Farming Systems in Southern Mali: How to Improve Small Farmers' Management Behaviors

FARMING SYSTEM IN SOUTHERN MALI:

HOW TO IMPROVE SMALL FARMERS' MANAGEMENT BEHAVIORS

by

Amadou Mamou Kone

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Center for International Education
School of Education
University of Massachusetts
Amherst

TABLE OF CONTENTS

INTRODUCTION

This study investigated the decision-making process of small farmers who deal with crop production resources. The research was conducted in an area covered by the rural development project, Operation High Valley (OHV) in Southern Mali, West Africa.

The goal of the study was to investigate the dynamics of crop production that prevail within the southern villages based on the production input supply structure (Production Implement Resources) and the decisions pattern the farmers follow in allocating these resources.

The hope of this study was that if the farmers were having any decisions problem with respect to the allocation of resources and consequently with crop production out put, training programs could be designed to help them solve these problems.

The study was conducted in four villages and concerned thirty-three individual households. The villages were sampled on the basis of their credit outstanding with OHV for the agricultural season 1983-1984. The households were randomly sampled.

The data were recorded through a questionnaire and interviews with the farmers. The data collection faced one major problem; its accuracy depended upon the recall ability of the farmers. The research methodology did undergo some changes due to time and resource constraints. The analysis was based on production input and output data. Group data analysis was performed through correlation co-efficients and regression analysis.

Chapter I and II present the research abstract and background information on Operation High Valley.

Chapter II and IV deal with the literature on farming systems and the problem statement of the study.

Chapter V and VI discuss the research methodology, both the initial and the revised design.

Chapter VII and VIII deal with research results and recommendations.

I. ABSTRACT

The study aims at designing a need analysis methodology and a curriculm that deals with the decision making process of small farmers in allocating resources in agricultural production.

The research will be implemented in the Operation High Valley (OHV) and dealing with food crop production.

The samples under study concern 33 households in 4 different villages.

The focus of study was the actual reactions (behaviors) of farmers in terms of decisions made, actions undertaken and the consequences of the actions with respect to three factors: the input supply system (credit system and extension activities), the market system, and the farmers individual goals and expectations. The study attempted:

- first, to establish the discrepancy that exists between the production decision making schemes as proposed by OHV (through the input and market systems) and the actual decision making process followed by the farmers:
- second, to identify the causes of this discrepancy,
- third, to propose a curriculum to deal with the discrepancy.

The final outputs of the study will be (1) the draft of a need analysis methodology to achieve the curriculum, and (2) the design of the curriculum.

The following considerations underlie the research goals:

i. The input supply system and the market system are a package of innovations to be proposed to the farmers. Any decision of the farmer concerning any of these innovations affects directly the others in its consequences. And, the production decisions of the farmer depend on socio-economic factors that are determinant within his community. As far as experience is concerned in southern Mali, the development projects emphasize the input supply system and the acquisition of technical skills by the farmers. Although considerations are being made to numeracy and accounting skills, little attention has been given to management decision skills given the package of innovations.

ii. Specific educational programs are needed to enhance the management ability of the small farmers. Unless such programs are implemented, the profitability of the input supply system and market system to the farmers will be compromised.

The research methodology to be followed has three components:

i. The situational analysis method as described by J. Van Velson (1978, p. 129-180). It consists of an in-depth analysis of the individual farming household as a unit of production and a unit of consumption. This method attempts to determine the socio-economic status of the farming household within the community. This will be done by individual

interviews and census data collection.

ii. The network analysis method: this method consists of the analysis of the social network of the farming household within the community. It will be used to assess the dependency level of the individual household as the resultant of community structure, norms and values that determine the individual production decisions. This concerns the economic and non-economic factors.

iii. Production decisions pay-off matrix method: the pay-off matrix will concern: (1) decisions made by the farmer, (2) factors taken into account in making the decisions and rationales used to weigh these factors, (3) actions undertaken, and (4) the consequences of these actions as evaluated by the farmer himself. Alternative decision pay-off matrix will be discussed with the farmer. These alternatives will be the backbone of the curriculum to be designed.

The significance of the study can be stated at different levels.

i. It will contribute to the understanding of the kind of problem small farmers are facing in their production decisions, their adoption behaviours and their insolvency.

ii. It will contribute to the educational development of adult farmers by adding new areas such as farm planning and management.

iii. It will contribute to the development of post-literacy in Mali where extensive efforts have been done in

numeracy and accounting. It will do so by adding new areas of linguistic research on management concepts and terminologies in Mandinka and Bambara, and provide areas where new post-literacy materials can be developed.

II. THE DEVELOPMENT PROJECT

The study was conducted within the "Operation Haute Vallee" (OHV) project area in southern Mali in western Africa. OHV was selected for the study based on the following criteria: the diversity of crop production covered by the project, the availability of descriptive data of the time of the research design, and the proximity of the research site.

OHV is an Integrated Rural Development Program originated in 1965 under the funding of the F.A.C. (Ford d'Aid a la Corporation) until 1970. Between 1970 and 1975 the project was supported by the national budget. Now the project is jointly supported by the Government of Mali and the USAID Development Fund. The goals assigned to the project as defined by the Government of Mali can be stated as follows:

i. to organize and monitor the input supply and the market systems for the promotion of the main crop production within the project area.

ii. to help the farmers organize their production and increase their productivity.

iii. to stimulate and/or initiate community development programs desirable for the welfare of the population.

The OHV Project covers an area of 31,530 kilometers alongside the river Niger. The area is divided into six development sectors: Kangaba (4,340 km^2), Bacoumana (4,290 km^2), Quelessebougou (4,280 km^2), Kafi (4,850 km^2), Koulikoro (6,340 km^2), Banamba (7430 km^2). The climate is characterized by a dry and a rainy season (5 to 6 months) with an average rainfall between 800 and 1,200 mm under favorable conditions.

The population within the project area is approximately 419,340 (with 246,836 adult members) living in 900 villages. The following ethnic groups compose the population: Bamboroi, Sarakole', Peulh, Somono, and Bozo. The project area numbers 15,800 farming households.

III. BACKGROUND

The study aims at contributing to the understanding and the improvement of the planning and management skills of farmers engaged in rural development projects. As P. Coombs and M. Ahmed noted, "small farmers especially need help in becoming better planners and managers" (1979, p. 119). On this issue the two authors quoted a retired agricultural extension agent in East Africa:

> Instead of selling technologies ... we must have begun by teaching simple farm planning and management. Then small farmers would have recognized the importance of improving their technologies (1974, pp. 119-120).

In rural development projects (agriculture) several explanations have been given to the failure of small farmers: lack of technical skills, unwillingness to fully adopt technologies, etc., but one of the causes may be the nature of rural development theories and strategies and the specific behaviours they require from the farmers.

David W. Norman (1980, pp. 1-2) mentioned that rural development theories during the past 20-30 years have stressed the following points:

- to tax agriculture production to finance industrial and urban development;

- to transfer technology from developed countries to developing countries;

- to build technology in developing countries on the basis of the technological experiences of developed countries;

- to selectively import technologies based on their adaptability to farming systems in developing countries.

Based on the assumption that rural economy should greatly contribute to national economies, development strategies have been designed so as to provide inputs supply system (credit, extension activities, training) and market system. The underlying goal of these strategies was to intensify the monetarization of rural economy. In order to secure an equal distribution of income in such strategies, government subsidy systems, community development programs (producers, consumer cooperatives), and off-farm activities have been implemented to offset risks of income shortage.

Given the efforts that have been done, the consequences of rural development strategies can be resumed as:

i. The emphasis on rural economy did effectively serve the national economy. For instance, in 1978 the rural sector contribution to the GNP in Mali was 45% (agriculture, livestock, fishery, forestry); the two basic cash crops (cotton and peanuts) contributed 72% of all export (MEN, 1981, p. 2).

ii. The intensive monetarization of rural economy did occur at the expense of small farmers and to the benefit of those farmers or semi-farmers (merchants, civil servants) who were already better off.

iii. An unequal distribution of risks did occur at the expense of small farmers and resulted in their often insolvency.

With respect to the above consequences, we can consider the issue: whether the failure of small farmers was due to the input supply sytem, and market system that prevailed or to the inability of the farmer to manage these systems or to respond to them (i.e., How to deal with risks).

Two general criticisms addressed this issue:

1. Macro-economic Criticism:

Raynault (1973, p. 160) pointed out that the total domination of rural economy by centralized inputs supply systems and market systems resulted in an unequal monetary circulation at the expense of rural economy that can barely generate and sustain its own capital accumulation. In other words, macro-economic strategy does not necessarily serve

the general welfare of rural people.

Based on this critique, Raynault proposed a guideline to redefine rural development in Sahel Africa. His guideline is similar in content to the Dag Hammerskjold Foundation's notion of "Another Development" with its five attributes: need-oriented, endogenous, self-reliant, ecologically sound, and based on structural changes. Central to Raynault's proposition, is the need to implement "micro-planning" at local levels to enable the communities and their members to set objectives and decide the means to reach these objectives. Such micro-planning requires a great deal of management skills from the farmers.

Micro-planning is being implemented in rural West Africa through community development programs. Guy Belloncle, Peter Easton, et al (1982) have done extensive studies on such programs in Mali, Niger, Upper Volta and Senegal.

In Mali, at local level (village) agriculture producer cooperatives named "Association Villageoises" have been in charge of some of the input supply and market activities in projects such as OACV[1] and CMDT.[2] Here young neoliterates (trained in numeracy and bookkeeping) organized credit and marketing systems under the responsibility of village committees. They did need assessment and distributed implements, traded crops and collected money from loanees. Through these

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1. O.A.C.V.: Peanuts and food crop producing project.
2. C.M.D.T.: Malian company for the development of textiles.

activities collective funds have been generated to the benefit of the associations. The underlying strategy of such programs was that:

- the "Associations" should decide who receives the loans in the village.

- the collective funds should be used to finance other development programs such as health, consumer goods supply, education, etc.

In noting the mismanagement of the collective funds, Belloncle and Peer (1982) stressed the urge:

i. to design training programs in literacy and numeracy to be addressed to the Association's committees to help them manage the collective fund. Unfortunately the kind of curriculum proposed dealt only with accounting and bookkeeping. It did not address decision making processes.

ii. to use the collective funds to guarantee the insolvency of the loanee and to finance the farmers who cannot fulfull the official credit requirements.

Although such propositions are significant, we can argue certain points:

i. even if the collective fund can guarantee the loanees, it does not solve the problem of insolvency of the farmers without any managerial skills. The failure of the farmers will certainly be a gain for the credit system and a loss for the Associations. The risks are simply transferred from the individual farmers and the credit system to the Associations.

ii. Not only the committees, but also the individual farmers should be trained in allocating farm resources.

In response to the macro-economic criticism, it can be argued that it is not necessary to implement micro-planning at the grass root level; indeed, farmers should be provided with the necessary skills to carry out effectively such planning. Therefore, special management training programs are needed.

2. Rural Development Project and the Dynamics of Crop Production in Rural Economy: Criticism

This criticism is based on the argument that the rationales for crop production prevailing in the social system in rural areas may be different from those disseminated by the development projects. In other words, do farmers always seek profit? And, if so, what kind of profit? If answered, these questions may explain the kind of production decisions small farmers make in their farming process.

In his study among the Bambara in southern Mali, John Van D. Lewis (1981) sorted out the extent to which the economics of peasant farming depends on extra-domestic coalitions.

Based on Chayonouv's slop and Sahlin's curve of domestic labor intensity (crop yield) Lewis provided interesting findings:

i. given crop yield increase, lineage and extra domestic coalitions (marriage ties, political agreement, labor exchange and cooperation) among households correlate with

farming performance skewed either heavily above or heavily below the compound (household) consumption needs. A compound with strong extra-domestic coalition support:

> . . . may produce very much more (in order to consolidate that support for the future) or very less without worrying about the consequences of a diminished grain supply (Lewis, 1981).

ii. the extra-domestic labor exchange and cooperation contribution to farm production may not increase the yield. This depends on when this labor is available and what use the farmers make of it. Lewis concluded that in such situations the communities:

> . . . are more committed for their security to a permanent subsistence producing organization than to increase the subsistence production itself (Lewis, 1981).

Thus, extra-domestic coalitions appear to be a group insurance system which determine the degree of dependency of the individual household within the community. Any decision of the individual farmers will be affected by this social network. The management efforts of the farmer are more likely aimed to maintain this support network.

At this point we may point out the issue whether the profit oriented rationales of agricultural development projects are compatible with extra-domestic coalitions system in rural southern Mali.

Lewis (1978), Warton (1968) and Raynault (1077) addressing the issues of monetarization of rural economy in Africa, mentioned the reorientation of the dynamics of production toward

capital accumulation. The consequences of this transition nowadays is the existence of communities and households with dual economic function that is capital accumulation (profit oriented) and capital redistribution (subsistence oriented). Although it may be difficult to make a net distinction, the dominance of one function over the other determines the economic orientation of the community and/or the farming household. The issue involved here is to what extent the community structure, norms, values, and the farming household production criteria are integrated into a profit oriented market economy. The distinct characeristics of the two categories of communities are various. We may find them in the labor relationship, the production rationale, household network, crops marketed, etc.

Regardless of the economic orientation of a community and/or the household, the successful farm depends on the responsibility and management skills of the farm-decision makers. This responsibility and decision skills are determined by the degree of dependency of the household, the input supply systems, the market system, physical and climatic conditions (Gilbert, et al., 1980, pp. 8-9). (See Annex 5).

IV. STATEMENT OF THE PROBLEM

The research will address the following problems:

(1) to determine the actual economic orientation or process that prevails within the community/villages, given the input supply system and the market system. The criteria

for determining this orientation will be: to what extent and under what conditions the extra domestic labor exchange, the extra-domestic labor cooperation, the extra-domestic product exchange, the extra-domestic implements exchange are integrated into the monetary system.

(2) To identify the actual impact of this economic process or dynamic of crop product on the production decisions of the individual farmers.

(3) To find out how different the farmers' decision process is from the decision schemes proposed by OHV.

(4) If there is a discrepancy a curriculum will be proposed that deals with planning and management accurate for each specific situation.

In dealing with the fourth problem, suggestions will be made concerning:

- the conditions under which such curriculum can be implemented and toward that specific target it should be directed.

- material to be developed to support the curriculum.

- linguistic research on management concepts and technologies, etc.

V. RESEARCH METHODOLOGY

The research framework refers to the Michigan State University's Rural Development paper #6 (1980) on its definition of "Farming System Research (FSR)" with four

characteristics:

1. The concept of farming system as production units and consumption units which are interrelated.

2. A "holistic" approach to farming systems study with respect to the natural and human environment.

3. The concept of farming systems as a set of sub-systems; e.g., crop variation, livestock, off-farm activities "which may overlap and interact with each other" (p. 3).

4. The concept of farming system as a problem solving situation where the household goals conflict with farming constraints.

Given these four characteristics of farming systems, the actual focus of study concerns the kind of constraints and problems the farmers face in planning and management.

1. Units of Study, Areas of Study and Focus of Analysis

i. Village level: The focus will be the socio-economic status of the village to be analyzed as traditional, transitional or modern. The problems will concern to what degree the villages are integrated within the monetary system.

ii. Individual household level: The analysis concerns the socio-economics of the household. The problem concerns how the management abilities of the farm decision maker(s) account for the socio-economics status of the household.

iii. Individual decision maker(s) level: The problem of concern is how decisions are made and carried out in allocating farm resources.

2. Sampling

i. Villages: They will be randomly sampled following the criteria below:

(1) village most participating in OHV project, and nearby a market place.	(2) village least participating in OHV project, and nearby a market place.
(3) village most participating to OHV project, and remote from market place.	(4) village least participating to OHV, and remote from market place.

"The least and the most participating to OHV" criteria refer to the degree to which the villages are engaged in the input supply system of OHV. The distance to the market as criteria refer to market opportunities as incentive to production. In this respect we should point out that merchants compete with the government marketing structure "The Federation of Cooperatives."

ii. Individual households: They will be sampled on the basis of their membership defined as persons sharing means of production, and product. A study from OHV Project Paper, USAID/MALI, showed the household composition for the entire project areas.

3. Data Collecting

i. At the village level data will be collected on the principal sources of wealth as shown on the following table. Another area of data is the degree of participation in OHV program: indebtedness within the credit system,

implements, average crop output, etc. Other sources will be considered if contributing to farm investment (livestock, off farm, etc.).

Land use by crop: adapted from OHV Project Paper, USAID/MALI:

Land Cultivatable	Land Cropped	Family/farm Average	Family/farm land cultivatable	Cereals % (paddy, millet, sorghum, maize) of cultivated land	Cash crops % cultivated (peanuts, cotton, tobacco)	Vegetable % of land cultivated
2000 Km	700 Km	12ha	5ha	75%	22%	2-3%

This table gives an idea of principal sources of wealth for the entire project areas.

ii. At the individual household level, data will be collected on the principal sources of wealth and on property holdings. While sources of wealth will concern basically the agricultural activities, the property holdings will concern those that are productive. For these concerns see Annex 1, Budget Schedule: Sections 1, 2, 3, 4, 5 and property schedule in Annex 3.

iii. At the individual decision makers level, data will concern the actual decisions made and their consequences. This will be done so through decision pay-off matrix; the pay-off

matrix will be expressed in monetary terms of losses and gains. If this is not possible, other terms of losses and gains will be considered. According to Nelson, et al, (1978, pp. 3-8), on-going farm decisions or alternatives and changes can be stated as follows:

Input-Output: Changes involve increasing or decreasing the use of resources with a corresponding effect on output.

Input-Input: Where changes involve substituting the resource for another without affecting the output.

Output-Output: Here changes involve substituting one enterprise for another.

In reality decisions may concern a combination of the three types of changes.

Now how do we construct a decision pay-off matrix?

Let us suppose a farmer has 5ha. to crop cotton. Our farmer is considering a certain type of fertilizer. Under uncertainty of rainfall and everything equal, our farmer may be confronted with alternative use of his fertilizer. A simple decision pay-off matrix for the use of fertilizer would look like this:

Events of uncertainty	Decisions - Actions - Output net return $ for the 5ha		
	FERTILIZE LIGHTLY	FERTILIZE MODERATELY	FERTILIZE HEAVILY
E_1: low rainfall	$ 800	$ 550	$ 200
E_2: average rainfall	1000	1200	1100
E_3: high rainfall	1100	1500	1800

Given this decision, materials (E_1, E_2, E_3; the fertilizer and the net return) our farmer's decision will depend on whether or not he is a risk taker.

If the farmer is someone who avoids risks (risk averter) he will apply the maximum rule of risky decisions by choosing the best of the worst net return (within case \$800). Thus by fertilizing lightly his expected net returns are \$800, \$1,000, and \$1,100.

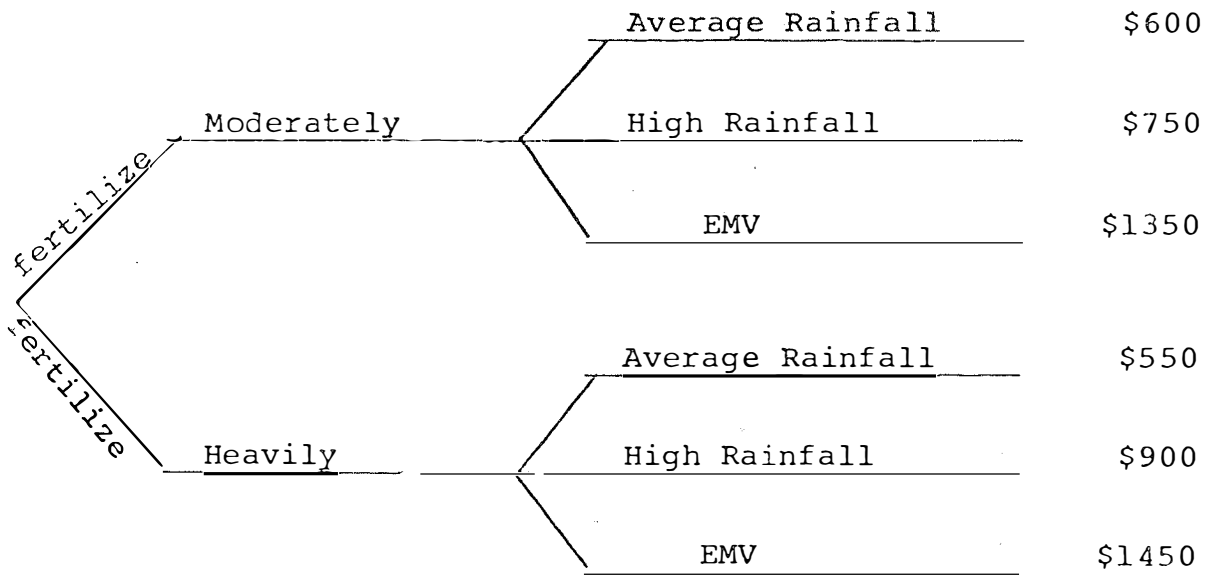
On the other hand, if our farmer is a risk taker, he has two possible alternatives:

i. First, he can apply the maximax rule of risky decisions by choosing the highest net return (\$1,800) and fertilize heavily. In this case, his range of risky output is between \$200 and \$1,800.

ii. Second, he can target the Expected Monetary Value (EMV) of his net return. In this case, let us suppose that the farmer excludes the probability of low rainfall (E_1). That leaves him with two events of uncertainty: E_2 and E_3. Let us assume that our farmer has a subjective probability of 50% chance of the occurrence of each of the two events E_2 and E_3. The EMV pay-off table will then be:

	Fertilize moderately	Fertilize heavily
E_2: average rainfall	\$1200 x 0.5 = \$600	\$1100 x 0.5 = \$550
E_3: high rainfall	\$1500 x 0.5 = \$750	\$180 x 0.5 = \$900
Expected Monetary Value (EMV)	= \$1350	= \$1450

The decisions tree in this case will look like:



If the farmer wants to maximize profit he will choose the highest Expected Monetary Value ($1,450) and apply heavily the fertilizer.

These sample examples of decision pay-off matrix are very simple ones. Pay-off matrix can concern several alternative decisions and events of uncertainty such as market fluctuations, natural calamities, etc. Also several criteria of profitability can be considered.

For the purpose of this study, the weighing of decision criteria will be discussed with the farmers themselves and in their own terms. This will be done by discussing with them the production decisions they made during the 1982-1983 production year. And on the basis of these actual decisions, alternative decisions pay-off matrix will be designed. Such alternatives

will constitute the content of the curriculum to be designed.

Since the main issue of the study is the management efforts of the farmers, how do we design a pay-off matrix to summarize these efforts?

Procedures for elaborating decisions pay-off matrix

1. List all alternatives decisions/actions. This listing should be based on the following check list:

- Do the alternatives relate to the solution of the management problem?

- Will the alternative contribute to the objectives of the decision-maker?

- Is the alternative consistent with the available resources?

- Is the alternative possible to implement with the present management capabilities of the farmer?

2. List all possible events of uncertainty expected to occur and influence the pay-off of any of the possible decisions and actions. This listing should be based on:

i. The possible impact or magnitude of the effect that the event can have on the pay-off.

ii. The probability or chance that the event will occur. This should be established on the basis of available information, whether from elaborate sources or personal experience.

iii. The events must be mutually exclusive and collectively exhaustive.

3. Budget out the pay-off: This should be expressed in terms of monetary loss and gain or in terms of losses and gains other than monetary. More than one measure may be used for each cell of the pay-off matrix. For instance, if the farmer's objective is to maintain his source of labor forces; e.g., extra-domestic labor exchange, measure should be found to express this objective.

In budgeting, for the purpose of this study, we are only concerned with partial budget as opposed to farm total budget. Since we are only concerned with the agricultural activities as principal sources of wealth, the partial budget will include those costs and returns which are actually affected by the alternative decisions. A partial budget should be computed for all alternative decisions and actions under consideration. This should be done following these four components:

i. Added returns: for products sold and services rendered as a result of the proposed actions.

ii. Reduced costs: both operating and ownership which would no longer be incurred for the alternative action.

iii. Added costs: the additional operating costs and ownership for the new capital assets associated with the alternative.

iv. Reduced returns: returns that would no longer be received if the alternative is selected (Nelson, et al., 1978, pp. 3-9):

(a) Added Returns + Reduced Costs = Total addition to profit

V. RESEARCH METHODOLOGY ABSTRACT

Area under Study	Unit of Study	Date Needed	Method	Focus of Analysis
Socio economic Status	Village Level	-principal source of wealth -land holdings -land under cultivation -labor structure -agriculture input-output -labor structure -market structure -gross income -gross expenditure -debt	-Interview -census data	economic orienta of the village a the individual household.
	Individual household level	-principal sources of wealth -land holdings -land under cultivation -labor sources -implements -agriculture input-output -gross income and expenditure -consumption -property holdings	-Interview -Census data -Schedule sheet (see Annex)	Self-sufficienc of the individu household
Production decision process	Individual decision maker(s)	-decision concern: (a)-credit: amount, source, allocation (b)-implements: nature, source, allocation (c)-market: when, where, to whom, product sold, bought (d)-exchange: what? to whom? for what purpose or reason?	-Interview -Census data -Schedule sheet (see Annex)	Mangement exper of decision mak

(b) Added costs + Reduced Returns = decrease in profit

(c) Total addition to profit-decrease in profit = Net change to profit (pay-off to the decision).

Four measures of profitability do exist, for the purpose of our study we are concerned with the return to managment efforts. This return computes as follows:
Net income - (charges for the unpaid labor + equity capital) = Return to Management (Nelson, et al., 1978, pp. 3-9).

VI. THE MODIFIED RESEARCH METHODOLOGY

The changes in methodology were caused by time and resource constraints.

i. Resources: The situational analysis technique, the network analysis procedures and decision making matrix needed more resources than was available. Adequate recording devices such as tapes and tape recorders were not available because of the cut in the research budget which was reduced at about one tenth.

ii. Time: The original research design required extended time for the researcher to remain in the villages. The time of research was reduced from four months to two because of the late availability of the budget. Added to that the budget was not available at once which caused the researcher to travel back and forth from the research site costing time.

The changes performed on the methodology are:

1. Sampling: Different from the first sampling criterion,

the four villages were sampled on the basis of their credit outstanding with OHV for the 1983-1984 production season:

(a) large amount of loans: Sido with 4,252,855 Malian Francs (FM); Falan with 3,087,785 FM; (b) small amount of loan: Farani with 797,380 FM and Ntabacoro with 403,000 FM. The four villages are situated in Quelessebougou sector:

- Sido village: ZER of Sougoulo, SB of Sougoula
- Falan village: ZER of Quelessebougou, SB of Falan
- Farani village: ZER of Quelessebougou, SB of Farani
- Ntabacoro, ZER of Dialakoro, SB of Ntabacoro

The invidvidual households have been randomly sampled from the extension agent record books as follows: Sido, Falan and Farani - 10 households; Ntabacoro - 3 households. In the case of Ntabacoro the 3 households were the only samples available at the time of the research.

2. Data Collecting

(a) At village level: data was recorded on total hectares cultivated and by crops (millet, corn, peanuts, cotton); population data and modern technology (tools) holdings were also recorded.

(b) At individual household levels, data concerned land, fertilizers, and their distribution among crops; credit outstanding, labor structure, tool holdings, crop output and revenue.

3. Data Analysis

The data was collected through interview, question-

naire and extension agent record books.

The changes in methodology did affect the data collecting techniques initially planned as well as the scope of data analysis. Individual case studies could not be performed to elaborate decision-matrix with the farmers. Given the data obtained, we decided to proceed to a group analysis of the 33 households. Correlation coefficients were computed and regression analysis performed based on the following variables:

(a) Dependent variables: production output (Kg) and revenue for the four crops (millet, corn, peanuts, cotton).

(b) Independent variables:

1 - total hectares cultivated

2 - hectares cultivated by crop

3 - quantity of insecticide used

4 - quantity of fertilizer used

5 - quantity of fertilizer use by crop

6 - the use of different varieties of fertilizer on one crop

7 - number of days worked by the manpower

8 - number of days worked with modern tools

These independent variables deal with production inputs and their allocation among crops. The inputs allocation follows the input-out farming alternative decision-making pattern: increasing and decreasing the use of resources with corresponding effect on production output. The analysis investigated how the decisions of the individual farmers in the aggregate affect the crop production process.

The analysis performed within this study should be considered cautiously since most of the data are recall data given by the farmer. This concerns mainly data concerning crop out-put for the millet, corn and peanuts and the quantity of fertilizers used on the different crop fields.

VII. RESEARCH RESULTS - PRODUCTION INPUTS

The village and household current productive resources are the land, agricultural tools, and manpower.

1. Resources at the village level

Because of archival deficiencies, data concerning certain resources was not available for all the four villages. Resource data are missing for N'Tabacoro village; data concerning active manpower are missing for all four villages; population data are missing for Falan and Farani. Data in Chart 1 in annex shows land holdings and agricultural tools at village level.

Table 1 below shows priority of land allocation among various crops at village level.

Table 1: Distribution of land in hectares by village and crops (campaign 1983-1984)

Village Name	Hectares in Millet	Hectares in Cotton	Hectares in Corn	Hectares in Peanuts
Sido	57	17	10.50	5.50
Falan	135	53	22.00	5.25
Farani	400	13	70.00	70.00
N'Tabacoro	?	?	?	?

Sources: Quelessebougou sector method

Although Farani has the greater quantity of land cultivated, this village has less agricultural modern technology than either Sido or Falan. Farani has less land allocated to cotton as compared to the other three crops.

2. Household level

As we pointed out earlier, the households were randomly sampled and were scattered throughout the four villages. The mean land cultivated for the sample is about 6.70 hectares with a standard deviation of 4.08 hectares; the median land area by household is 2 hectares. Table two gives land distribution amond the four crops as follows: Only one household cultivated 2 hectares. Six households cultivated less than 5 hectares.

Table two: Land distribution in hectares by crops for the 33 household samples. (based on meaner and standard deviation for the group)

Crop	Mean (hectares)	Standard Deviation (hectares)
Millet	4.59	3.36
Cotton	0.90	1.14
Corn	0.65	0.74
Peanuts	0.50	0.55

As we can notice hectares cultivated in cotton shows the greatest variation among the thirty-three households as well as millet.

3. The use of fertilizers

The modern fertilizers available to the households were urea, cotton complex and phosphate of ammonia. The fertilizer often used on the following crops was: Cotton-complex and/or urea; corn-complex and/or urea; millet-phosphate and/or complex;

peanuts-urea. The mean quantity of fertilizer used was about 161.36 kg. with a standard deviation of 213.51 kg. and a median of 50 kg. As we can sense it the quantity of fertilizers used varies a great deal among households. Indeed the median quantity of fertilizers used is about 50 kg. and 16 households are above this median and 17 households are about the .80 kg. median. Concerning the distribution of fertilizers among the four crops, table three gives the following figures:

Table three: Mean and standard deviation of quantity of fertilizers allocated to each crop for the 33 households.

Crop	Mean (kg.)	Standard Deviation (kg.)
Cotton	104.54	156.30
Corn	19.69	22.15
Millet	15.90	35.25
Peanuts	0.75	4.35

This table shows how the quantity of fertilizers allocated to each crop respectively varied significantly from one household to another. In general, the farmers do not follow approximated decision patterns in allocating this particular resource.

But a quick glance on how the 33 households prioritized land and fertilizer allocation among the crops shows the following:

Land Distribution	Fertilizer Distribution
1. Millet	1. Cotton
2. Cotton	2. Corn
3. Corn	3. Millet
4. Peanuts	4. Peanuts

This table shows that millet and cotton take up more land than corn and peanuts, but cotton and corn receive more fertilizer where cotton held first priority. How these decision structures effect the production outputs will be dealt with in Chapter 7 on page 34.

4. Labor: This concerns manpower as well as the use of modern agricultural tools.

A. Manpower: The sources of manpower were identified as follows: (1) household membership; (2) cooperative labor exchange; (3) extra-domestic labor exchange.

B. Household membership: This concerns households' members that were currently working in the fields. In the case of our sample the number of working members varies between 2 and 16 (males and females). Eleven households have between 2 and 5 workers, six households have between 11 and 15 workers, fifteen households have between 6 and 10 workers, and one household has 16 workers. The average days worked by this working force is about 96 days for the campaign 1983-1984. From this manpower the priority went first to millet, followed by cotton and/or corn, then peanuts.

C. Cooperative Labor exchange: This cooperative labor is composed of the youths and women traditional associations called ton. These associations are working groups within the villages. Their membership is often voluntary and based on sex and age. The cooperative labor exchange has been found in two villages: Sido and Farani.

Table 4: Use of labor associations in Sido (campaign 1983-1984)

House-holds	Working members of the associations	No. of days worked	Fields	Compensation per association
#1	31 youths	1	cotton	1250 malian francs
#2	25 youths	2	cotton	2700 malian francs
#3	40 youths	3	cotton	8000 malian francs
#4	15 women	1	cotton	1500 malian francs
#5	25 women	1	cotton	2000 malian francs
#7	41 women	1	cotton	2500 malian francs
#8	30 women	2	millet	3000 malian francs
#9	30 women	2	cotton	7500 malian francs
#10	40 women	1	cotton	3000 malian francs

As it shows, nine out of the ten households inquired did use the Associations. Household #6 who did not use the Association has cultivated 6 hectares of land, but has no modern tools. The active members of the household number five persons.

Table 5: Use of Labor associations in Farani campaign 1983-1984

House-holds	Associations' members	No. of days worked	Fields	Compensations per associations
#3	80 women	2	millet/ cotton	32000 malian francs and one cow
#4	28 youths	1	cotton	14000 malian francs
#5	22 youths	1	cotton	11000 malian francs
#6	80 women	1	millet	40000 malian francs
#7	60 women	1	cotton	30000 malian francs
#8	60 women	3	millet/ cotton	18000 malian francs
#9	9 youths	1	cotton	one goat

Source: Interview with the farmers

Three out of ten households did not use labor associations, but as we will see they did not use the extra-domestic labor exchange network either.

For these two villages the labor associations have been called upon during harvest time and did concern only millet and cotton and only for a relatively short duration (between 1 and 3 days). Although it cannot be claimed within the scope of this study (because of the data obtained), the use of labor associations may be linked to the number of plots the households do have and the shortage of manpower. But a question remains to be investigated: How economical is the use of labor associations in terms of financial investment?

D. Extradomestic labor exchange: This exchange is performed in kind. The following exchange procedures have been identified: (a) manpower to manpower; (b) manpower to monetary rewards; (c) manpower to agricultural tools.

The first two of the three procedures were performed in the village of Sido. Household #1 exchanged four members with another household for the same amount of time. Household #10 exchanged labor with two other households for seven days: two days paid in salary (100 malian francs a day for two persons) and two and a half days worked on the field of each of the two partners. In fact household #10 paid 400 malian francs for two days and worked five days. Added to that, household #10 also worked some days on relative's fields for free.

Concerning the two other procedures: The sending of agricultural tools or the exchange of tools against manpower, cases have been found in Sido, Falan and N'tabacoro villages.

1. Sido

case 1: Household #2 rented the insecticide spray T15 for five days for 1750 malian francs (FM) and the plow TM for one day and worked three days on the owner's field.

case 2: Household #5 rented the plow TM for 3 days and worked for five days on the owner's fields.

case 3: Household #6 rented the spray T15 for 4 days for 1850 FM. The household also traded for 4 days the plow TM for 6 days work on the owner's field.

case 4: Household #8 rented the seeder for 4 days for 1400 FM.

case 5: Household #10 rented the spray T15 for 4 days for 1500 FM.

2. N'tabacoro

case 6:: Household #2 rented the plow TM for 1 day and worked for two days in the owner's field.

3. Falan

case 7: Household #2 rented the plow TM for 3500 FM.

case 8: Household #6 rented the spray T15 for 3 days for 3000 FM.

case 9: Household #5 rented one of his extra plows TM to different households for about 25,000 FM.

E. Modern Technology

As it points out the rate of agricultural tools renting varies from one village to another and from one household to another. The question of how economical this exchange procedure

is and to whom is yet to be investigated.

The bases for this resource exchange is the shortage of modern technology for certain farmers. Currently there is a set of six type of tools that are recommended by the O.H.V.: the plow TM, the plow multicultor, the seeder, the insecticide sprays T15 and ULV, and the cart. Among these six types of tools only 5 households possess all of them; 7 households have four types and 7 others have two types. 5 households have only 1 type and 9 households have no tools at all. Table six below highlights the tool distribution among the 33 households.

Table six: Distribution of tools by number of households.

Types of tools	Plow TM	Plow multicultor	seeder	spray T15	spray ULV	Cart
No. of households	21	15	11	7	6	13

Source: Questionnaire and interview with the farmers

24 out of 33 households are equipped at least with one type of tool. The time of use of the tools are given by the table below.

Table 7: Use of the modern technology in time.

Number of years in use	2-5	6-10	11-15	16 or more
Number of tools	28	35	12	6

About 53 out of the 81 tools identified have been in use for about 6 to 20 years. The average time of use of the season 1983-1984 is 46 days.

To summarize we can state that the production inputs are either directly paid or exchanged or obtained through O.H.V. credit system. The following diagrams highlight how the farmers afford production inputs.

1. manpower ⟷ to manpower
2. manpower ⟶ paid salary
3. modern tools ⟷ manpower
4. modern tools ⟶ paid rent

(a) the fertilizers are obtained through O.H.V. short term credit (1 year) at the following prices:

- cotton complex 50 kg. = 11,400 Malian Francs (FM)
- urea 50 kg. = 11,200 FM
- phosphate ammonia 50 kg. = 13,000 FM
- insecticide 4 liters = 7440 FM

(b) We mentioned that modern technology is either purchased (in cash or credit) or exchanged. Among the ten cases of exchange of modern tools, six were paid in cash (between 1500 and 3500 FM) and four exchanged in kind (between 2 and 3 days work on the owner's field). In N'tabacoro village, household #1 generated about 25,000 FM in income by renting one extra plow TM to various households.

(c) Manpower is based on household membership or obtained through extra-domestic labor exchange or cooperative labor exchange. Only one case of paid manpower was found. Sixteen households did call on youths and women labor associations (cooperative labor). Among these 16, 15 did compensate the associations in cash varying between 1500 and 40,000 Malian Francs.

5. Land distribution among crops and production outputs

The mean lands allocated by the crops shows that millet received the biggest share, 4.60 hectares with a standard deviation (SD) of 1.18, corn 0.65 hectares with a SD of 0.74 hectares, and

peanuts, 0.50 hectares with a SD of 0.55 hectares. Hectares cultivated in cotton substantly correlate production (correlation coefficient of 0.49) while the other crops are negatively correlated to production: Millet (CC=-0.45), corn (CC=-0.17) and peanuts (CC=-0.07). But when their relative contribution to revenue is considered, cotton field accounts for 24%, millet for 11%, corn for 5% and peanuts for 2%.

6. Fertilizer distribution among crop and production outputs

The mean quantity of fertilizers allocated by crops shows that cotton received the biggest share (104.54 kg.), followed by corn (19.69 kg.), millet (15.90 kg.) and peanuts (0.75 kg.) The variation in crop production seems to be best accounted for by the use of fertilizer on corn (CC=0.35), then the next best by peanuts (CC=0.29) cotton (CC=0.17) and millet (CC=-0.01) But with respect to their relative contribution to revenue, corn accounts for 54%, cotton 8% and millet and peanuts 0%. With respect to the production process, the reviewed statistics above seem to suggest that:

(a) The use of modern technology and fertilizers are very important factors in the production.

(b) The larger the land cultivated the more likely is a farmer to use modern technology.

(c) A farmer is likely to fertilize his fields heavily, moderately or lightly independently of the size of the fields.

(d) The larger the field of millet, corn and peanuts, the less the production.

Production process: Decisions and outputs

How do production decisions currently affect crop output and farmers' income? To answer this question we performed correlation coefficients (CC) and regression analyses based on the following factors as production inputs: (1) total land cultivated by farmer and hectare by crops; (2) fertilizer (kg.) and insecticide (liter) used, and (3) the use of modern technology (number of days work with modern tools).

The correlation computed does not have necessarily a cause-effect relationship value or prediction characteristic. Indeed we are investigating the patterns the farmers follow in allocating resources among the crop they cultivate.

1. Overall inputs and Production outputs

The variations in crop production seem to be best accounted for by the use of modern tools (correlation coefficient of 0.46), then next best by fertilizer (CC of 0.48). The total of hectares cultivated is middly negatively correlated with crop production (CC=-0.24). But when we consider each of the three factors in terms of their contribution to the production in monetary terms (total revenue), modern technology and fertilizer are very important factors in production outputs, whereas total land cultivated may not matter very much. Manpower shows a 0.36 correlation with production.

Farmers tend to use fertilizers in quantity indifferently of the size of their fields (CC=0.10), whereas farmers with larger hectares tend to use modern technology (CC=0.52). In other words the size of the land may not be an important criterion in deciding to use a certain amount of fertilizer.

(e) When the fields are fertilized, production and revenue are best accounted for by respectively, cotton and corn.

While every effort has been taken to insure that they represent all of the four villages there undoubtedly are some differences between the statistics of the 33 household sample and the parameters of all the households in the four villages. This brings us to our research problem statement:

VIII. CONCLUSION

Problem statement and research results

The underlying argument to our problem statement was that rural communities in southern Mali were undergoing changes in their production process or dynamic of crop production. We assumed that these changes could be plotted along an evolution scale from subsistence economy to market oriented economy. By market oriented economy we meant that the crop production rationale are input structure and supply system, and production outputs are integrated into monetary system. In other words inputs are afforded and production outputs exchanged in monetary terms. We also argued that the changes in production process may confront the farmers with production decision problems. We proposed to investigate the changes in the dynamic of crop production and the consequent decisions these changes bring about, and to propose training solutions to deal with this problem.

1. Problem statement one: This first problem was stated as to determine the actual production process on dynamic of crop production that prevails within the villages. To deal with this

problem we proposed to consider the production input supply system, that is: manpower, modern technology and implements (fertilizers and insecticides) and so determine how these inputs are exchanged. We also proposed to determine to what extent production outputs are sold.

1.a. Inputs supply system

1. Manpower is an ideal subsistence production as it has been experienced in Mali, manpower as production input is an unpaid labor force either based on household membership or obtained through extra-domestic or cooperative labor exchange network. This network is often based on family ties, marriage connection or political agreement among households. In the case of extra-domestic labor exchange, usually persons are exchanged between households for the same amount of working time. Under the cooperative labor exchange, youths or women traditional associations or ton work on individual household's field. The association is compensated then in kind (animals, portion of the harvest, etc.)

Under our study we find out that most of the labor exchanged that involved the associations were paid for. Only one case was compensated in kind. (one good) For which concerns extra-domestic labor exchange, one case was based on family ties and one other on paid salary. The remaining 4 cases were exchanged in kind in terms of tool rentings.

2. Modern technology: We find out that the agricultural tools were either bought or rented in kind or monetary terms. The tendency was renting in monetary terms.

3. Fertilizers and insecticides are obtained in monetary terms through the O.H.V. short-term credit system. At this level we should point out that O.H.V. is not the only source for the peasants. A study conducted by Mamadon Zoumana Kone (1983) on the traditional credit system showed that based on 120 samples about 10% of the farmers invested on their exploitation loan contracted with parents and friends (about 718,500 Malian Francs of value.)

1.b. Production outputs:

Among the four crops cultivated that are millet, corn, peanuts and cotton only the latter is sold on the market. The other three are for consumption as the farmers themselves said. There was only one case whereas peanuts were sold on the market.

To answer the question to what extent the production process is integrated to monetary, we would say that the input-supply is fully integrated while the production output is partially integrated. We would state therefore, that the dynamic or process of crop production is in transition between subsistence and market economy. The transition can be sensed by two findings

- firstly, food crops are not sold, but consumed.
- secondly, the input supply system of mainly manpower and modern technology follows the traditional pattern of production resources exchange. Manpower is more exchanged with modern tools rather than person-to-person.

(1) Traditional stage: manpower ⟷ to manpower

(2) Transitional stage: modern tools ⟶ to manpower
⟶ to paid rent

But one should be cautious about the two statements above. In fact, when we considered resources allocation (land and fertilizers) we noticed that the first two priorities went to at least one food crop (millet or corn) and to the cash crop which is cotton.

2. Problem statement two: How does the actual production process impact on the farmers' decisions? This was the initial statement, but after considering the data, we restated the question the other way around: How do the production decisions of the individual farmers in the aggregate affect the process of crop production? To answer this question we found:

- firstly, the size of land cultivated is an important factor. We noticed the total amount of hectares cultivated and hectares cultivated in millet, corn and peanuts are middly negatively correlated to production. There might be several explanations to this tendency. The farmers may cultivate more land than required with respect to the inputs they afford. Another explanation may be the distance between the different plot they cultivated and the number of these plots which brings time pressure on the farmer to follow the agricultural calendar. Indeed another reason should be investigated to clarify the situation.

- secondly, there is the tendency to overemphasize the use of fertilizers on cotton while the benefit for doing so is not obvious. Table 8 on page 41 shows that for the same amount of hectares cultivated when investment in monetary terms goes up the return on investment tends to decrease (households #3 and #9;

households #1, #4, #2). At this point we should recall that the data obtained here are obtained through interviews and the farmers may have under- or overestimated their investment or revenue. Some of the information was cross-checked with the record of the extension agents.

3. Problem statement three: Does the decision making process of the farmers differ from the decision schemes proposed by the O.H.V. extension service? If any difference, what can be done about it?

These questions cannot be totally answered based on the data obtained from our study. We will recommend to further the research on this issue. The following elements should be considered.

3.a. The decisions schemes disseminated by the extension service: These decisions schemes are designed and tested on experimental farm stations and pilot farms before being disseminated. These production themes should be reassessed to establish their effectiveness.

3.b. Production decision-making process of the farmers

This process should be investigated during an ongoing production season. The method should be a participative evaluation as a follow-up to the extension dissemination activities. A sample of farmers will be given a production sheet based on the census data sheets in the annex: Annex 1 (Section 1 & 2); annex 2 (Section 3 & 4); annex 3 (Section 2,3 & 4). This production deals with the input allocations among the crops: land, labor fertilizers and insecticides. The farmers will file in the

Table 8: Investment and return on investment of selected household that cultivated cotton in Sido

Investment	household #3	household #9	household #1	household #4	household #2	household #5	household #6
hectare cultivated	2 ha.	2 ha.	1.5 ha.	1.5 ha.	1.5 ha.	0.50 ha.	0.50 ha.
fertilizer	54,000 FM	28,400 FM	135,800 FM	86,800 FM	11,400 FM	22,800 FM	22,800FM
paid labor	8000 FM	7800 FM	1250 FM	1500 FM	2700 FM	2000 FM	-----
insecticides	- - - -	- - - -	- - - -	14,880 FM	14,800 FM	- - - -	7440 FM
rent tools	- - - -	- - - -	1750 FM	- - - -	- - - -	- - - -	1850 FM
total investment	59,000 FM	36,200 FM	138,800 FM	103,180 FM	28,980 FM	24,000 FM	32, 090 FM
Revenue	243,000 FM	450,000 FM	165,000 FM	177,000 FM	120,000 FM	37,500 FM	76,200 FM
return on investment	184,000 FM	413,800 FM	26,200 FM	73, 820 FM	91, 020 FM	13, 500 FM	44, 110 FM

production sheet as the season goes on. At the end of the season the data will be processed and discussed with the farmers. Comparison should be made to how close a farmer comes to the decision schemes proposed by the extension service. This comparison will be based on decision matrices elaborated from the production sheet.

Experience showed that when literate farmers can perform such data collecting; i.e., the experimental neoliterate training program in O.A.C.V. The experiment was conducted by the research Division of the National Literacy headquarters in Mali on youth collective farms.

3.c. Designing a training program: After discussing with the farmers the evaluation results based on the production sheet, a curriculum will be designed to deal with the problems the peasant encountered during the season. Since the extension activities are based on farmer associations, curriculums will be designed for each association based on their particular characteristics as defined by the O.H.V.

The participative evaluation itself should be the framework of the training program and should follow the steps below:

a. Group discussion: At the beginning of the production season, the farmers will be informed of the purpose and objectives of the research and instructed how to collect data.

b. Individual counseling: This counseling should be done during the season by the extension agent. It should concern problems encountered in dealing with the productive sheet.

c. Group discussion: At the end of the season, at this level the peasants will discuss and compare their individual decision matrix among themselves with the help of the farmers

if necessary, alternative decision matrices will be designed for each individual farmer to try during the next production season.

	Sido	Falan	Farani	N'tabacoro
Population	389	- -	- -	- - -
Active members	- -	- -	- -	- - -
Number of farms	19	59	32	- - -
Land/rice	- -	5 ha.	5 ha.	- - -
Land/cotton	17 ha.	53 ha.	13 ha.	- - -
Land/corn	10.5 ha.	22 ha.	35 ha.	- - -
Land/peanut	5.5 ha.	5.25 ha.	70 ha.	- - -
Land/millet	57 ha.	135 ha.	400 ha.	- - -
Plow TM	66	56	6	- - -
Number of multicultors	27	36	3	- - -
Seeder	7	7	2	- - -
Spray T15	26	19	5	- - -
Spray ULV	6	19	1	- - -
Cart	21	- -	5	- - -
Amount of loan 1983-1984	4,252,855 FM	3,087,785 FM	797,380 FM	403,000 FM
Amount of loan to be reimbursed	- -	381,230 FM	646,740 FM	- - -

ANNEX

ANNEX 1

Household Input-Output Schedule Sheet

Section 1

Land under cultivation	Household members	Land holdings	Other
Total acreage: paddy millet sorghum maize peanuts cotton tobacco	-total number -Ha/person millet paddy sorghum maize peanuts cotton tobacco -How many crop year? -Which crop ?		-tax -water -change -contribution

Section 2

	Plow	Multi-cultivators	Carts	Peanut Pickers	Harrow	Cows
-Own						
-Loan						
-Hire						
-Borrow						
-Duration						
-Price						
-Maintenance						

ANNEX 2

Budget Schedule Sheet

Section 1 - Expenditure

Items	Direct				Loan					Contribution			
	Q	S	P	V	Q	S	P	V	I	Q	S	P	V
Investment: -Plows -Multicultivator -Carts -Peanuts pickers -Harrow -Cows -Fertilizers -Insecticides -Fungicides													
Household maintenance -food -others													
Education: -formal -nonformal													
Tax: -person -animal -others													

NB: Q - Quantity
S - Source
V - Value
I - Interest
P - Period

Section 3

Multicultivators				Carts				Plows				Peanut Pickers				Cows			
Own	Loan	Borrow	Hire	Own	Loan	Borrow	Hire	Own	Borrow	Loan	Hire	Own	Borrow	Loan	Hire	Own	Borrow	Loan	Hire
NoDR	NoDR	NoD	NoDR	NoDR	NoD	NoDR	NoDR	NoDR	NoD	NoDR	NoDR	NoDR	NoD	NoDR	NoDR	NoDR	NoD	NoDR	NoDR

Note: NoD = Number of days
R = Rate

LABOR			
Unpaid		Paid	
Source		Source	
Male	Female	Male	Female
NoD	NoD	NoDR	NoDR

	Fertilizer		Insecticides		Fungicides	
	Quantity	Value	Quantity	Value	Quantity	Value
Paddy						
Millet						
Sorghum						
Maize						
Peanuts						
Cotton						
Tobacco						

Section 4

Output				Consumption			Sales		
	quantity	price	value	quantity	price	value	quantity	price	value
-millet									
-paddy									
-sorghum									
-maize									
-peanuts									
-tobacco									
-cotton									

Section 2: Income

Source	Sale	Quantity	Period	Price	Value	Remarks
Paddy Millet Sorghum Maize Peanuts Cotton Tobacco Others						
	Hire					
Cows Persons Multicul- tivators Plows Carts Peanuts Pickers Harrows						
	Rent					
Cows Persons Multicul- tivators Plows Carts Peanuts Pickers Harrows						

Section 3: Total Budget

Expenditure						Income					
Date	Item	Quantity	Price	Source	Value	Item	Quantity	Price	Value	Source	

Section4: Indebtedness

Debt	Amount	Lender	Date incurred	Reason	Interest

Loan	Amount	Borrower	Date incurred	Reason	Interest

Section 5: Savings

Item	Amount	Source	Interest	Period

ANNEX 3

Property Schedule

Item	Quantity	When Acquired	Source	Price	Value	Remarks

ANNEX 4

HOUSEHOLD SOCIO ECONOMIC STATUS

Household Composition	Number of Household	Active Workers	Ha/Person	Average Expenditure	Average Income	Indebtedness	Average Savings	Average Property Value	Economic Categories
I 20-30 persons									
II 10-19 persons									
III Less than 10 persons									

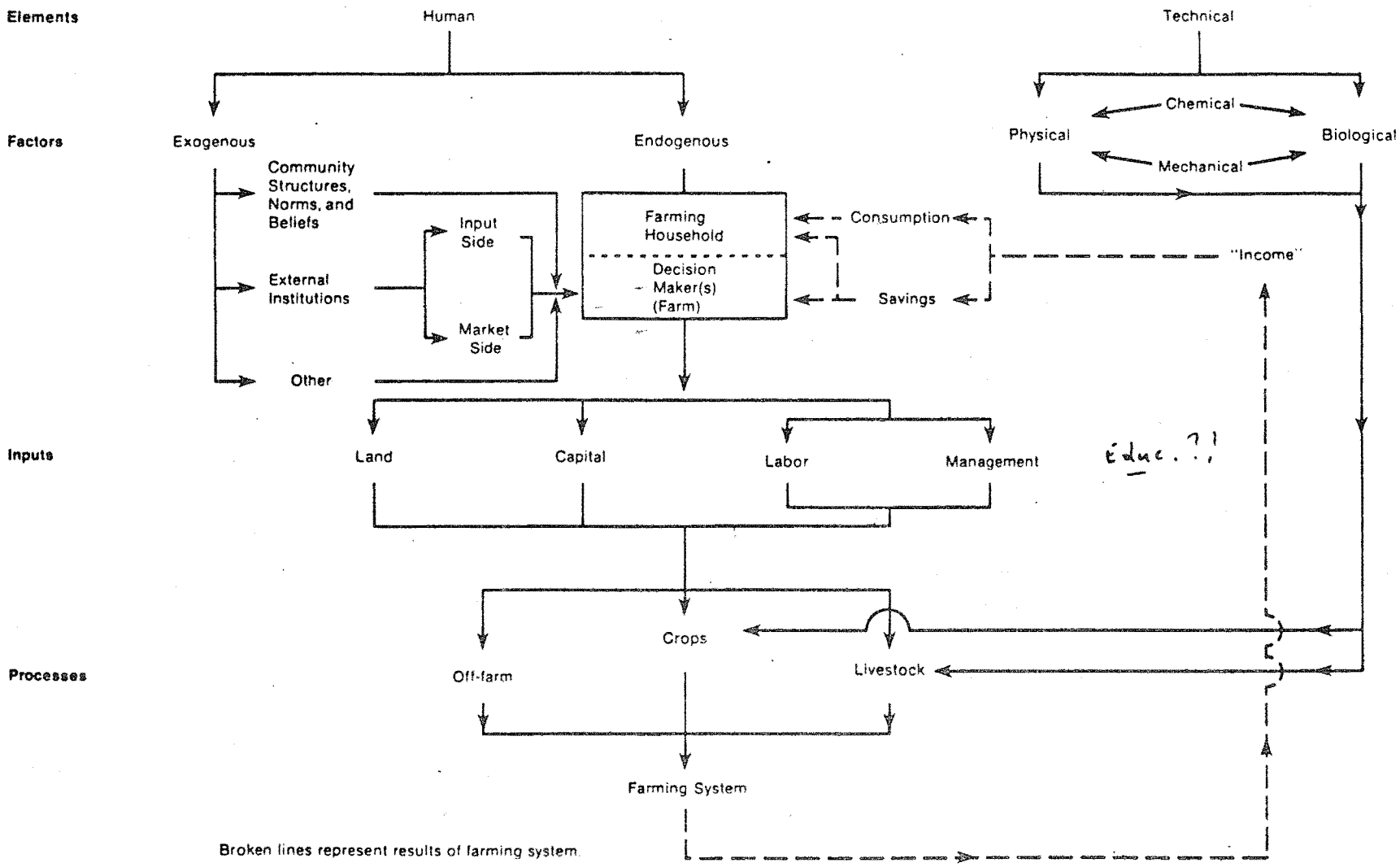


Figure 1 Schematic Representation of Some Determinants of the Farming System

ANNEX NUMBER 6

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