdays between 10:00 p.m. and 10:30 p.m.   By listening to these programs you are likely to learn something new about farming.

5. OTHER SOURCES OF INFORMATION: Your neighbours are also good sources of information pertaining to farming. Through conversation your neighbour can give you some advise and/or suggestions regarding crop growing. Also through observation, you can learn a lot by merely looking at the way your

neighbouring farmer is developing his farm. In addition, Agricultural officers and cooperative societies' officials are capable of giving expert advice pertaining to farming.

6. <u>CONCLUSION</u>: From the sources discussed above it is clear that there are several ways through which you as a farmer can acquire knowledge about farming. This knowledge will in turn help you to develop your farm and make it more profitable.

IHUMO CIA MAUNDU MEGII URIMI.

1.   Nikuri na ihumo nyingi cia maundu megii urimi. Ihumo
imwe no iteithie murimi atekuruta mbeca no ingi ni ciendaga murimi
arute thendi nyingi. Gitumi gia karatathi gaka ni kumenyithia arimi
ihumo iria ikoragwo kuo ohamwe na maundu megii urimi. No ningi
karatathi ta gaka gatingihota kuheana ihumo ciothe no ni ngwiciria ati
nigegutuma wambiririe gucaria maundu maingi maria mangikuhotithia
gutuika murimi mwega na urona baita kuma mugunda wake.

2.   TUBUKU NA TURATATHI:

          Ni kuri na tubuku tuingi turia tukoragwo na uhoro wigii urimi.
Kwa muhiano, kabuku kamwe getagwo Crop Production Pocket Book
kandikitwo ni ruhonge rwa urimi rwa Thirikari ni kaheyanite maundu
maingi ma uria murimi agiriirwo ni gwika nigetha ongerere uingi na
wega wa maciaro ma mimera ya mithemba miingi. Uhoro uyu wigii ukuria
wa mimera ta mbembe, mboco, na mboga. Uhoro naguo wigii kahua ni kuri
na kabuku getagwo Coffee Growing (Leaflet No.255) karia kaheanaga
uhoro wa gutheria mugunda, kuhanda kahua, guita muchin'gi, uhuthiri
wa fatalaisa, kunina ria, guceha kahua, na kuraga tugunyu twa kahua.
Turatathi tungi twina uteithio ni "Fatalaiza Kwa Kahawa" na "Pata
Pesa Kutoka Kwa Kahawa". Uria we wi murimi wagiriirwo ni kumenya ni
ati ona akorwo ukuragia mimera ya muthemba uriku, ni kuri na turatathi
kana tubuku tuingi kuma kwa ruhonge rwa Information Centre ya
Ministry Ya Urimi turia tungiguteithia ukuriaini wa mimera iyo.

3.   COO:

          To muhaka ukorwo ui guthoma nigetha uhote gucaria uhoro wigii
urimi mwega. Guthii coo ta iria ikoragwo Nairobi kana Nyeri ni
gugutuma ugie na maundu maingi ma bata. Thiini wa coo-ini ici ni
gukoragwo na wonania wa indo cia urimi na mundu ahota kwongerera uugi
niundu wa kwirorera machini cia kurima ohamwe na indo iria ihuthagirwo
mugunda-ini ta fatalaisa, ndawa na mbegu cia kuhanda. Andu aria
makoragwo makionania indo ici ni makoragwo mehariirie kweretha uria
indo icio irutaga wira ohamwe na baita yacio. Ningi guthii cionanirio-
ini cia indo cia urimi ni gugutuma wone uria arimi aria angi mathiite
na mbere na onawe ni ukwiyuria uria ungika nigetha uhote kugia na
magetha mega ta andu aria angi.

4.   KAMEME:

Kameme ni kindu kia bata gia gutuma umenye uhoro wigii urimi.
Mugambo wa Kenya wina ibindi nyingi iria ikonainie na urimi. Kibindi
kimwe hihi kiabata makira ni kiria gitagwo "Sikio La Mkulima"
kiria kimemerekagio o muthenya tiga kiumia kuma thaa imwe na ndagika
mirongo ina na ithano kinyagia thaa igiri ni National Service (githweri).
Station ino no imemerekagia "Maisha ya Mkulima" muthenya wa njuma kuma
thaa ithatu itigitie robo kinyagia thaa ithatu. O hamwe na uguo arimi
aria maiguaga githungu no mahota guthikiriria "Jembe To-day" iria
imemerakagio ni General Service (Githungu) muthenya wa keri kuma thaa
igiri na nuthu kinyagia thaa ithatu na muthenya wa njuma kuma thaa inya
kinyagia thaa inya na nuthu. Guthikiriria ibindi ici ni gugutuma
umenye maundu maingi megii urimi wina umithio.

5.   IHUMO INGI CIA MAUNDU MEGII URIMI:

Andu aria murigainie nao onao mahota gukuhe maundu ma bata
megii urimi. Kwaria na andu aria murigainie kwahota gukuhe utari wigii
ukuria wa mimera. Ningi kwirorera uria andu acio marakuria migunda yao
ni gugutuma uthome maundu maingi. Ohamwe na uguo ngirigaca na obitha
a society mahota gukuhe utari wa bata muno wigii urimi.

6.   KURIKIRIRIA:

Kuringana na ihumo iria ciagwetwo haha rugongo ni gukuonekana
ati kuri na njira nyingi iria we murimi ungihota kwongerera uugi
ukonii urimi. Uugi uyu naguo ni uguguteithia gukuria mugunda waku na
uhote kugia na baita nene gukira iria urona riu.

UCTION:

The objective of this leaflet is to give you farmers a number of
s which you can do to help Kenya develop. It is hoped that after
ding this leaflet you will ask yourself what you can do on your farm
contribute to Kenya's development.

UCATION:

Every farmer should send his children to school because the future of
is country will largely depend on these children. The importance of edu-
ion has been recognized by the Kenyan government since it spends 35% of
budget on education.

If all children in this country are educated, then one can expect their
ulthood to be spent in better living conditions than their parents are
ing. However, living a better life does not necessarily mean working in
ite collar jobs. After school young men and women can still be profitably
ployed in rural areas since this country is highly dependent on agriculture.

RAMBEE PROJECTS:

Since Kenya became independent hundreds of self-help projects have been
mpleted. These projects include building of hospitals, schools, cattle-dips,
ctories and buying large scale farms.

Such self-help projects as you may know have greatly contributed to the
velopment of our country and should therefore be encouraged. For any given
oject to succeed people must generously contribute. If you have hitherto
en reluctant to contribute remember that you are in some way hampering
ogress and are depriving the present and future generations chances of better
ving.

ESERVATION OF WILDLIFE:

To many people wild animals do not appear to be of any economic value.
wever, we should all remember that thousands of visitors come to our
untry to see these animals and in so doing bring a lot of money into our
untry. For instance, in 1976 Kenya earned £40 million from tourism and
e is expected to continue earning substantial incomes in future years.
ch money is badly needed to develop the country partly by buying imports
at facilitate development and partly by financing local projects such as
ads, schools, and the like. However, if this inflow of income is to continue
ld animals must be preserved and this is why the government banned hunting
th effect from May this year (1977)

E OF HEALTH FACILITIES:

It is the responsibility of everyone to visit a hospital or a dispensary
enever sick. It is also his responsibility to take his sick children to
e clinic. Some people have the habit of downplaying sickness by asserting

that the disease will soon go away. This is a bad habit because it has cost many lives, some of which would have been saved if the patients were taken to the doctor in time. You should also remember that prevention is better than cure. Therefore, practice simple health rules such as washing your hands before eating, drinking clean water, and cooking your food properly. If you follow these simple rules, then Kenya will be a nation of healthy people and you as a farmer will be able to look after your farm properly.

RELIGION:

      Some people have argued that religion has nothing to do with good or bad living. However, when an individual is at peace with God he is likely to be a stable person in most of his activities. He knows that by working hard in his farm he is in essence praying to God. In addition, a person who loves God will not be involved in stealing and/or malicious destruction of other people's property. He will help his neighbours who are suffering and will assist others to make them successful human beings. Harmonious living is important if we are to progress. Hence, be a good follower of God and contribute to Kenya's progress.

CONCLUSION:

      The points discussed above are some of the hundreds which everybody in Kenya can do or avoid doing to make the present and future living in Kenya comfortable. Remember if everyone does his part this country could be a paradise. Now ask yourself what you can do on your farms to contribute to Kenya's development.

UHORO WA UTHII NA MBERE WA BURURI

KUMA KURI_____

Muoroto wa karatathi gaka ni gutariria arimi njira imwe iria
mangiteithiriria bururi wa Kenya gukura. Ningwihoka ati wathoma maundu
maya merethe haha muhuro ni ugucoka wiyurie uria we wi murimi ungika thiini
wa mugunda waku nigetha uteithiririe bururi witu guthii na mbere.

GITHOMO:

Murimi wothe ni agiriirwo ni gutwara ciana ciake thukuru tondu uturo wa
thutha-ini wa bururi uyu ugakorwo wi mokoini mao. Bata wa githomo thiini
wa bururi ni uikaine gwi Thirikari ya Kenya na nikio irutaga gicunji kia
mirongo itatu na ithano thiini wa igana kia mbeca ciayo o mwaka ihuthirwo
na githomo. Korwo ciana thiini wa Kenya no igie na githomo, ukuruini
wacio no ikorwo na miikarire miega gukira uria ithui tuikaraga. No riri
miikarire miega ndiugaga atino muhaka mundu andikwo wira wa wabichi. Andu
marikia githomo no mahote kuruta wira migundaini na mone mbeca njiganu
tondu utonga muingi wa bururi uyu umaga kuri urimi.

NGVATANIRO:

Kuuma hindi iria Kenya yaheirwo wiyathi ni maundu maingi mahingitio
ni gwiteithia kwa andu ene. Maundu maria mahingitio ni td gwaka
mathibitari, machukuru, minanda ya guthambiria ng'ombe na maundu mangi ta
macio. Maundu maya, toria we hihi ui, ni makuritie bururi makiria na
magiriirwo ni kugathiririo. No nigetha o undu uria wambiririo urike no
muhaka andu mahothe mbeca kwa uingi. Kuoguo angikorwo mbere io
ndurahothaga mbeca ririkana ati ni urakoragwo ugituma bururi ukure kahora
gukira uria ungirakuraga.

UMENYERERI WA NYAMU CIA GITHAKA:

Andu angi thiini wa bururi uyu matiri mamenya faita ya nyamu cia
githaka. No ni magiriirwo ni kumenya ati ngiri nyingi cia ageni kuuma
mabururi makuraihu ni mokaga bururiini uyu witu kwirorera nyamu icio cia
githaka na moka ni matutigagira mbeca nyingi makiria. Kwa muhiano, mwaka
ucio urathirire wa 1976 Kenya niyonire shillingi million 800 kuma kuri
aceri acio na ni gukwihokwo ati bururi ni uguthii na mbere na kuona mbeca nyingi
miaka iguka. Mbeca icio ni ibatarainie mmo ni undu wa kugura indo cia
gukuria bururi na kuriha uthondeki wa-mabarabara, machukuru, oma indo ingi
nyingi. No nigetha mbeca ici ciakuuma kuri ageni ithii na mbere naguka no
nginyagia tumenyerere nyamu cia githaka ota uria tumenyagirira nyamu cia
muciii. Giki nikio gitumi kiria thirikari ihinge ugwimi wanyamu cia githaka
kuuma mweri wetano mwakaini uyu wa 1977.

UTHERU:

Utheru ni kindu kia bata makiria. Mundu o wothe agiriirwo ni kumenya
ati kurigiriria ni kwega gukira kuhonia. Kwoguo ni wega gwithambaga moko
hindi ciothe mbere ya kuria irio na moko, kunyuaga mai matheru, na kurugaga
irio nginya ikahia wega. Tungirumirira maundu maya no tunyihie ndwari thiini
wa micii iitu na ciana ciitu no ikure na ugima wa mwiri. Na kwa mutino
mundu umwe angirwara thiini wa mucii ni wega agateng'erio thibitari nigetha
murimu ucio uthondekwo atanagwatia andu aria angi a mucii ucio. Na ona
uguo noguo kwagiriire ni gwikwo mwana angirwara.

NDINI:

Andu amwe ni moigaga ati ndini na uthii wa na mbere ititwaranaga.
No uguo tiguo. Hindi iria mundu ena thayu na Ngai wake niahotaga kuruta wira
wake na njira njega. Ni ui at kuruta wira nakio ni undu umwe na kuhoya Ngai.
Mundu ta ucio in oii ati guturio in indo cia kuiya tiwega na kwoguo
ndanyariraga andu aria marigainie. Kwenda mundu uria ungi ota uria
wiyendete ni gutumaga bururi ugie na thayu na uthii na mbere makiria.

Ngirikiririra maundu maya magwetwo haha o hamwe na maria mariganira
ni ma bata makiria na ni magiriirwo ni kwamukirwo ni mundu o wothe uria ukwenda
bururi witu uthii na mbere. Ririkana ati ungihingia gacunji gaku na uria
ungi gake bururi no uthii na mbere gukura ota uria ukoretwo ugikura kuuma
twaheo Wiyathi. Riu ta wiyurie uria ungika mugunda-ini waku nigetha
uteithiririe Kenya gukura.

TABLE B-7

MASS MEDIA EXPOSURE ITEMS

1. During the last <u>one month</u> how many times did you listen to the radio?

2. About how many movies did you see last year?

3. How many times did you read each of the following daily newspapers during the last one month?

	None	1 - 10 times	11-20 times	more than 20 times
Daily Nation				
The Standard				
Taifa Leo				

4. During the last three months, how many times did you read each of the following weekly newspapers?

	None	1 - 5 times	6 - 10 times	more than 10 times
Sunday Nation				
Bararza				
Taifa Weekly				
Target				

5. During the last three months, how many times did you read each of the following weekly magazines?

	None	1 - 5 times	6 - 10 times	more than 10 times
Weekly Review				
Safari Magazine				
Kenya Gazette				

6. During the last six months, how many times did you read each of the following monthly magazines?

	None	1 - 3 times	more than 3 times
Kenya Farmer			
Nyota			
Mshiriki Wa Kenya			
Drum			
Trust			
Trade & Industry			
Viva			

APPENDIX C

DEMOGRAPHIC, SOCIOECONOMIC, AND
MASS MEDIA EXPOSURE DATA BY CELL

Note: The figures in this appendix indicate percentages.

Each cell of the experimental design has been numbered

11, 12, 13, etc. These numbers indicate a combination

of treatments of the two factors to which each group

of subjects was exposed. The first number refers

to source credibility level (1 = Agricultural officer,

2 = cooperative union officer). The second number

refers to different levels of the message content

(1 = coffee fertilizer news, 2 = general farming news,

and 3 = National Development news). For instance, the

fifty subjects in the "21" cell were exposed to coffee

fertilizer news which purported to originate from the

local Cooperative Union officer. Contr 1 and Contr 2

were control groups which were not exposed to any

treatment.

TABLE C-1

RESPONDENT'S AGE BY CELL

CELL	N	Under 30 yrs.	31-44	45-54	55-64	over 65
11	50	4	16	20	40	20
12	50	6	36	18	20	20
13	50	2	38	20	22	18
21	50	8	30	24	18	20
22	50	2	26	26	24	22
23	50	6	32	28	10	24
Contr 1	50	8	28	20	18	26
Contr 2	50	0	30	16	28	26
Total Sample	400	5	29	21	23	22

TABLE C-2

RESPONDENT'S ANNUAL INCOME BY CELL

CELL	N	Under sh. 3999	4000 to 7999	8000 to 9999	over sh. 10000	DK/Refused
11	50	36	26	8	10	20
12	50	24	20	10	32	14
13	50	16	26	12	26	20
21	50	20	22	16	34	8
22	50	10	24	22	44	-
23	50	18	40	6	20	16
Contr 1	50	30	32	10	24	4
Contr 2	50	30	20	8	24	18
Total Sample	400	23	26	11	27	13

TABLE C-3

RESPONDENT'S SOURCE OF INCOME

OTHER THAN FARMING BY CELL

CELL	N	NONE	BUSINESS	JOB	OTHER
11	50	70	10	12	8
12	50	58	10	16	16
13	50	54	6	28	12
21	50	62	10	20	8
22	50	88	2	10	0
23	50	62	8	16	14
Contr 1	50	60	8	12	20
Contr 2	50	62	12	22	4
Total Sample	400	65	8	17	10

TABLE C-4

RESPONDENT'S EDUCATION (IN YEARS) BY CELL

CELL	N	NONE	1-4 YRS.	5-8 YRS.	OVER 8 yrs.
11	50	32	42	24	2
12	50	36	38	24	2
13	50	48	32	18	2
21	50	32	40	28	-
22	50	22	48	28	2
23	50	38	32	26	4
Contr 1	50	42	28	30	-
Contr 2	50	32	26	28	14
Total Sample	400	35	36	26	3

TABLE C-5

NUMBER OF WIVES BY CELL

CELL	N	NONE	ONE	2-3	OVER 3
11	50	0	80	16	4
12	50	2	82	14	2
13	50	4	78	18	0
21	50	0	84	14	2
22	50	2	72	24	2
23	50	4	82	14	0
Contr 1	50	4	78	18	0
Contr 2	50	2	78	18	2
Total Sample	400	2	79	17	2

TABLE C-6

RESPONDENT'S NUMBER OF UNMARRIED CHILDREN BY CELL

CELL	N	NONE	1-2	3-4	5-6	OVER 6
11	50	6	20	28	12	34
12	50	14	10	22	22	32
13	50	6	18	12	20	44
21	50	16	16	18	22	28
22	50	6	8	26	22	38
23	50	12	16	12	26	34
Contr 1	50	10	16	20	32	22
Contr 2	50	10	16	16	26	32
Total Sample	400	10	15	19	23	33

TABLE C-7

RESPONDENT'S SIZE OF FARM IN ACRES BY CELL

CELL	N	2 AND UNDER	3-4 ACRES	5-6 ACRES	OVER 6 ACRES
11	50	36	44	6	14
12	50	30	30	18	22
13	50	28	34	20	18
21	50	34	32	20	14
22	50	16	26	20	38
23	50	38	34	16	12
Contr 1	50	32	40	10	18
Contr 2	50	18	20	22	40
Total Sample	400	29	33	16	22

TABLE C-8

RESPONDENT'S ACREAGE OF COFFEE BY CELL

CELL	N	LESS THAN 1 ACRE	1-2 ACRES	3-4 ACRES	OVER 4 ACRES
11	50	24	56	18	2
12	50	34	48	10	8
23	50	34	56	10	0
21	50	46	44	10	0
22	50	14	52	22	12
23	50	42	46	10	2
Contr 1	50	40	50	10	0
Cont 2	50	32	52	14	2
Total Sample	400	33	51	13	3

TABLE C-9

RESPONDENT'S TYPE OF HOUSE BY CELL

CELL	N	MUD	STONE	TIMBER	OTHER
11	50	14	14	64	8
12	50	18	10	42	30
13	50	14	16	60	10
21	50	22	10	34	34
22	50	22	6	40	32
23	50	26	6	34	34
Contr 1	50	22	8	32	38
Contr 2	50	20	26	50	4
Total Sample	400	20	12	45	23

TABLE C-10

RESPONDENT'S LITERACY
(NUMBER OF WORDS READ)
BY CELL

CELL	N	0-4	5-9	10 WORDS
11	50	48	6	46
12	50	40	10	50
13	50	52	10	38
21	50	34	16	50
22	50	36	12	52
23	50	46	12	42
Contr 1	50	44	4	52
Contr 2	50	34	20	46
Total Sample	400	42	11	47

TABLE C-11

RESPONDENT'S NUMBER OF COFFEE
TREES OWNED BY CELL

CELL	N	1-500 TREES	501-1000 TREES	1001-2000 TREES	OVER 2000 TREES
11	50	44	38	8	10
12	50	44	30	16	10
13	50	50	30	18	2
21	50	50	30	14	6
22	50	16	38	20	26
23	50	50	36	10	4
Contr 1	50	52	34	14	0
Contr 2	50	28	50	12	10
Total Sample	400	42	36	14	8

TABLE C-12

RESPONDENT'S SEX BY CELL

CELL	N	MALES	FEMALES
11	50	66	34
12	50	54	46
13	50	56	44
21	50	62	38
22	50	74	26
23	50	56	44
Contr 1	50	60	40
Contr 2	50	64	36
Total Sample	400	61	39

TABLE C-13

RESPONDENT'S RADIO LISTENING DURING
THE PAST ONE MONTH BY CELL

CELL	N	ZERO TIMES	1-10 TIMES	11-20 TIMES	OVER 20 TIMES
11	50	32	4	2	62
12	50	46	6	0	48
13	50	24	4	4	68
21	50	22	10	2	66
22	50	24	10	4	62
23	50	32	2	8	58
Contr 1	50	28	8	8	56
Contr 2	50	26	2	0	72
Total Sample	400	29	6	4	61

TABLE C-14

RESPONDENT'S MOVIE ATTENDANCE DURING

THE PAST ONE YEAR BY CELL

CELL	N	ZERO TIMES	1-6 TIMES	OVER 6 TIMES
11	50	80	12	8
12	50	76	16	8
13	50	82	14	4
21	50	80	18	2
22	50	94	4	2
23	50	72	18	10
Contr 1	50	88	10	2
Contr 2	50	86	12	2
Total Sample	400	82	13	5

TABLE   C-15

RESPONDENT'S "DAILY NATION" READERSHIP

DURING THE PAST ONE MONTH BY CELL

CELL	N	ZERO TIMES	1-10 TIMES	OVER 10 TIMES
11	50	88	4	8
12	50	92	4	4
13	50	90	8	2
21	50	88	10	2
22	50	92	4	4
23	50	80	18	2
Contr 1	50	94	2	4
Contr 2	50	82	10	8
Total Sample	400	88	8⁻	4

TABLE C-16

RESPONDENT'S "STANDARD" READERSHIP

DURING THE PAST ONE MONTH BY CELL

CELL	N	ZERO TIMES	1-10 TIMES	OVER 10 TIMES
11	50	90	8	2
12	50	96	2	2
13	50	92	8	0
21	50	92	8	0
22	50	92	6	2
23	50	98	2	0
Contr 1	50	92	6	2
Contr 2	50	94	4	2
Total Sample	400	93	6	1

TABLE C-17

RESPONDENT'S TAIFA LEO READERSHIP DURING

THE PAST ONE MONTH BY CELL

CELL	N	ZERO TIMES	1-10 TIMES	OVER 10 TIMES
11	50	74	6	20
12	50	86	10	4
13	50	74	16	10
21	50	80	20	0
22	50	78	16	6
23	50	78	14	8
Contr 1	50	80	16	4
Contr 2	50	72	16	12
Total Sample	400	78	14	8

TABLE C-18

RESPONDENT'S "SUNDAY NATION" READERSHIP

DURING THE PAST THREE MONTHS BY CELL

CELL	N	ZERO TIMES	1-5 TIMES	OVER 5 TIMES
11	50	90	8	2
12	50	94	6	0
13	50	96	4	0
21	50	100	0	0
22	50	98	2	0
23	50	90	10	0
Contr 1	50	98	2	0
Contr 2	50	92	4	4
Total Sample	400	95	4	1

TABLE C-19

RESPONDENT'S "BARAZA WEEKLY" READERSHIP

DURING THE PAST THREE MONTHS BY CELL

CELL	N	ZERO TIMES	1-5 TIMES	OVER 5 TIMES
11	50	96	4	0
12	50	98	2	0
13	50	90	8	2
21	50	96	2	2
22	50	94	6	0
23	50	96	2	2
Contr 1	50	94	4	2
Contr 2	50	92	8	0
Total Sample	400	94	5	1

TABLE C-20

RESPONDENT'S "TAIFA WEEKLY" READERSHIP

DURING THE PAST THREE MONTHS BY CELL

CELL	N	ZERO TIMES	1-5 TIMES	OVER 5 TIMES
11	50	92	6	2
12	50	90	8	2
13	50	92	6	2
21	50	96	4	0
22	50	92	8	0
23	50	92	8	0
Contr 1	50	96	4	0
Contr 2	50	88	8	4
Total Sample	400	92	7	1

APPENDIX D

RESULTS OF PRINCIPAL COMPONENT ANALYSIS

OF KNOWLEDGE AND ATTITUDE FOR PILOT STUDY:

COMPUTATION OF SOURCE CREDIBILITY LEVELS;

AND LEAST SQUARE SOLUTIONS OF TWO-WAY ANALYSIS

OF VARIANCE FOR ATTITUDE AND USAGE PER ACRE

TABLE D-1

RESULTS OF PRINCIPAL COMPONENT
ANALYSIS OF KNOWLEDGE FOR PILOT
SAMPLE

FACTOR 1: PRINCIPLE KNOWLEDGE

VARIABLE   LOADING

1. Name of one coffee fertilizer recommended
    by the Ministry of Agriculture (A)   .630

2. Name of one coffee fertilizer recommended
    by the Ministry of Agriculture (B)   .675

3. Name of one coffee fertilizer recommended
    by the Ministry of Agriculture (C)   .614

4. Kenya Farmers Association as source of
    fertilizer   - .412

FACTOR 2: "HOW TO" KNOWLEDGE

5. Same amount of fertilizer to all coffee
    plants?   .505

6. Basis of deciding how much fertilizer
    to apply to each coffee plant in a year.   .501

7. Right time to apply fertilizer on coffee
    plants.   .561

VARIABLE	LOADING

8. Coffee factory as source of fertilizer.   .356

9. Same fertilizer for all crops   -.573

FACTOR 3: AWARENESS KNOWLEDGE

10. Other smallholders as sources of fertilizer. .905

11. Best method of fertilizer storage   .677

12. Number of kilo-bag sizes of coffee ferti-
    lizers available   -.591

13. Fertilizer increases quality of coffee
    berries   .424

14. Fertilizer increases quantity of harvest.   .404

TABLE D-2

RESULTS OF PRINCIPAL COMPONENTS

ANALYSIS FOR ATTITUDE

ITEM	LOADING	INTERNAL CONSISTENCY COEFFICIENT
1. A farmer increases his annual harvest by using fertilizer.	.747	.693
2. Fertilizer makes the soil lose moisture.	-.667	.767
3. Fertilizer application improves the quality of crops.	.623	.669
4. Farms get more weeds when fertilizer is used.	-.435	.527
5. Fertilizer makes crops grow faster than animal manure.	.524	.509
6. Fertilizer costs so much money that it is not worth it.	-.462	.552
7. To increase farm incomes all crops should be planted with fertilizer.	.809	.720
8. Fertilizer is easier to apply on crops than animal manure.	.694	.661

	ITEM	LOADING	INTERNAL CONSISTENCY COEFFICIENT
9.	Application of fertilizer is only beneficial to large farmers.	-.512	.608
10.	Only farmers without animals should use fertilizer.	-.571	.615

TABLE D-3

PILOT STUDY's

NUMBER OF PEOPLE WHO SAID A PARTICULAR
SOURCE GIVES MORE CREDIBLE INFORMATION
THAN A CORRESPONDING SOURCE

	News paper	Neighbor	Sales man	Radio	Local coop. officer	Agri-culture officer
Newspaper	–	13	17	7	5	2
Neighbour	16	–	19	8	6	1
Salesman	12	10	–	7	4	2
Radio	22	21	22	–	13	3
Local coop. Officer	24	23	25	16	–	5
Agri-culture officer	27	28	27	26	24	–

Note:

The table should be read as follows:

Out of 29 respondents, 13 said that newspapers
give more truthful information about farming
than neighbours and 16 said neighbours give
more truthful information than newspapers.

TABLE D-4

PROPORTIONS OF RESPONDENTS WHO SAID
A PARTICULAR SOURCE GIVES MORE
TRUTHFUL INFORMATION THAN A CORRESPONDING SOURCE.

	News paper	Neighbor	Sales man	Radio	Local coop. officer	Agri- culture officer
Newspaper	.50	.45	.59	.24	.17	.07
Neighbour	.55	.50	.66	.28	.21	.03
Salesman	.41	.34	.50	.24	.14	.07
Radio	.76	.72	.76	.50	.45	.10
Local coop. Officer	.83	.79	.86	.55	.50	.17
Agri- culture officer	.93	.97	.93	.90	.83	.50

Note:

This table should be read as follows:

.45 or 45% of the sample said newspapers give more
truthful information about farming than the neighbours
and .55 or 55% said neighbours give more truthful in-
formation than newspapers.

TABLE D-5

NORMAL DEVIATES OF THE PROPORTIONS
OF RESPONDENTS WHO SAID ONE SOURCE
GIVES MORE TRUTHFUL INFORMATION THAN A
CORRESPONDING SOURCE.

	News:paper	Neighbor	Sales man	Radio	Local coop. Officer	Agri-culture Officer	Total:
Newspaper	.00	-.13	.23	-.71	-.95	-1.48	-3.04
Neighbour	.13	.00	.41	-.58	-.58	-1.881	-2.731
Salesman	-.23	-.41	.00	-.71	-1.08	-1.48	-3.91
Radio	.71	.58	.71	.00	-.13	-1.28	-0.59
Local Coop. Officer	.95	.81	1.08	.13	.00	-.95	2.02
Agri-Culture Officer	1.48	1.88	1.48	1.28	.95	.00	7.071

TABLE D-6

TWO-WAY ANALYSIS OF VARIANCE FOR HIGH ATTITUDE SCORE CHANGES: LEAST SQUARES SOLUTION: UNEQUAL CELL SIZES

a. <u>Cell-Frequencies:</u>

		Message			
		bl	b2	b3	Total
SOURCE	al	14	19	13	46
	a2	12	12	5	29
	Total	26	31	18	75

b. <u>Cell-total scores</u>

		Message			
		bl	b2	b3	Total
SOURCE	al	142	129	148	Al=419
	a2	88	80	38	A2=206
	Total	Bl=230	B2=209	B3=186	G =625

<u>Relevant Equations</u>

(1) $= G^2/n.. = (625)^2/75 = 390625/75 = \underline{5208.333}$

(2) $= \sum x^2 =$ sum of squares of all observations $= \underline{6877.00}$

(3) $= \sum (A_i^2/n_i.) = (419^2/46) + (206^2/29)$

$= 3816.543 + 1463.310 = \underline{5279.853}$

(4) $= \sum (B_i^2/n._j) = (230^2/26) + 209^2/31) + (186^2/18) = \underline{5365.68}$

(5) $= \sum\sum (AB_{ij}^2/n_{ij}) = (142^2/14) + ..+(38^2/5) = \underline{5468.517}$

C. Cell-mean scores

Message

		b1	b2	b3	Total
SOURCE	a1	10.143	6.789	11.385	
	a2	7.333	6.667	7.600	
	dj	2.810	0.122	3.785	
	Wj	6.462	7.355	3.611	17.428
	Wjdj	18.158	0.897	13.668	32.723

where,

$$d_j = \overline{AB}_{1j} - \overline{AB}_{2j} \text{ and}$$

$$W_j = \frac{n_{1j}n_{2j}}{n_{1j}+n_{2j}}$$

The adjusted sum of squares for interactions is given by:

$$SSab(adj) = \sum Wjdj^2 - \frac{(\sum Wjdj)^2}{\sum Wj}$$

$$\Sigma Wjdj^2 = (2.810)(18.158) + (.122)(.897) + (3.785)(13.668)$$

$$= 102.866$$

$$\frac{(\sum Wjdj)^2}{\sum Wj} = (32.723)^2/17.428 = 61.441$$

Therefore, SSab(Adj.) = 102.866-61.441 = 41.425

SSCells = Equation(5) - Equation (1)

$$= 5468.517 - 5208.333 = \underline{260.184}$$

Unadjusted SS for Message & Source

SSa = Equation(3) - Equation (1)

$$= 5279.853 - 5208.333 = \underline{71.528}$$

SSb = Equation (4) - Equation (1)

$$= 5365.680 - 5208.333 = \underline{157.35}$$

Adjusted SS for Message and Source

SSa (adj.) = SS cells - SSab (adj.) - ssb

$$= 260.184 - 41.425 - 157.35 = \underline{61.409}$$

SSb(adj.) = SS Cells - SSab(adj.) - SSa

= 260.184 - 41.425 - 71.528 = 147.231

SS error = Equation (2) - Equation (5)

= 6877.00 - 5468.517 = 1408.483

Summary of Analysis of Variance

Source of Variation	SS	DF	MS	F-Test
A(source credibility	61.409	1	61.409	3.008
B(message content)	147.231	2	73.616	3.606*
AB(message X source)	41.425	2	20.713	1.015
Error	1408.483	69	20.413	

Conclusion: Message content has a significant effect at .05 level.

TABLE D-7

TWO-WAY ANALYSIS OF VARIANCE FOR

ADJUSTED USAGE PER ACRE: LEAST SQUARES

SOLUTION: UNEQUAL CELL SIZES

Note: The computation followed Winer's method explained
in pages 291 to 293.

(a) Cell Frequencies

	b1	b2	b3	Total
a1	17	21	25	63
a2	18	40	29	87
Total	35	61	54	150

(b) Cell-total scores

	b1	b2	b3	
a1	125.216	197.93	358.491	A1=681.637
a2	97.714	1238.562	397.888	A2=1734.164
Total	B1=222.93	B2=1436.492	B3= 756.379	G =2415.801

(1) $= G^2/n.. = (2415.801)^2/150 = 38{,}907.296$

(2) $= \sum x^2 =$ Sum of squares of all observations $= 171{,}881.77$

(3) $= \sum(A_i^2/n_i.) = (681.637)^2/63 + (1734.164)^2/87 = 41{,}942.013$

(4) $= \xi(B_j^2/n.j) = (222.93)^2/35 + (1436.492)^2/61 + (756.379)^2/54$

     $= 45,842.569$

(5) $= \xi\xi(AB_{ij}^2/n_{ij}) = (125.216)^2/17 + \ldots + (397.888)^2/29$

     $= 52,268.940$

c. <u>Cell-mean scores</u>

	b1	b2	b3
a1	7.366	9.425	14.340
a2	5.429	30.964	13.720
dj	1.937	-21.539	0.620
Wj	8.743	13.770	13.426
			$\xi Wj = 35.939$
Wjdj	16.935	-296.592	8.324
			$\xi Wjdj = 271.333$

where,

$dj = \overline{AB}_{1j} - \overline{AB}_{2j}$ and

$Wj = \dfrac{N_{1j}N_{2j}}{N_{1j}+N_{2j}}$

The adjusted sum of squares is given by:

$$SSab \ (adj) = \text{\textonehalf}Wjdj^2 - \frac{(\text{\textonehalf}Wjdj)^2}{\text{\textonehalf}Wj}$$

$$\text{\textonehalf}Wjdj^2 = (1.937)(16.935) + (-21.539)(-296.592)$$
$$+ (.620)(8.324) = 6426.259$$

$$\frac{(\text{\textonehalf}Wjdj)^2}{\text{\textonehalf}Wj} = \frac{(-271.333)^2}{35.939} = 2048.515$$

$$SSab \ (adjust) = 6426.259 - 2048.515 = \underline{4377.744}$$

SS cells = Equation (5) - Equation (1)

$$= 52,268.94 - 38,907.296 = 13,361.644$$

Unadjusted SS:

SSa = Equation (3) - Equation (1)

$$= 41942.013 - 38,907.296 = 3034.717$$

SSb = Equation (4) - Equation (1)

$$= 45,842.569 - 38,907.296 = 6935.273$$

Adjusted sum of squares

SSa (adj.)= SS CELLS - SSab (adj.) - SSb

$$= 13,361.644 - 4377.744 - 6935.273 = \underline{\underline{2048.627}}$$

SSb (adj.)= SS Cells - SSab (adj.) - SSa

$$= 13.361.644 - 4377.744 - 3034.717 = 5949.183$$

SS error = Equation (2) - Equation (5)

$$= 171,881.77 - 52,268.94 = \underline{119,612.83}$$

Summary of Analysis of Variance

Source of Variation	SS	df	MS	F
A (Source of credibility)	2048.627	1	2048.627	2.466
B (Message level)	5949.183	2	2974.592	3.581*
AB (Message X source)	4377.744	2	2188.872	2.635
Error	119612.83	2	830.644	

Conclusion: Message level is significant at .05 level but
             source credibility and interaction are not
             significant at this level.

APPENDIX E

DEPENDENT VARIABLE MEAN SCORES

BY HIGH, MODERATE AND LOW LEVELS

OF EIGHT RECEIVER VARIABLES

Note - The sample is divided into three groups labeling all
       those subjects whose scores on each receiver variable
       lay above one standard deviation of the mean"high";
       those whose scores lay below one standard deviation
       of the mean "low", and all those whose scores lay
       within one standard deviation of the mean "moderate".
       The numbers in bracket are the number of respondents
       in each cell.

DEPENDENT VARIABLE MEAN SCORES BY LEVEL OF EDUCATION

Level of Education	Knowledge		Attitude		Usage per acre	
	Before	After	Before	After	Before	After
LOW	6.206	6.391	49.943	53.045	-4.552	8.579
	(141)	(110)	(141)	(110)	(109)	(61)
MODERATE	6.287	6.569	52.063	53.539	1.382	20.038
	(143)	(102)	(143)	(102)	(110)	(61)
HIGH	6.491	6.841	52.284	53.826	1.940	15.324
	(116)	(69)	(116)	(69)	(91)	(45)

DEPENDENT VARIABLE MEAN SCORES BY LEVEL OF AGE

Level of age	Knowledge Before	Knowledge After	Attitude Before	Attitude After	Usage per acre Before	Usage per acre After
YOUNG	6.056 (18)	7.067 (15)	51.500 (18)	53.800 (15)	-6.063 (11)	5.367 (11)
MIDDLE	6.356 (118)	6.703 (74)	51.576 (118)	53.486 (74)	-5.174 (92)	15.378 (42)
OLD	6.328 (262)	6.474 (190)	51.275 (262)	53.347 (190)	1.737 (205)	15.117 (113)

TABLE E-3

DEPENDENT VARIABLE MEAN SCORES BY LEVEL OF OPINION LEADERSHIP

Level of opinion leadership	:	Knowledge Before	:	After	:	Attitude Before	After	:	Usage per acre Before	:	After
LOW	:	6.275	:	6.594	:	51.331	53.189	:	-3.131	:	10.729
	:	(251)	:	(175)	:	(251)	(175)	:	(186)	:	(97)
MODERATE	:	6.383	:	6.447	:	51.750	53.776	:	5.018	:	16.642
	:	(120)	:	(85)	:	(120)	(85)	:	(102)	:	(63)
HIGH	:	6.414	:	6.810	:	50.276	53.857	:	-4.410	:	49.436
	:	(29)	:	(21)	:	(29)	(21)	:	(22)	:	(7)

DEPENDENT VARIABLE MEAN SCORES BY LEVEL OF COSMOPOLITANISM

Level of Cosmopolitanism	Knowledge Before	After	Attitude Before	After	Usage per acre Before	After
LOW	6.342	6.434	51.117	53.415	1.145	13.361
	(222)	(159)	(222)	(159)	(165)	(94)
MODERATE	6.290	6.791	51.871	53.330	-1.527	16.432
	(124)	(91)	(124)	(91)	(99)	(56)
HIGH	6.278	6.581	51.333	53.677	-4.462	15.239
	(54)	(31)	(54)	(31)	(46)	(17)

TABLE E-5

DEPENDENT VARIABLE MEAN SCORES BY LEVEL OF INCOME

| LEVEL OF INCOME | : | Knowledge | | : | Attitude | | : | Usage per acre | | |
	:	Before	After	:	Before	After	:	Before	:	After
LOW	:	6.045	: 6.231	:	50.144	: 52.154	:	-3.799	:	-2.196
	:	(44)	: (26)	:	(44)	: (26)	:	(34)	:	(9)
	:		:	:		:	:		:	
MIDDLE	:	6.209	: 6.462	:	51.500	: 53.359	:	2.707	:	11.399
	:	(110)	: (78)	:	(110)	: (78)	:	(82)	:	(48)
	:		:	:		:	:		:	
HIGH	:	6.398	: 6.583	:	51.811	: 53.611	:	-0.284	:	19.028
	:	(196)	: (144)	:	(196)	: (144)	:	(166)	:	(95)

TABLE E-6

DEPENDENT VARIABLES MEAN SCORES BY LEVEL OF LITERACY

(NUMBER OF WORDS READ)

Level of Literacy	:	Knowledge		:	Attitude		:	Usage per acre		
	:	Before	After	:	Before	After	:	Before	:	After
LOW	:	6.132	: 6.427	:	50.352:	53.234	:	1.210	:	14.978
	:	(159)	: (124)	:	(159) :	(124)	:	(124)	:	(72)
	:		:	:			:		:	
MODERATE	:	6.724	: 6.632	:	51.759:	52.789	:	9.050	:	11.673
	:	(29)	: (19)	:	(29) :	(19)	:	(19)	:	(12)
	:		:	:			:		:	
HIGH	:	6.389	: 6.681	:	52.085:	53.667	:	-2.931	:	14.659
	:	(211)	: (138)	:	(211) :	(138)	:	(167)	:	(83)

TABLE E-7

DEPENDENT VARIABLE MEAN SCORES BY LEVEL OF MEDIA EXPOSURE

Level of media exposure	Knowledge		Attitude		Usage per acre	
	Before	After	Before	After	Before	After
LOW	6.385	6.737	51.762	53.465	-1.156	14.792
	(143)	(114)	(143)	(114)	(114)	(70)
MODERATE	6.038	6.474	51.231	53.737	7.228	27.945
	(26)	(19)	(26)	(19)	(19)	(11)
HIGH	6.342	6.621	51.728	53.591	-3.858	9.594
	(114)	(66)	(114)	(66)	(97)	(43)

TABLE E-8

DEPENDENT VARIABLE MEAN SCORES BY LEVEL OF NUMBER

OF NEWSLETTERS RECEIVED

Level of # of Newsletter	Knowledge Before	After	Attitude Before	After	Usage per Acre Before	After
LOW	6.153	6.458	50.672	53.336	7.449	20.323
	(131)	(131)	(131)	(131)	(103)	(92)
MODERATE	6.462	6.625	50.725	53.050	-6.830	10.869
	(80)	(80)	(80)	(80)	(57)	(48)
HIGH	6.281	7.156	52.437	54.125	-0.471	5.248
	(32)	(32)	(32)	(32)	(26)	(15)

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