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TECHNICAL COMMITTEE FOR THE SYSTEM OF PRODUCTION
PROGRAM AND RURAL ECONOMY

Preliminary Analysis of the Maize Subsector
and Principal Questions

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FOREWORD

This research on the maize subsector began in January 1992. It is part of a larger set of concerns incorporated in the long-term agricultural research plan in Mali. In effect, subsector research had been justifiably considered throughout the planning process as an indispensable complement to thematic research and research on systems of production that are, above all, oriented towards the comprehension of and research towards solutions to problems that affect the various levels and processes of production. The analysis of other aspects, most notably those related to marketing, processing, consumption etc., requires another approach: an approach by product that is not sufficiently explored in Mali.

Certainly, our breeders and other thematic research specialists are aware of these problems and have taken them into consideration each time information is available. But we are forced to acknowledge that these specialists have never benefited from an in-depth study concerning the economic and socio-cultural realities that determine the behavior of actors at different levels of the system (production, marketing, processing, consumption, etc.) with respect to the technical packages and products released by the research system. All of which suggests that researchers need to re-examine their basic hypotheses and to thus take into consideration within their research activities the preoccupations of the "consumers" of the products of the agricultural research system.

Subsector research permits one to create such a dynamic at the level of the national agricultural research system. It puts into place a system to gather and diffuse feedback and creates a platform for interdisciplinary collaboration built around the problems of developing a given crop or animal enterprise.

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INTRODUCTION

The purpose of this report is to present the major components of a research project currently underway on the maize subsector. Our objective, at this point, is not to present research results per se, but to discuss the main lines of investigation and the methodology followed in order to receive comments, remarks and suggestions. These types of contributions are all the more necessary because this research on maize is viewed as a pilot project for the following reasons:

Seeking Experience in Subsector Research

The Department of Agricultural Planning and Rural Economy, which is responsible for research concerning production subsectors, has little experience in this line of work. This research on maize was initiated, among other reasons, to develop a methodology for future research.

Experimenting with a System of Collaboration between Researchers, Development Agents and Private Sector Operators

In general, subsector research requires the participation of different specialists to study appropriate solutions to problems that will be identified. It is important, in doing this, to stake out the contours and axes of collaboration between various actors and specialists in development questions.

The report is organized as follows:

- I. The notion and approach of subsector research
- II. Results of rapid appraisal on the maize subsector
- III. In-depth surveys and directions for collaboration

I. CONCEPT AND APPROACH OF SUBSECTOR RESEARCH

1. Meaning of the subsector

The long-term strategic plan for agricultural research in Mali accords an important role to research related to the production subsectors. What does such research involve?

We know that a product, before being consumed (human, animal or industrial consumption), passes through many steps and is, at the same time, the object of both transactions and various physical transformations. A series of operations takes place, one after the other, in a logical sequence. In the case of cereals, for example, one can cite the supplying of farm inputs, the act of farm-level production itself, processing, conservation and consumption. These different operations respond to the consumption needs that determine them. They comprise the components of the subsector, and the analysis of the constraints that are encountered at the different levels is indispensable for all work aimed at promoting a given product.

The goal of subsector research is therefore to understand the conditions under which each of the steps cited above unfolds, to be able to undertake actions for improvement. To do this, the following aspects are important to grasp:

The motivations of the economic actors

The operations discussed above are undertaken by actors whose identity, motivations, and means of action need to be analyzed.

The same can be said of the results obtained by these actors. These different approaches permit one to understand the constraints facing the actors.

The synergies between the different steps

The idea of a subsector evokes the image of a nerve, transmitting nervous impulses to different parts of the body. In this same way, the activities of economic actors (intervening at different steps) mutually influence and condition each other. It is therefore important to reason in terms of the influence of decisions taken at one level on decisions made at other levels and vice versa.

Interactions with respect to other subsectors

Products are frequently substitutable, one for another. This dimension is important to keep in mind before conceptualizing policies for a given subsector.

The existence or non-existence of sub-subsectors

A subsector may be decomposed into sub-subsectors if certain particularities manifest themselves. Isolating such sub-subsectors in the research is of necessity to avoid lumping together dissimilar activities. For example, the production of fresh maize may be considered a sub-subsector because of its specificity.

2. The approach of subsector research

The subsector approach, as was just underlined, is rather complex. It requires, at the same time, understanding the processes undertaken at each of the different steps in the subsector and analyzing the behavior of the actors.

This is why the subsector approach, following a kind of systems approach, iteratively combines a global, synthetic approach with an analytical one. The analytical approach is better described as Cartesian.

The purpose of the global, synthetic approach

There exists a chain of dynamic relationships among the different actors of the subsector. Analysis at a given level is insufficient. What is necessary is a global diagnosis to reveal the strengths and weaknesses of the subsector. This will consist of examining, step by step, the principal problems.

Above all, it is important to delineate the areas of our ignorance concerning the factors that block subsector performance.

The purpose of the Cartesian or analytical approach

The Cartesian approach consists of "breaking down the difficulties" to understand better the problems that arise at a given level. Therefore, after identifying the areas of our ignorance, in-depth studies are necessary. But the in-depth knowledge acquired is not the end in itself. Its goal is to permit a better clarification of the totality of the subsector's problems.

This approach thus involves an iterative process that allows one to go from a global view of the subsector to specific problems and vice versa.

The subsector approach also has many points in common with the farming systems approach (broad vision of the production process, multi-disciplinarity, interactions with economic actors). The two approaches complement one another in analyzing the food system, where the farming systems approach is applied horizontally, and subsector research vertically (see Table 1).

TABLE 1: MATRIX OF THE FOOD SYSTEM

PRODUCTION AND DISTRIBUTION FUNCTIONS	SUBSECTORS					
	Millet	Sorghum	Maize	Rice	Peanuts	Cotton...
Distribution of Inputs Extension Production Processing Storage Transportation Marketing/Exchange Financing Coordinating Functions: - Price - Quality control - Regulations - Property Rights - Contracts/Exchange - Risk methods of management Consumption						

Source: Ndoye, Ousseynou and Mark Newman (1984) "Approche Methodologiques pour l'Etude de la Commercialization des Produits Agricoles et Alimentaires au Senegal". Institut Senegalais de Recherches Agricoles, Bureau d'Analyses Macro-economique, Document de Travail 4-2.

II. RESULTS OF RAPID APPRAISAL ON THE MAIZE SUBSECTOR

1. Introduction

The rapid appraisal involved interviews with the economic actors operating at different steps of the subsector and the technical agents and researchers involved (CMDT, OPAM, etc.) in the actions of extension, processing, breeding, etc. The survey involved informal, open discussions, led by a moderator using an interview guide (see Appendix) that contained questions for each step of the subsector (production, storage, marketing...) and for each type of economic actor (farmers, merchants, consumers ...). Three field visits were conducted by multi-disciplinary teams (agricultural economists, a geographer, and a nutritionist):

- (i) Axis Yanfolila - Bougouni - Ouelessebouougou - Bamako (from February 24 to February 26);
- (ii) Axis San - Koutiala - Sikasso - Kadiolo (from March 8 to March 11);
- (iii) Axis Massigui - Dioila - Fana - Bamako (from March 11 to March 15).

In addition to these field visits, interviews were also conducted in Bamako among consumers, merchants and processors (artisanal and semi-industrial systems). The rapid appraisal also benefited from the analysis of some secondary data concerning production, consumption, and the price of cereals. The results of these surveys are presented according to the different steps of the subsector which are depicted in the following schematic drawing (see Figure 1).

2. Production

Statistics from the DNSI (National Statistics Office) indicate that the area planted with maize has evolved in a see-saw manner from 1980/81 to 1990/91. As indicated by the following graphs, area and production did not demonstrate a drastic drop despite the liberalization of cereal prices and

FIGURE 1: THE MAIZE SUBSECTOR IN MALI

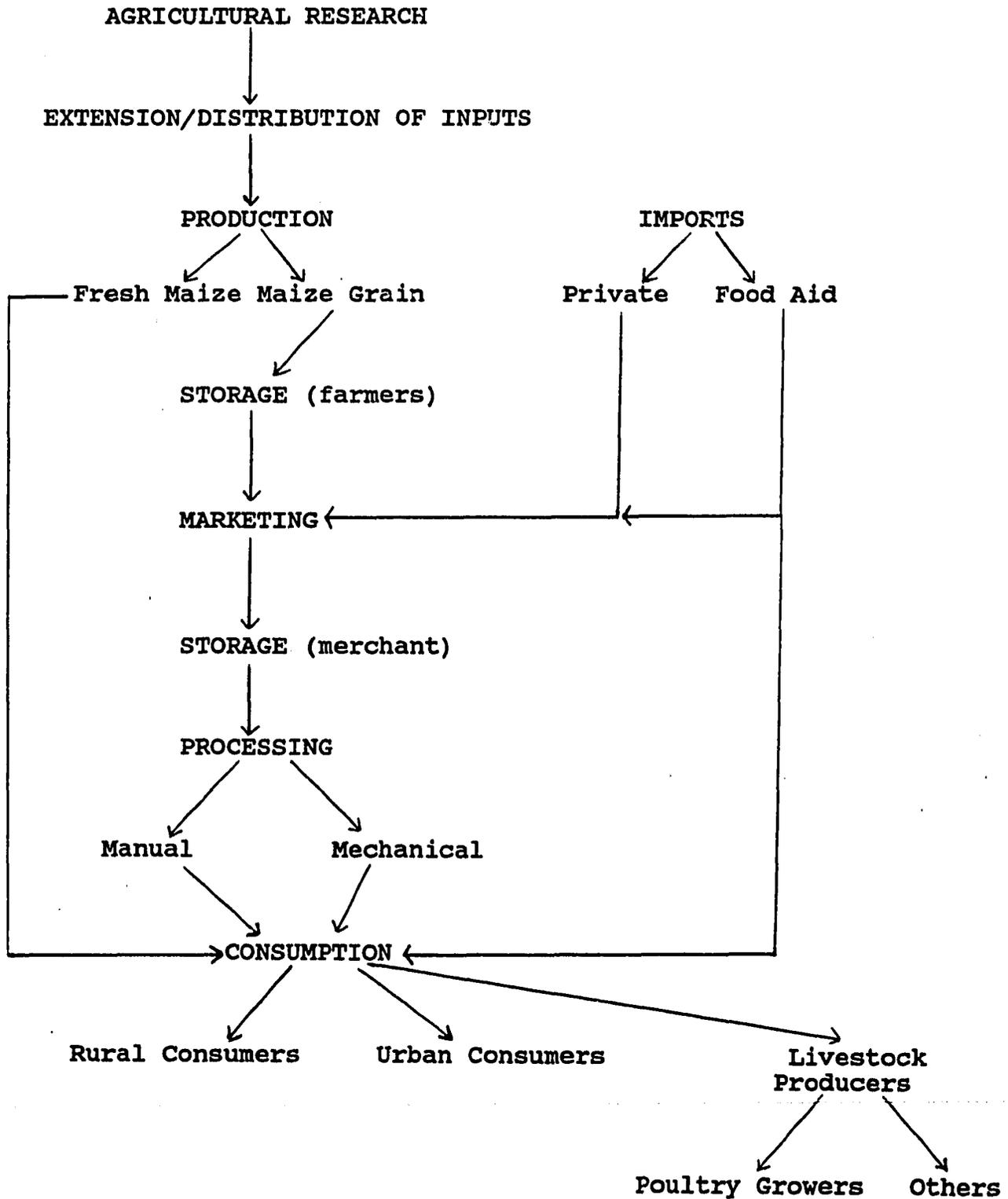


FIGURE 2A

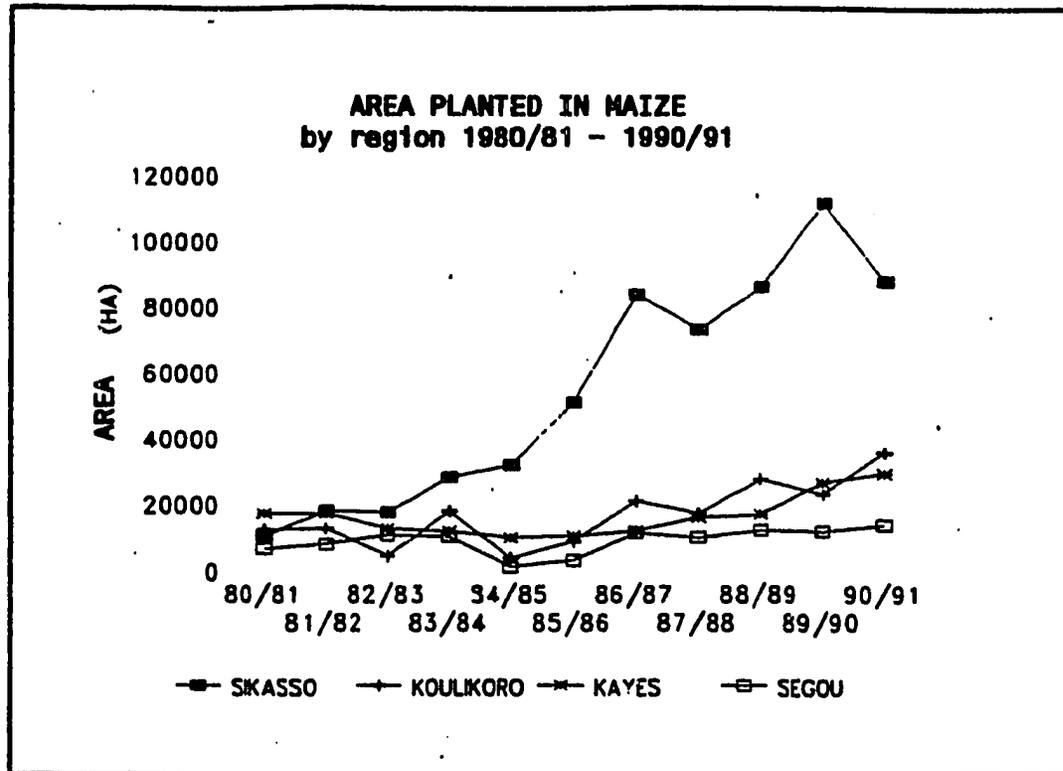
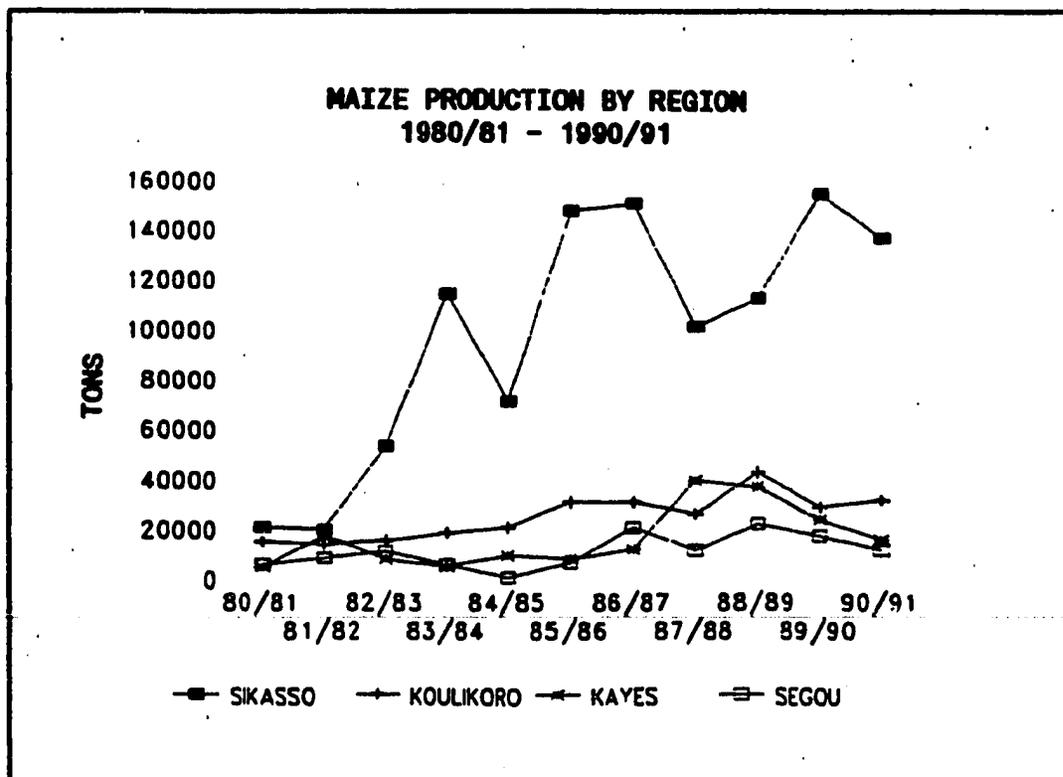


FIGURE 2B



Source: DNSI

the withdrawal of the CMDT from marketing this crop. Farmers have continued to produce maize in different forms. The regions of Sikasso, Kayes and Koulikoro are the main producers (Figure 2). But maize remains a secondary crop at the national level (on the order of 10% of land and 15% of cereal production).

Maize produced close to the household compound

This practice is frequent in non-specialized maize zones or in areas situated at the northern limits for this crop. Maize is cultivated in small areas where the soil benefits from household refuse. The maize thus produced is consumed or sold fresh.

Maize grain produced in main fields

The "Project Maize" that existed in the CMDT zone developed this practice. Some cultural techniques and new varieties were introduced. These technical packages are not currently followed.

Fresh maize produced in main fields

This type of production seems to give a higher return to farmers' labor to the extent that sale price is more remunerative than maize sold as grain. This type of production seems constraining in that it requires specific and early-season cultural operations. Farmers with small tractors seem best equipped to undertake such production. Generally, farmers producing for this market choose yellow varieties and varieties of sweet corn.

Off-season maize

Statistics concerning this topic do not exist, but some market gardeners practice this on a small scale. Production is aimed at home consumption or towards the sale of fresh produce. In general, these production techniques are not well-mastered.

3. Adaptive behavior of the farmer in the CMDT zone

Given marketing constraints, the CMDT requires cultivation of cotton in order for farmers to qualify for credit for other crops. This means that only the best growers of cotton and other cash crops (peanuts, San sesame) are able to benefit from input-credit for the cereal crops like maize.

On the other hand, maize is always sold for a lower price than other cereals. For all of these reasons, farmers elaborated their own strategies:

Abandonment of maize as a lead crop in the rotation

Maize comes after cotton in the rotation. This allows farmers to minimize the input needs for maize (as maize benefits from the carry-over effect of cotton fertilizer).

Not following recommended fertilizer applications

With the suppression of credit for inputs, farmers now apply minimal amounts of inorganic fertilizer but complement them with organic manure. This permits a reduction in monetary costs.

Development of millet-maize intercropping

Maize-millet intercropping is without doubt a traditional practice in the southern Mali zone. But because of the problems described above, the tendency to practice intercropping has become stronger. The farmers in certain locations like Kadiolo have developed practices very adapted to their situation, involving transplanting millet into the maize field after the second weeding. This allows them to resolve in one step all the problems of mechanizing millet-maize intercropping consistent with the spacing recommendations of the agricultural research system.

Adoption and selection of varieties as a function of their hardiness and early maturity

Maize varieties perform differently depending on whether or not the farmer follows the recommended doses. Thus the rustic varieties, that is to say those that tolerate farmer practices, are those that the farmers adopt (TZESR-W). Early maturity also enters into farmers' marketing strategies (drawing down of old millet stocks after the maturation of maize, for example). In general, these varieties are white.

Extension of the cultivated areas

It seems that farmers attempt to raise production by increasing the area planted and not by attempting to raise yields.

Orientation of production towards satisfying the need to have cereals for family consumption and to pay outside labor (the case of farmers with tractors)

The area cultivated and the choice of varieties seem to be based on consumption needs rather than market considerations.

The question that must be asked is what are the consequences of these practices on the level of production, productivity, and production costs. This suggests the need for a thorough analysis of these farmer practices.

4. Marketing conditions and operations

Marketing involves many elements that are all equally important.

4.1 Financing the operation

The financing method is rather complex and is regulated by a "moral contract" between the buyer and wholesaler or semi-

wholesaler. The purchases can be pre-financed by the wholesaler or the semi-wholesaler, or by the assembler himself.

In a number of cases, the financing obtained by the wholesaler's buying agent or the semi-wholesaler covers more than just cereal marketing. Thus we have noticed that the purchase of products like arabic gum, seeds etc. are also financed by the same sources.

In general, the extension of credit and the stipulated period for the delivery of the cereal or the reimbursement in cash are not rigidly set. They are perpetually renegotiated. Everything depends on reciprocal trust. Interest is not charged on such credit.

4.2 Sharing of costs

The supplier of funds generally delivers the sacks for the grain. All other charges are covered by the buyer. In particular, these include handling charges (transportation from the place of purchase by truck and by truck to the warehouse), transportation, etc.

Net margins for buyers rarely attain 10 F/kg for cereals (these are generally between 2.5 and 5 F/kg).

It is important to note that at Zangasso, independent, private agents were identified. In particular, some private "loaders/unloaders", travel free of charge on the trucks and also carry out their own business deals between various cities, but in return for their transport are responsible for loading and unloading the bags of all passengers on the truck.

4.3 Storage

Storage takes place on cobs or as grain. In farm settings, storage on the cob is more frequent. This method seems to protect the grain from insect attacks.

Farmers who store their harvest in grain form, that is after threshing, use insecticide treatments. These are frequently toxic, like DDT powder, phosphine etc. This treatment practice

seems to be most widespread among farmers with tractors, who are large maize producers (the case encountered at Koutiala and Zangasso).

Maize is hardly ever stored collectively at the village level (village food-security granaries and communal village granaries for commercial stocks). It is equally necessary to emphasize that the introduction of improved granaries has not been a success in the CMDT zone. Design errors have resulted in important losses for certain villages (for example, a granary that is built directly on the ground when it should have been built on piles).

At the merchant level (assemblers, semi-wholesalers), the practice of storage was not evident. The market agents we interviewed emphasized that storage is not a profitable operation for them. They make their money by rapidly turning over their capital.

However, further investigations are necessary at the wholesaler level in Bamako concerning maize storage.

4.4 Marketing duration and price

The marketing period for maize is short. In effect, maize becomes rare in the market after February.

In general, maize is sold in rural markets for lower prices than other cereals. This finding demonstrates that maize faces strong competition from other cereals like millet and sorghum and that the demand for maize remains weak as long as the price of competitive cereals has not attained a certain level. It is therefore during shortages that maize is in demand.

The towns of Koutiala and Sikasso are simultaneously production zones and commercial transit zones. During the hungry season in Mali, maize is also imported from the Ivory Coast. This opportunity to import Ivorian maize does not last more than one month.

The main commercial flows of maize goes towards Bamako, Kayes, Nioro du Sahel, Mopti and Gao (not very important flows), as shown on the following map (see Figure 3).

4.5 Transportation

Merchants provide very little of their own transportation. They borrow or rent trucks that regularly visit rural markets.

Sometimes merchants collectively rent a truck to transport their cereal products and passengers simultaneously. Such an arrangement allows the merchants to avoid paying transportation costs for their cereals. The transportation fares paid by the ordinary passengers cover the rental cost.

4.6 Price and marketing margins

A graphic presentation of prices at the production level in rural markets and consumer prices in consumption zones shows large gross margins. For the marketing axis Fana-Bamako, for example, the average gap between the producer price and consumer price is on the order of 35 CFA/kg (Figure 4a). The price gap for maize is sometimes more important than for sorghum: an average of 4.5 CFA/kg higher for the Koutiala-Bamako axis, for example (Figure 4b).

These price differentials correspond to the marketing margins that are captured by the merchants (Table 2). It is therefore necessary to study the means that might permit the farmers to capture a portion of these margins. For the farmers, this implies a degree of participation in assembly and bulking of their own production. To carry out this task, good organization is essential. The example of the federation of village food security granaries in the CMDT region of San, which was able to gather together and store its cereal surpluses in an accessible location and negotiate a price higher than the prevailing market price on the order of 10 CFA/kg, is an enlightening example.

Fig. 3

MARKETING AXES FOR MAIZE

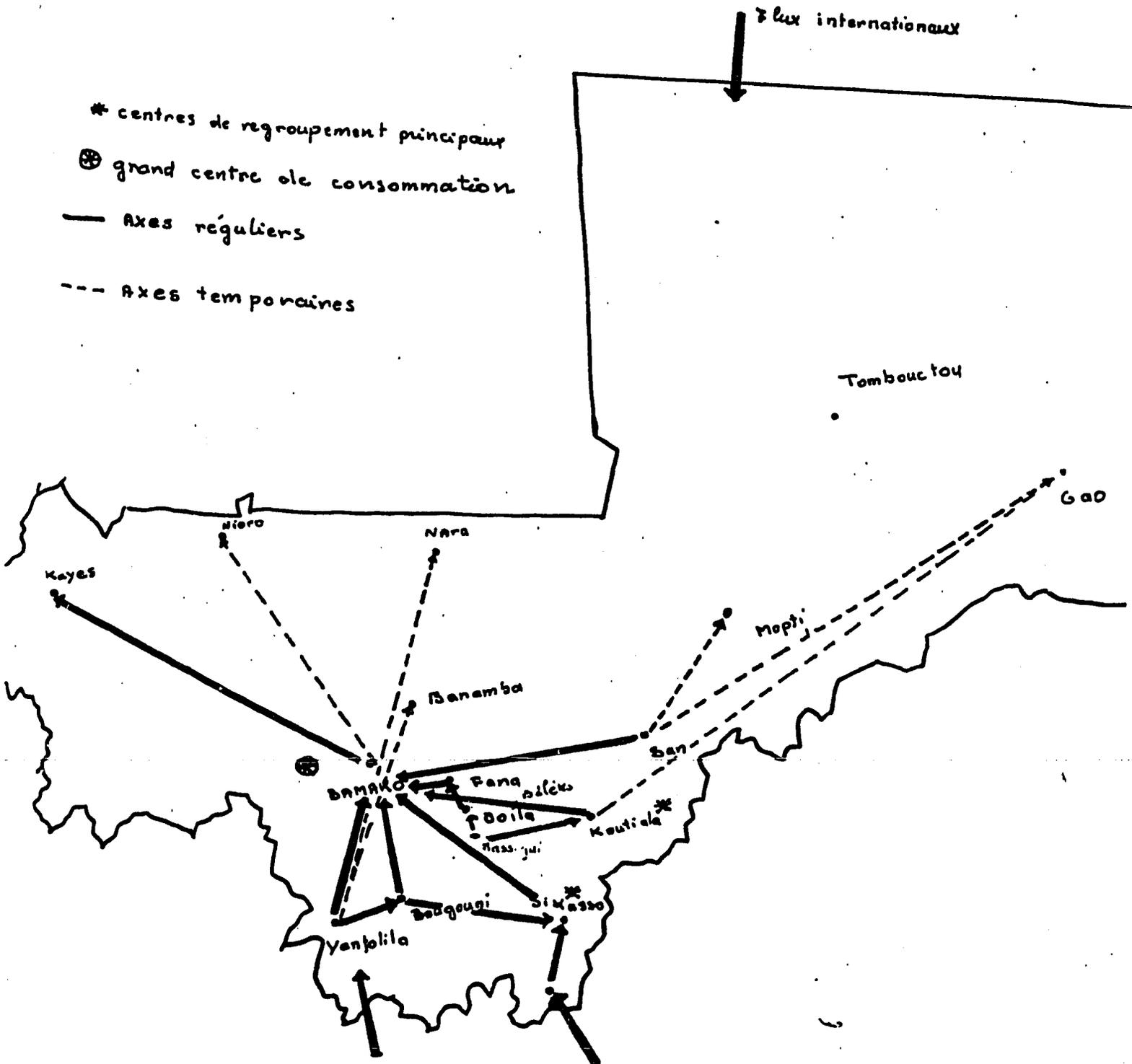


FIGURE 4A

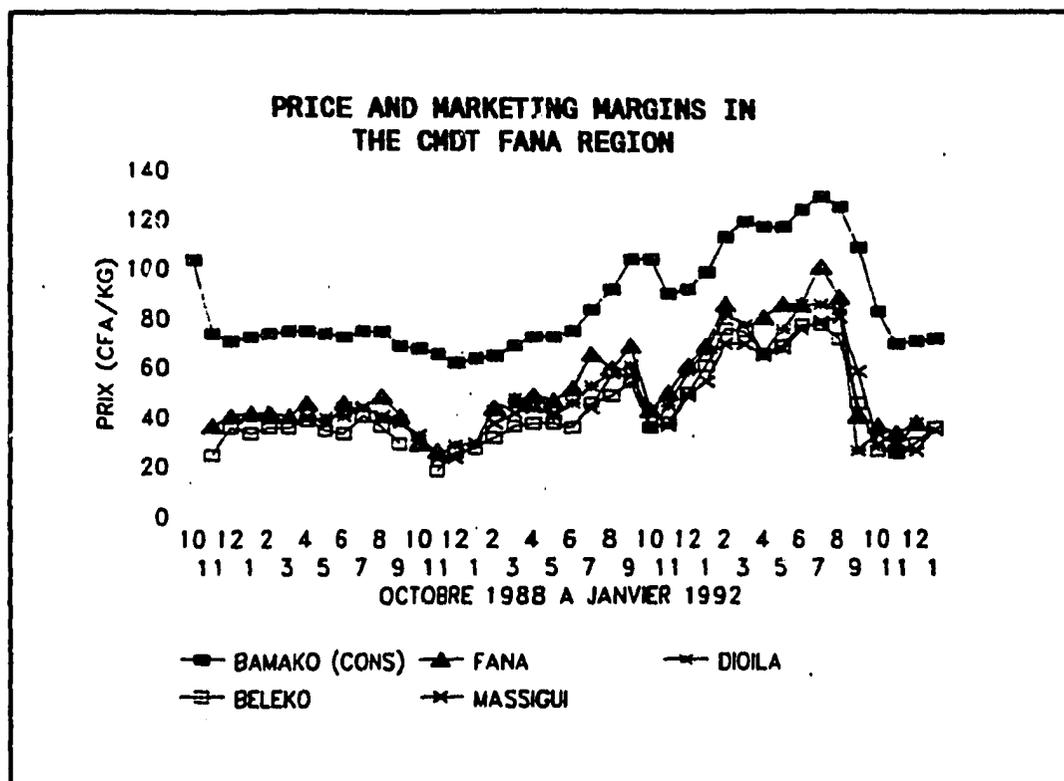
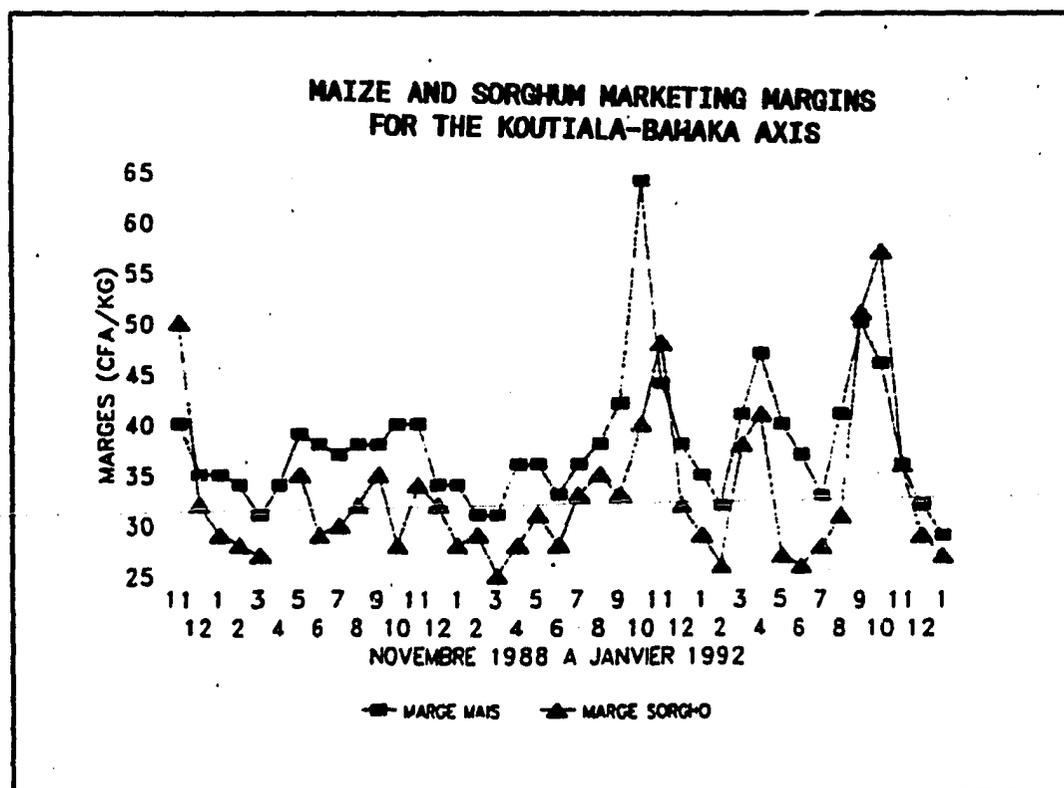


FIGURE 4B



Source: SIM/OPAM

TABLE 2: TRANSPORTATION COSTS AND MARKETING MARGINS
CFA/KG

ORIGIN	DESTINATION	TRANSPORTATION COST	MARGINS
Ouelessebougou	Bamako	5	NA
Bougouni	Ouelessebougou	5	NA
Bougouni	Bamako	5	NA
Manankoro	Bougouni	7.5	NA
Yanfolila	Bougouni	6	NA
San	Mopti	NA	1 - 5
San	Bamako	5 - 7.5	1 - 5
Koutiala	Bamako	5 - 7.5	2.5 - 10
Koutiala	Mopti	5 - 7.5	5 - 20
Koutiala	Gao	17.5 - 25	5 - 10
Koutiala	San	4	NA
Zangasso	Koutiala	2.5	2
Sikasso	Koutiala	5	NA
Sikasso	Bamako	NA	5 - 7.5
Kadiolo	Sikasso	5	5
Korogo (IC)	Sikasso	6	NA
Abidjan (IC)	Koutiala	17.5 - 25	NA

Note: NA = not applicable

Source: Rapid appraisal survey

After deducting for monetary costs

5. Processing and preservation

The processing of maize is the constraint frequently cited to explain the low level of consumption. The pounding of maize (dehusking, grinding etc.) poses serious problems for women. Certain varieties are particularly well-known for their hardness. This concerns varieties like Tiemantie etc. Therefore, women sometimes ask their husbands to change to varieties that are less tiresome to pound.

From the viewpoint of cost, maize processing is more expensive than that of other cereals.

Concerning semi-professional processing (neighborhood mills), existing equipment is not adapted for maize transformation (no husker at San, use of rice huskers, etc.).

Semi-industrial processing, like the flour mills installed in the CMDT and ODIMO regions offer possibilities for diversification into a number of products made from maize (large grits, medium grits, fine grits, others), but the quality of the products fabricated by these mills is not the best. Black spots appear in the sacks of packaged products. This situation is linked to the presence of maize germ.

These grits are also produced by women using artisanal processes. The quality of the product is clearly superior and the marketing strategies are more effective:

- the quantity produced is modulated as a function of sales, and
- the largest proportion of the processed product corresponds to that which is in highest demand by consumers.

Price per unit for the packaged product (i.e., price per sack) remains unvarying. It is the quantity in the sack that varies with the rising price of the raw material.

The problem of processing remains central to the issue of stimulating consumption. The problems of degerming and the

fabrication of new products adapted to the taste and financial resources of consumers remain the key questions.

6. Consumption

One can distinguish three types of consumption: human consumption, animal consumption, and industrial consumption.

6.1 Human consumption

Data from the 1988-89 budget-consumption survey reveals that the consumption of maize is relatively weak in comparison to other rainfed cereals. In fact, sorghum (in the regions of Kayes and Koulikoro and in the Bamako district) and millet (in the Sikasso, Segou, Tombouctou and Gao regions) are the most consumed cereals (Figure 3a). Maize consumption remains important in the Kayes and Sikasso regions. One also notes that the level of consumption is very linked to the level of local production, which signifies that the majority of maize that is produced is consumed in the same place (Figure 3b). Thus, the Mopti, Tombouctou and Gao regions, are weak consumers of maize, and also produce very little. This demonstrates the weak market orientation of maize production, which appears mainly oriented towards home consumption. The rural zones, as shown in the graph entitled "Rural and Urban Consumption of Maize by Region", consume most of the maize that they produce (Figure 3c). The Kayes and Gao regions demonstrate a different tendency, which needs to be investigated in the upcoming studies.

The findings raise the following questions:

- Why is maize less consumed than other cereals?
- Why this strong production orientation towards home consumption?

These questions certainly are linked to problems of processing, consumption, and marketing.

Concerning ways of preparing maize, it is consumed in different forms: "to", "cous-cous", "seri", "moni" etc. Maize is the basic staple in certain locations like Kadiolo and Yanfolola.

FIGURE 3A

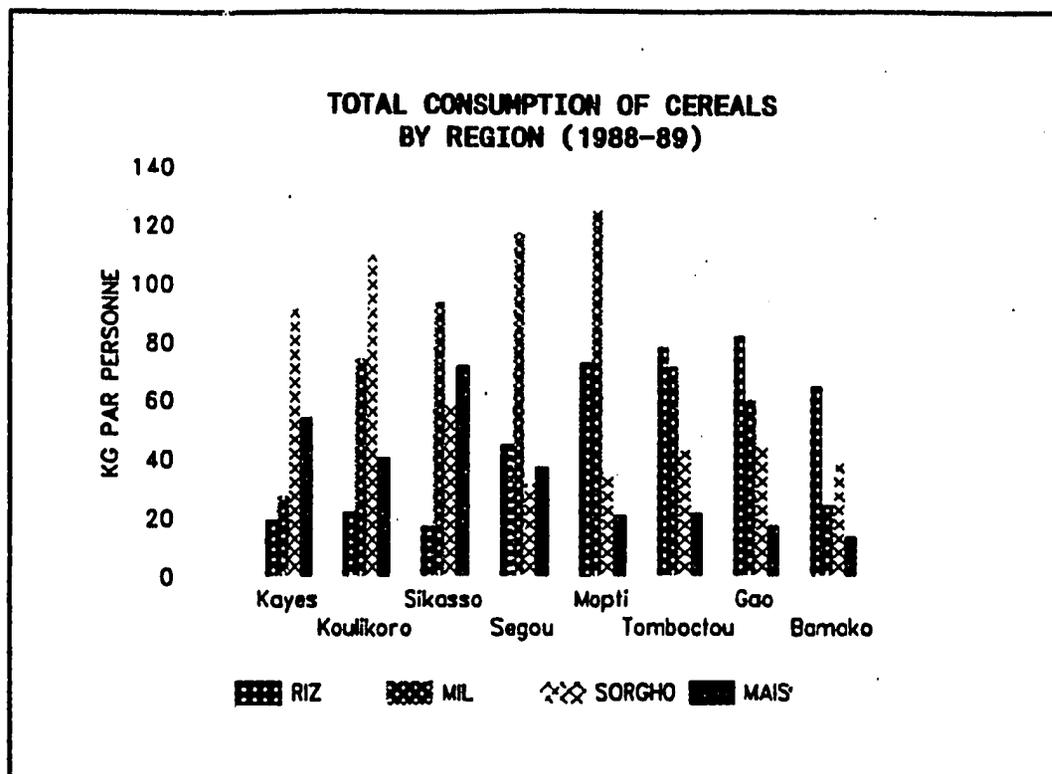
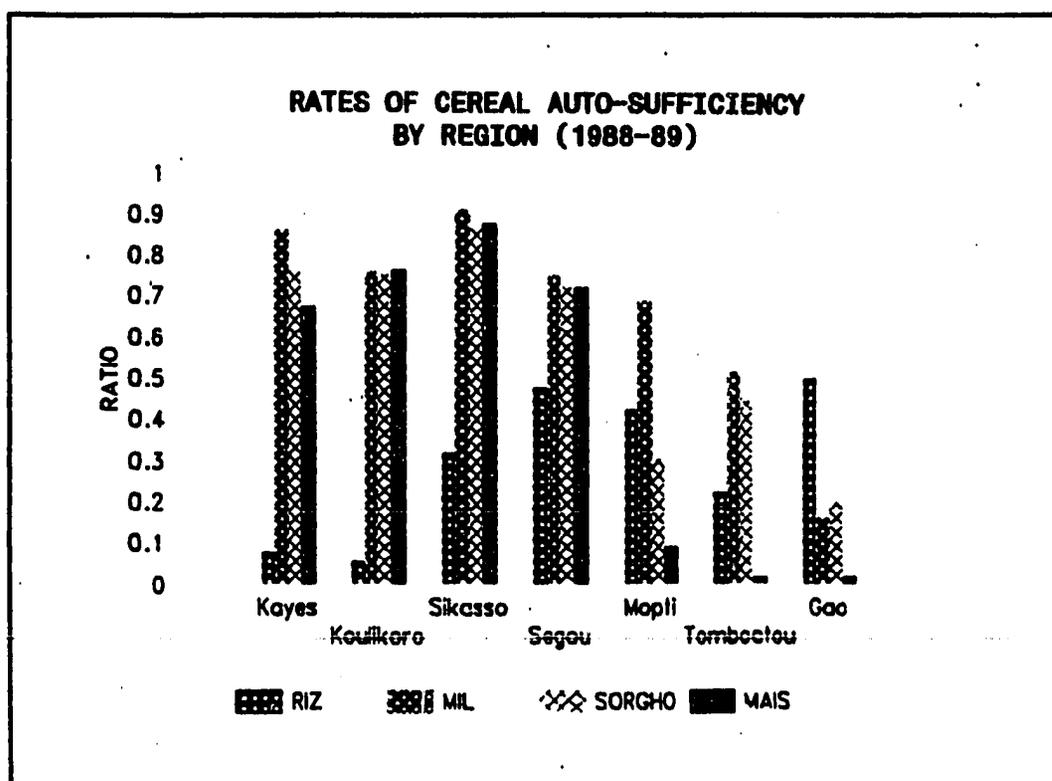
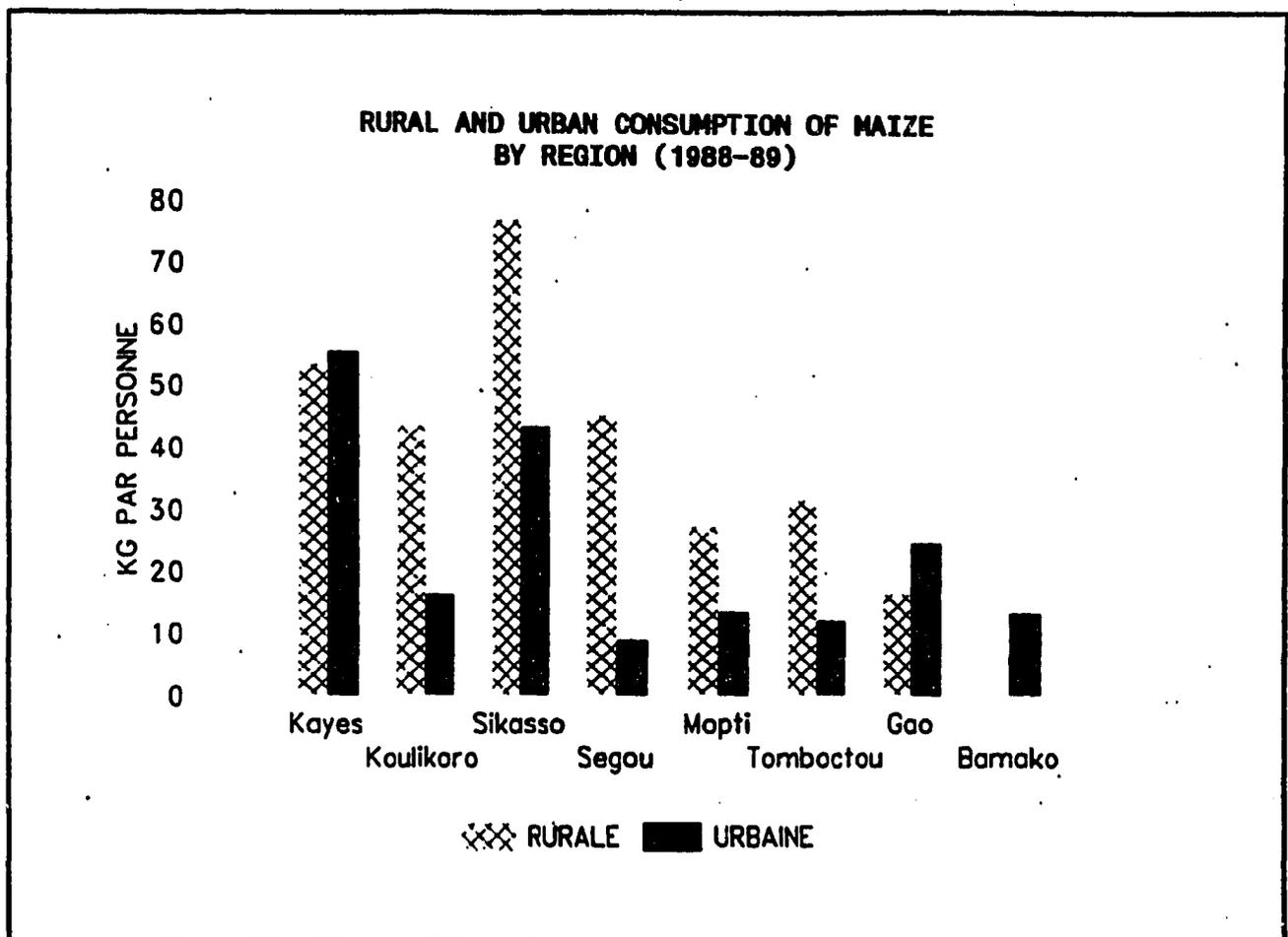


FIGURE 3B



Source: DNSI Enquête Budget Consommation

FIGURE 3C



Source: Enquête Budget Consommation

In a number of rural zones, yellow maize is alleged to be the origin of certain illnesses (malaria, impotency, etc.), which, of course has a negative influence on the level of consumption. These questions remain to be looked at in-depth.

In contrast, in urban areas, consumers prefer yellow maize. There is thus a lack of congruence between urban consumer preferences and the current orientation of production.

The question that arises, when thinking about promoting maize production (which will require the establishment of reliable markets) is to understand what measures must be taken to satisfy the demands of urban consumers? What role will the breeder, processor, etc. play?

6.2 Animal consumption

There are few statistics on this subject. But the use of maize grain in animal feed again remains very low. Our preliminary surveys indicate that a certain change is beginning to manifest itself. As a matter of fact, maize is becoming more and more used in animal feed, notably poultry feed.

Some industrial production units for poultry feed, like "Moulavic", have begun to emerge. A strong, potential demand exists in this area. Poultry producers, like urban consumers, also demand yellow maize. The yellow pigmentation is said to have a certain influence on the coloring of the eggs.

6.3 Industrial consumption

In Mali, factories like "BRAMALI" (the brewery), "SOMAPIL" (a dry-cell battery company), and many textile outfits use maize in different forms (degermed grits, very fine degermed flour). Annual requirements are only several hundred tons per year. But to be able to satisfy this market, some steps have yet to be taken:

- having the capacity to degerm maize,

- being able to produce a very fine flour (on the order of 150 microns).

Currently, only "Les Grands Moulins of Mali" can accomplish this degerming at a capacity of 50 tons per day.

III. PROPOSED IN-DEPTH STUDIES AND DIRECTIONS FOR COLLABORATION

The development of the maize subsector will require strengthening and stabilizing the supply and demand of this product. Increasing demand necessitates:

- improving the image of the product in the eyes of the consumer and/or,
- reducing the cost to the consumer.

Concerning the second category, that is, supply, stimulating it requires a stable producer and remunerative producer price. This could be accomplished by a better integration of producers into the commercial circuits and/or by a notable reduction in the costs of production.

The proposed in-depth studies are certainly not exhaustive, but would permit the discovery of the key constraints and the identification of measures that need to be undertaken (at the technical, institutional and policy levels) to arrive at this redynamization of the subsector.

1. Production level

A rapid examination of the farm-level production process shows that farmers in the CMDT zone are developing adaptive strategies taking into account the constraints they encounter: choice of varieties, adoption of certain fertilization practices, spatial arrangements etc.

A better understanding of these strategies is essential, particularly the choice of varieties, how frequently they are replaced, etc, all of which influences productivity and costs of production.

Do farmers produce at a lower cost? What is the gap in productivity resulting from the adoption of alternative strategies? How can one resolve the problem of farmers wanting to produce white varieties while consumers demand yellow varieties?

To answer these questions, the following investigations are proposed:

- the identification of varieties cultivated, the characteristics sought by farmers, the quality of their seed and the networks through which new varieties are diffused to farmers;
- an analysis of the yield gaps between farmer practices and recommended techniques;
- calculation of the cost of production.

2. Marketing

The method and performance of the traditional financing system remain enigmatic. Some studies are therefore needed to understand all the main lines of this financing method.

On the other hand, the discrepancies between producer and consumer prices suggest that the farmers may be able to play a role in improving their revenues by participating in certain activities. But to do this, what type of organization should be suggested to farmers?

3. Consumption

Stimulating consumption requires supplementary investigations, be they on human consumption or animal consumption.

3.1 Human consumption

- **consumption of fresh maize**

This form of consumption is rather developed, but there is little knowledge of the problems that surround it: the varieties most desired, supply constraints facing the consumer, the level

of freshness demanded, etc. Fresh maize has problems that are specific to it alone. This is why it is important to analyze the fresh maize sub-subsector.

- **consumption of maize grain**

Consumers have very diverse behaviors vis-a-vis maize. Some prefer "cous-cous" or "to", others prefer to consume maize in porridge form, etc. An understanding of food habits is therefore necessary before determining how to influence them. Indeed, developing an increased level of maize consumption implies the fabrication and testing of new products (or the popularization, on a large scale, of those that already exist). The tests that will be conducted will permit the estimation of demand curves using those tests in which the various techniques and scales of appropriate processing technology will be analyzed.

3.2 Animal consumption

Demand is very strong for this type of consumption. This demand seems moreover inelastic; in other words, the range of choices for poultry growers is quite limited. Maize has a comparative advantage over other cereals. This phenomenon suggests the possibility of establishing contracts between agriculturalists and poultry producers in order to assure the necessary feed supply for one group while assuring a remunerative and stable price for the other.

**TABLE 2b. IN-DEPTH SURVEYS AND COLLABORATIVE POSSIBILITIES:
MARKETING LEVEL**

THEMES	ACTIVITIES	SPECIALISTS AND ORGANIZATIONS TO INVOLVE
<p>Contracts and traditional financing methods</p> <p>Possibilities for farmers to integrate more into the marketing process</p>	<p>Surveys at the merchant level</p> <p>Analysis and typology of various financing arrangements</p> <p>Sociological study of the producers</p> <p>Studies and tests of marketing strategies</p>	<p>Outside collaborators (supported by PRISAS)</p> <p>DPAER agricultural economists</p> <p>Outside collaborators (supported by PRISAS)</p>

TABLE 2c. IN-DEPTH SURVEYS AND COLLABORATIVE POSSIBILITIES:
CONSUMPTION AND TRANSFORMATION LEVELS

THEMES	ACTIVITIES	SPECIALISTS AND ORGANIZATIONS TO INVOLVE
A. HUMAN CONSUMPTION		
Fresh maize sub-subsector	Study of production and marketing conditions	DPAER agricultural economist and DRA breeder
	Analysis of results	
Study of food habits	Analysis of DNSI data	Outside collaborators (DNSI)
	Rapid appraisal of urban households and restaurants	DRA technical scientist and DPAER agricultural economist
	Formal survey of urban households	DPAER agricultural economists
	Study concerning price and availability of processed products	Outside collaborators (SIM/OPAM)
Test of new products	Fabrication and testing of new products	DRA technical scientist and DPAER agricultural economist
Processing techniques and scales	Review and synthesis of existing processing studies	DPAER agricultural economists
	Economic analysis of techniques	DPAER agricultural economists
B. ANIMAL CONSUMPTION		
Demand and supply practices of poultry producers	Rapid appraisal	DPAER agricultural economists
	Monitoring the sources and composition of poultry rations	DPAER agricultural economists and CRZ animal scientists
	Feasibility study of contracts between poultry producers and AVs (village cooperatives)	DPAER/PRISAS study

**APPENDIX
RAPID RECONNAISSANCE QUESTIONS (CHECKLIST)**

RESPONDENT: Staff of the technical units and extension officials from the regional offices of regional development authorities (ODRs).

PRODUCTION

1. What are the different systems and techniques used in growing maize? What are their distinguishing traits?
2. What changes have occurred in maize production conditions (area cultivated, techniques, yields) since the drought of the 1970s? What are the principal causes of these changes?

STORAGE

3. What are the different levels, scales and techniques for maize storage?
4. What experiences have you had with respect to the support offered by ODR for village storage?

MARKETING

5. What are the principal marketing channels of unrefined and processed maize: surplus zones, assembly centers, marketing axes, wholesale consumption centers?
6. Who are the principal actors participating at each level along these marketing channels?
7. What are the specific activities and strategies of these agents? What relationships exist among these agents?

CONSUMPTION

8. What are the principal kinds of non-human consumption of unrefined or processed maize? Do these consumption types represent an important potential market?

RESPONDENT: Agricultural producers practicing different production techniques for maize/village associations (cooperatives)

PRODUCTION

1. What changes have occurred in maize production conditions (area cultivated, techniques, yields) since the drought of the 1970s? What are the principal causes of these changes?
2. Do you cultivate maize in a main field or only in plots near the household compound? Of the total area cultivated in cereals, what part is comprised of maize?
3. Is the primary reason for cultivating maize to assure food self-sufficiency or as a cash crop?

STORAGE

4. What are the different levels, scales and techniques for maize storage?
5. What is, for each of the storage systems, the extent of storage and preservation problems (quantitative and qualitative losses according to storage duration and capacity)?
6. Do you participate in a village storage organization? How are the different functions of this organization managed? What are the advantages of this type of organization? What difficulties have you encountered?
7. What factors influence maize conservation (variety, maturity of the grain, ...)?

MARKETING

8. How many sacks of cereal have you sold or do you expect to sell this year? This represents what proportion of your total production of cereals?
9. How many sacks of maize have you sold or do you expect to sell this year? This represents what proportion of your total production of maize? What is the seasonality of sales, of providing maize to processors? Why this choice?
10. How have you sold them (in bulk in town, in bulk to an assembler, in small quantities to the weekly market)? Why? What distance do you travel to the place of sale? What method(s) of transportation are used? What are the transportation costs? Who makes the decisions about the sale or purchase of cereals?

RESPONDENT: Rural consumers

CONSUMPTION

Family Head

1. During periods of availability, under what circumstances and during which period do you consume maize?
2. Have you experienced cereal deficits during the last five marketing years (number of marketing years...)?
3. Who is responsible for cereal purchases, in the case of a deficit for the household? Who is responsible for preparing the meals?
4. What cereals do you buy during times of deficit? If maize is not one of them, why not? If maize is, what proportion of the cereal bought is composed of maize? Why?
5. How many sacks of rice/millet/sorghum/maize do you buy? How frequently do you purchase these items?
6. How do you decide the different quantities of cereal to buy? Why? What is the periodicity of these purchases?
7. What cereals do you receive as gifts during deficit times? What part is composed of maize?
8. What are the principal kinds of non-human consumption of unrefined or processed maize? Do these consumption types represent an important potential market?

Housewife

9. What dishes do you prepare based on refined cereals (millet, sorghum, maize)? and in what form (flour, grits)?
10. Do you often use maize to prepare these dishes and in what circumstances (social events, ordinary food patterns)?
11. Are there any difficulties in using maize in the preparation of these dishes (availability on the market, processing, storability...)?
12. Does the preparation of dishes with a maize base require particular condiments not required by other cereals? Which ones? Why?
13. Are there specific maize-based dishes for the different age groups (children, elderly)?
14. Do you use a mill to process your maize? Do processed products (millet/sorghum/maize) respond to your needs? What do you think of processing costs?
15. Would you use more maize if there were products already processed and available at the market?
16. Do you normally buy products made of maize (grits, flour)? What do you think of these products?

Ordinary consumers

17. What do you think of maize-based dishes and what are your preferences within this category? Why?

18. For dishes that can be based on different cereals (millet, sorghum, maize, rice), what cereal base do you prefer?
19. In your opinion, what is the nutritional value of maize relative to other cereals?

RESPONDENT: Cereal subsector sections of CMDT

PROCESSING

1. What are the different actors, levels (location and scale), and techniques involved in processing?
2. What are, for each processing method, the processed products and their destinations (clientele and use)?
3. What are the constraints as they pertain to processing, storage and assuring an adequate supply of maize?

RESPONDENT: NGOs (Non-Governmental Organizations)

1. What are the different actors, levels (location and scale), and techniques involved in processing?
2. What are, for each processing method, the processed products and their destinations (clientele and use)?
3. What are the constraints as they pertain to processing, storage and assuring an adequate supply of maize?

RESPONDENT: Food Technology Laboratory of IER

PROCESSING

1. What types of activities do you perform?
2. What is the nutritive value of maize? Does processing affect the taste of the product being transformed?

RESPONDENT: Processors: Village Associations (cooperatives) and rural private-sector entrepreneurs; semi-industrial private-sector firms and urban industrial enterprises

PROCESSING

1. What are, by level of the individuals involved, the principal constraints encountered by the milling of cereals in general and maize in particular (maintenance, milling rate, assuring adequate supplies of unprocessed cereals)?
2. What are, for each processing method, the processed products and their destinations (clientele and use)?

STORAGE

3. What storage systems do you use (types, practices, and duration)?
4. What is, for each of the storage systems, the extent of storage and preservation problems (quantitative and qualitative losses according to storage duration and capacity)?

CONSUMPTION

5. What are the principal kinds of non-human consumption of unrefined or processed maize? Do these consumption types represent an important potential market?

RESPONDENT: Merchants (wholesale merchants; wholesalers from assembly centers and large consumption centers; assemblers/wholesalers from assembly centers; wholesalers from consumption centers; retailers from consumption centers)

MARKETING - STORAGE

1. What cereals do you market?
2. What quantities do you market each month (transaction volumes)? Do the proportions of different cereals marketed vary according to the season?
3. From whom do you buy and to whom do you sell cereals (position within the marketing network)? Do you have permanent relations with them (existence of implicit or explicit contracts)?
4. What are the origins and destination of the cereals that you sell (marketing axes)? What are the transportation costs?
5. How do you manage to finance your activities and what are the difficulties you face in doing so?
6. What distinguishes the wholesalers, semi-wholesalers, and retailers? What type of merchant do you consider yourself?
7. What are the principal marketing channels of unrefined and processed maize: surplus zones, assembly centers, marketing circuits, wholesaling centers and outlets for consumption?
8. Who are the principal actors participating at each level along these marketing channels?
9. What are the specific activities and strategies of these agents? What relationships exist among these agents?
10. According to these actors, what is the position, specific characteristics and marketing constraints associated with maize (unrefined and processed) compared with other cereals?
11. For how long do you store cereals? And using what techniques?

Repeat questions 2, 3, 4, and 11 specifically for maize.

12. Are there difficulties or constraints specifically linked to the marketing of maize (securing an adequate supply, quality, transportation, storage, selling)?
13. At what time of the year does maize become rare on the market? Why?
14. What is the price level of maize compared to other cereals? Why?
15. Are there opportunities for supplying industrial companies or poultry producers with maize (available supply and the existence of a potential demand)?
16. Do export opportunities for maize exist (supply availability and the existence of potential demand) towards Senegal, Ivory Coast etc.?

RESPONDENT: Livestock producers

CONSUMPTION

1. What different uses are there for maize in animal production?

RESPONDENT: Urban consumers

CONSUMPTION

Family head

1. Who is responsible for purchasing cereals for the household?
2. How many sacks of rice/millet/sorghum do you buy? How frequently do you purchase these items?
3. How do you decide the different quantities of cereal to buy? Why? What is the periodicity of these purchases?
4. What are the principal kinds of non-human consumption of unrefined or processed maize? Do these consumption types represent an important potential market?

Housewife

5. What dishes do you prepare based on dryland cereals (millet, sorghum, maize)? and in what form (flour, grits)?
6. Of these dishes, which could be prepared with maize and in which form (flour, grits)?
7. Do you often use maize to prepare these dishes and in what circumstances (social events, ordinary food patterns)?
8. Are there any difficulties in using maize in the preparation of these dishes (availability on the market, processing, storability, ...)?
9. Does the preparation of dishes with a maize base require particular condiments not required by other cereals? Which ones? Why?
10. Are there specific maize-based dishes for the different age groups (children, elderly)?
11. Do you use a mill to process your maize? Do processed products (millet/sorghum/maize) respond to your needs? What do you think of processing costs?
12. Would you use more maize if there were products already processed and available at the market?

Repeat questions 4 through 9 for rice-based dishes.

13. Do you normally buy processed products made of maize (grits, flour)? What do you think of these products?

Ordinary consumers

14. What do you think of maize-based dishes and what are your preferences within this category? Why?
15. For dishes that can be based on different cereals (millet, sorghum, maize, rice), what cereal base do you prefer?
16. In your opinion, what is the nutritional value of maize relative to other cereals?