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dissertation entitled

SEGMENTATION OF FAMILY FARMS WITHIN TWO ETHNIC GROUPS IN SENEGAL: THE SERER AND THE WOLOF

presented by

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has been accepted towards fulfillment
of the requirements for

Ph.D. degree in *Sociology*

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Date *17 May 1991*

SEGMENTATION OF FAMILY FARMS WITHIN TWO ETHNIC GROUPS IN SENEGAL: THE SERER AND THE WOLOF

by

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A DISSERTATION

Submitted to
Michigan State University
in Partial fulfillment of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY

Department of Sociology

1991

ABSTRACT.

In Senegal, farming is by far the dominant activity through which rural Serer and Wolof families satisfy one of their fundamental functions, the economic role of production. Agricultural production is organized by family labor and structured under the leadership of the head of the family, which, in almost all cases is the eldest male. He coordinates and directs the contribution of all family members to the process of production and is responsible for resource allocation.

Such an organization is not static but is in a constant evolution characterized by changes in family size, changes in age structure and roles of family members and, particularly, changes in the structure of families through segmentation. The contribution of each family member to the production does not eliminate the diversity of individual goals and expectations and strategies in pursuit of self-interest.

This dissertation focusses on the changes of the family structure through segmentation among two ethnic groups in Senegal: the Serer and the Wolof. Interviews were conducted on two hundred heads of units of production (100 Serer and 100 Wolof). The study has two objectives:

1) Understand the process of segmentation, its patterns, its causes and its evolution in relation with the deterioration of agricultural conditions;

2) Identify ways in which such an understanding might contribute to overall agricultural development in Senegal.

In contrast to segmentation, succession describes a change in roles within the farm family after a dependent producer takes over the management of the unit of production from a deceased or retired father. Segmentation implies the separation of a farm family into several economic units.

The study differentiates three patterns of segmentation: personal request when a dependent producer seeks the authorization to create his own economic unit of production; recommendation, when the head of the farm family proposes to a dependent to have a family farm of his; and conflict resulting from disagreement within the farm family.

Personal request occurs from a desire of economic independence. Recommendation is dictated by the size of the farm family.

The establishment of separate units of production does not mean the vanishing of the joint family as a social unit nor does it eliminate interactions between the farm family of origin and the newly created unit of production.

For both Serer and Wolof, a positive association exists between the size of landholding and the size of farm family. Also the data support the hypothesis that newly created farm families have a smaller size of holding as well as lower level of equipment.

As a result of limited resources, most Serer and Wolof farm families lack food self-sufficiency which in turn may

accelerate family segmentation. It is a priority to help these farm families increase their levels of production by improving the conditions of agricultural production and by creating opportunities to supplement income from agriculture.

TO MY WIFE AND MY CHILDREN

FOR THEIR

SUPPORT AND PATIENCE

ACKNOWLEDGEMENTS

I am very grateful to the Senegalese Institute for Agricultural Research (ISRA) and to the United States Agency for International Development (USAID) for making possible the pursuit of my graduate work at Michigan State University.

I want to express my deepest appreciation to Dr Christopher Vanderpool who served as my academic advisor throughout my training. His invaluable assistance and encouragements never wavered.

I am very grateful to Drs Marilyn Aronoff, Jay Artis, James Bingen and Craig Harris. Their academic assistance, suggestions and criticisms were very much appreciated.

Many thanks to my immediate family, friends and relatives and particularly to Hyacinthe Dioh, MD for so kindly accepting my children during my absence, to Djibril Diouf, Ousseynou Diouf and Amadou Ndiaye for their collaboration in data collection.

Thank to all of you.

TABLE OF CONTENT

LIST OF TABLES

Chapter 3.

LIST OF FIGURES.

LIST OF MAPS

GLOSSARY OF LOCAL WORDS IN SERER AND WOLOF.

Serer	Wolof	English
Foulang	-	Represents the space occupied by each farm family in a residency unit shared by several family farms.
Mbind	Ker	Residency Unit.
Yal Mbind	Borom Ker	Head of the residency unit.
Ngak	Ndiel	Daily food for the farm family.
Yal Ngak	Borom Ndiel	Head of farm family or production unit
Ndiatigue	Ndiatigue	Person in the farm family holding economic authority (decision maker).
Surga	Surga	Dependent producer.
	Mere la ber la	Free a surga against whom you have a grudge.
-	Gerem la watch la	Free a surga who has shown a capacity to be self-supporting.
-	Mer beru	Decision of a displeased surga to separate from his

		ndiatigue.
Saad	Saad	Paid work
Side	Diarga	Manager of family cattle herd

ACRONYMS

I.R.A.T.: Institute of Tropical Agronomic Research.

I.S.R.A.: Senegalese Institute of Agricultural Research.

N.P.A.: New Agricultural Policy.

SO.DE.FI.TEX.: Society for the Development of Textile Fibers.

SO.DE.VA.: Society for Development and Extension.

PREFACE

Agriculture in Senegal is based on the cultivation of groundnut and cereals (millet, rice). In an effort to help develop agricultural production, the Senegalese government introduced several programs beginning with the creation of cooperatives in the early sixties 1/. An important introduction was the "Programme Agricole" through which agricultural inputs: groundnut seeds, fertilizers, equipment were made available to producers to be paid after harvest and on an annuity basis. Price support is established and outreach agencies were created aimed at providing peasants with agricultural and management training. Also research activity, particularly research on varieties of groundnut, was encouraged. Despite these efforts, the role of agriculture in the country's economy is decreasing. The statistics show a decrease in the share of agriculture in the Gross Domestic Product from 25% in 1965 to 22% in 1987 (World Bank Report, 1989).

Three interrelated circumstances combine to create such a deteriorating situation of agriculture. These are human factors, environment factors and policy factors.

Concerning the human factor, rapid demographic increase (overall Senegal rate of population increase is 2.9%) translates into high population densities population leading to a quest for more land for cultivation to feed the growing

population. As population increases, the size of holding for farm families is smaller leading to further pressure on land. Moreover, inadequate agricultural techniques are leading to soil degradation.

A hostile ecological environment characterized by sparse and irregular rainfall, and by a drop in rainfall made agriculture precarious. In addition ecological destruction resulted from the introduction of groundnut as a monocrop. Deforestation was practiced for the expansion of groundnuts cultivation. This, in turn, led to erosion in the Wolof zone and wind erosion in the Serer zone. Because of lack of conservation measures, agriculture land is being lost through soil exhausted and erosion.

The government decision to stop the Programme Agricole in 1980 indicated a new orientation to the agricultural policy in Senegal. This orientation was evident in the introduction of the Nouvelle Politique Agricole (NPA) in 1984 calling for less state intervention and more responsibility for peasants. Peasants must rely on themselves for the acquisition of factors of production needed. This led to a detrioration of the conditions of production for farm families that had previously benefitted from the advantages offered by the Programme Agricole. Thus, farm families created since the end of the Programme Agricole and farm families in general may be facing enormous difficulties in obtaining such factors of production as seed, equipment,

credit, etc.

Changes in the conditions of production do not only affect the level of agricultural production of Serer and Wolof. They are causes and effects of the changes of structure of Serer and Wolof farm families through segmentation. As effects, the partition of factors such as labor, land and equipment that follow segmentation reduces the level of available resources for agricultural production.

As causes of the segmentation, limited resources within farm families increases the need to look for other alternative out of the family farm, what pushes segments of families to separate. As result, the conditions of agricultural productions are not only causing but also accelerating the process of segmentation. Also they explain the increase of the number of cases for patterns of segmentation such as personal request and recommendation. In other words, the response to deteriorating agricultural conditions appears to be the fragmentation of segments of Serer and Wolof farm families.

Changes in these factors then suggest a deterioration of the conditions of production for farm families in general. Also they suggest difficulties that farm families created since the end of that Programme Agricole and farm families in general may be facing for the acquisition of factors of production. The process of segmentation, through the partition of factors of production it implies, contributes

to increasing problem faced by agriculture in the zone considered. This leads to the hypotheses:

1) the later a farm family is created, the smaller the size of holding available;
2) the smaller the size of holding, the higher the pressure on land and the higher the pressure on land, the higher the risks of soil degradation;
3) the later a farm family is created, the lower its level of equipment.
4) the degree of interaction between farm families of same origin may be affected by the pattern of segmentation.

The study of segmentation in the context presented has two purposes:

1) to better understand the process of segmentation its causes its patterns;
2) to investigate ways in which such and understanding might contribute to overall agricultural development.

As to the organization of this paper, Chapter one presents the context of the study and provides useful information about the Serer and Wolof and about their main activity of production as well.

Chapter Two refers to the literature review and the methodology.

Chapter Three describes the patterns of access to farm operator status among Serer and Wolof. Particularly, it the causes and patterns and evolution of segmentation as well as the perception Serer and Wolof have about segmentation.

Chapter Four describes the characteristics of farm families and their impact on agricultural production. It also indicates the extend to which interaction among farm families are developed.

Chapter Five presents the situation of food self-sufficiency in relation to the characteristics of farm families and provides information on livestock as a recourse in case of shortage of food.

Finally, Chapter Six presents a summary of the study as well as the importance of findings for agricultural development and for social research on family. It also focus on the necessity for policy oriented toward helping farm families to take into consideration farm circumstances.

CHAPTER I - PROBLEM IDENTIFICATION AND CONTEXT OF THE STUDY OF FAMILY SEGMENTATION

I-1. Context of the Study.

I-1-1. Notes on Serer and Wolof Ethnic Groups.

A former French colony, Senegal is located on the western coast of Africa. The total area is about 196 thousand square kilometers, and the population is estimated at 7 million. The average annual growth of population is 2.9% with a fertility rate of 6.5 per thousand (World Development Report, 1989).

Six main ethnic groups compose the population: The Wolof, the Serer, the Toucouleurs, the Diola, the Peulh and the Manding (Map 1).

Ethnic identification is counterbalanced, however, by relationships that cut across ethnic lines. Among these are the use of the Wolof language as the "lingua franca" in almost all the country. Secondly, there are tolerated interactions in the form of joking relationships between Diola, Peul, Serer, and Toucouleur. In the case of Serer and Wolof, the two largest ethnic groups, a long history of interaction has resulted in significant mutual adoption of

cultural patterns. To a certain extent, the Wolof might have adopted the land tenure system developed by the Serer. Such interactions have been possible since the two groups share the same proximate geographic space.

The Serer are divided into two groups: those located in the regions of Fatick and Kaolack, previously the Sine-Saloum region. Our sample is drawn from this group. The second group is located in the region of Thies. The Wolof are located chiefly in the Northwestern part of the country, but are also dispersed throughout the country.

Concerning family formation, families are organized on the basis of lineage. Each lineage is composed of several extended family units which are the basic units of production. Such family formations still prevail.

As to the residence patterns, scattered farmstead communities characterize the pattern of settlement for the Serer ethnic group. The constitution of villages in relation to the availability of public services (wells, health centers) is increasingly dominant.

The Wolof live in a cluster village type of settlement. In each, families live in compounds arrayed around a patio, a residency unit called "Mbind" by the Serer and "Ker" by the Wolof. Stockades separate family living quarters. "Mbind" and "Ker" are primarily units of residency under the moral authority of the oldest man designated as "Yal Mbind" for Serer and "Borom Ker" for Wolof. In most cases, "Yal Mbind"

and "Borom Ker", also exercise control over economic decision making. But, in a "Mbind" and "Ker", several economic leaders may coexist with one moral authority. This occurs when several independent production units share the same residency unit.

Previous studies have identified several differences in familial relationships between Serer and Wolof. The Serer are considered more attached to the cohesion of the family, and more respectful of traditional values. The Wolof, on the other hand, are described as more open to the outside, and more independent oriented (Pelissier, 1965; Martin, 1970). Empirical data on both ethnic groups indicate that the Serer in rural areas have larger families than the Wolof (Martin, 1970). The Wolof have largely adopted Muslim beliefs accelerating the shift from a matrilineage to a patrilineage kinship. Muslims also are dominant among the Serer, but 5.0% of family farms surveyed are Catholic.

Concerning family formation, Serer and Wolof families are organized on the basis of lineage. Each lineage is composed of several families extended and/or conjugal which are the basic units of production, in other words, they constitute the level at which agricultural activity is organized. The structure of these units is not static but changes over time. These changes follow cultural age rules of age and circumstances (death or retirement of the father from agriculture activity). These types of economic groups, are

units of analysis in this study.

I-1-2. Agriculture Activity in the Senegalese Context.

Agricultural production remains the main source from which a large percentage (70%) of the Senegalese population draws its living (VII Plan Economic et Social). Agriculture accounts for 22% of the Gross National Product (GDP).
As indicated, Serer and Wolof respondents are respectively located at the district of Ngayokheme of the region of Fatick and the district of Kaymor of the region of Kaolack. The territory covered by these regions (about 23000 square kilometers) was known as the Sine-Saloum region. It corresponds to what used to be called the groundnut basin, where groundnut cultivation was introduced and expanded. This region is presently under the influence of human ecological and policy factors that are progressively deteriorating the Serer and Wolof systems of production which in turn affect their family organization.

a) Family Organization of Agriculture Production.

Agriculture is organized in economic decision units called units of production or farm families in which the farm operator and his family depend primarily on farming for living through their labor. The structure of families

involved in agriculture production varies from nuclear families consisting of parents and their offspring, to extended families that include several generations and, in soAgriculture in Senegal is based on the cultivation of groundnut and cereals (millet, rice). In an effort to help develop agricultural production, the Senegalese government introduced several programs beginning with the creation of cooperatives in the early sixties 1/. An important introduction was the "Programme Agricole" through which agricultural inputs: groundnut seeds, fertilizers, equipment were made available to producers to be paid after harvest and on an annuity basis. Price support was established and outreach agencies were created aimed at providing peasants with agricultural and management training. Also research activity, particularly research on varieties of groundnuts, was encouraged. Despite these efforts, the role of agriculture in the country's economy is decreasing. The statistics show a decrease in the share of agriculture in the Gross Domestic Product from 25% in 1965 to 22% in 1987 (World Bank Report, 1989).

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for more land for cultivation to feed the growing population. As population increases, the of holding for farm families is smaller leading to further pressure on land. Moreover, inadequate agricultural techniques are leading to soil degradation.

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obtaining such factors of production as seed, equipment, credit, etc.

b) Difficulties of Agriculture.

As indicated earlier, agriculture in Senegal faces enormous difficulties tied to three interrelated aspects. First, the lack of access to farm inputs results from the New Agricultural Policy on one hand and, on the other hand, from the lack of resources for peasants to acquire factors needed. Secondly, the ecological constraints imposed by a hostile environment limit peasant efforts towards increasing agricultural production. Finally, the continued deterioration of factors such land which not only is insufficient but is being being destroyed under population pressure.

I-1 -3. Importance of the Study of Segmentation.

The combination of human, environmental and policy factors degrades the conditions of agricultural production in Senegal. Also it contributes to lower peasant economic expectations, particularly of young peasants who view themselves trapped in a family system that can no longer provide economic security and, even less, satisfy their personal needs. A lack of confidence in the family develops and a search for other opportunities as alternatives to low

production occurs. The deteriorating conditions may lead to changes in the family processes of segmentation by accelerating existing patterns and/or introducing new patterns of structural changes within Serer and Wolof families. In particular, this translates in the desire of young people to have their own farm families accelerating internal changes in families, organizational and structural changes as well.

Given the difficult conditions agriculture is facing in Senegal, the study of segmentation is important for two reasons. First, formulating adequate policy towards agricultural development fitting conditions facing peasants and focussing their cooperation will be hazardous (1) unless farm families circumstances are taken into account, (2) without an understanding how farm families are structured, how changes of the organization and structure occur and without understanding what the impact of theses changes. Secondly, the study of segmentation addresses such critical questions as:

- What are the patterns of segmentation?
- How does segmentation occur?
- What variations in segmentation are observable within the Serer and Wolof ethnic groups?
- What are the patterns of segmentation and how did they change over generations?
- How does segmentation relate to wider societal changes?

will help better understand the nature and causes of changes occurring within families.

This study also discusses the characteristics of family farms in terms of the availability of land, labor and equipment, their capabilities for investment, and finally, the technical knowledge of the producers.

Hence another important goal of this study is to identify what agricultural inputs should be made available, particularly to those newly created family farms, e.g., training, supply of factors of production to family farms (seeds, fertilizer, equipment).

Production is organized under the social and economic leadership of the older active male (not sick or retired) of the family. All decisions relating to agricultural production fall under his authority. He is responsible for resources allocation and the distribution of consumption to members of the family. Besides operating the production unit, the production head represents the family farm in its external relations, e.g., membership in the cooperatives, and for groundnut marketing. Despite changes introduced that give married women and the younger generation of men the possibility of owning plots of groundnut and controlling the income generated from them, elder male heads of family farms still play a preponderant role in the way agriculture is conducted.

There differences between the Serer and Wolof concerning

their involvement in agriculture (Pelissier, 1965). The Serer are rooted in agriculture and have developed techniques that generally support a high population density, that is, using grazing aniamls with cropping effectivily utilizing manure to preserve soil fertility.

Confronted with population pressure on land (highest rural density of population in Senegal, 105 inhabitants/square mile) and facing unfavorable environment, the Serer system, however, does not seem to be able to maintain itself. On the other hand, the Wolof are considered to be historically less tied to land and to have used a much more extensive technique of cultivation. The introduction of the groundnut, may have accelerated their conversion to agriculture and contributed to a rapid and large extension of land colonization.

CHAPTER II - LITERATURE REVIEW AND METHODOLOGY

II-1. Literature Review.

Succession and segmentation describe changes that occur within farm families during the family life and which affect its organization. Changes in the headship of the production unit, internal changes of the family, changes in the size of the family and changes in the ages of members of the family are important because of their social and economic consequences.

Changes in members' ages lead to variations in duties to variations in the division of labor, within the family. They add to changes in family size, to create variations in the importance, nature of needs and problems of the family. These changes suggest the interrelations that take place in the family as a system. They describe a continuous evolution that suggests that the family is unit in process of transformation rather than it is a static unit (Hareven, 1974).

The concept of family developmental life cycle describes the process through which a family moves from its constitution through marriage and from its extension through the birth of children to its division. It suggests that each family has a life story characterized by "cycles of growth and dissolution" (Greenhalgh, 1985). Several phases compose

this process: 1) constitution, 2) maturation, 3) extension, and 4) dispersion or division, what we refer to as segmentation.

Segmentation is not perceived as the final stage of the process. There is indeed a continual back and forth movement from joint family to nuclear family, back to joint family during which fission and fusion are observed, (Desai, 1964; Pritchard, 1932). Segmentation suggests a dissociation which does not necessarily exclude interaction between different segments created as may suggest dissolution.

Several arguments have been made on what has caused and is still causing segmentation of traditional extended families from extended to smaller nuclear families. Among these: the effects of industrialization and the introduction of new social ideas and values; the effects of demographic processes and, the effects of land tenure. What is meant by demographic processes are changes in the size of family farms as well as changes in the age and status of family farms members. All three relate to the economic situation within which families live and evolve.

Urban industrialization, but also new ideas that go along with it, are seen as accelerating changes in the extended family structure into smaller nuclear families (Goode, 1963; Gore, 1968). The industrialization process introduces new values that determine access to resources, not on the basis of one's membership to a family, but on the basis of

personal qualification. By offering an alternative, real or perceived, to the security of the extended family, and by creating a set of opportunities, industrialization has contributed to greater mobility particularly from localities facing difficult economic conditions. In response, people, particularly young people, are said to be attracted to moving from the village and into residential nuclear families in the localities to which they migrate. Economic opportunities in the new location lower their economic dependence on the extended family. They may benefit from education opportunities in addition to acquiring new values and behavior patterns.

Nevertheless, social and economic contacts with the extended family are maintained through visiting, mutual aid, including financial aid in the form of remittances, and emotional support (Parsons, 1965; Sussman, 1982). The direction of dependence may change. That is, the extended family may become more financially dependent on members who settle elsewhere but continue to support relatives in the home village. Under these conditions, the rule of seniority which ascribes authority to the eldest may be modified in favor of young who provide such economic support, that is economic success may provide with achieved status. Whatever its role in the changes that affect the traditional extended family, urban industrialization cannot by itself explain the break up of families (Greenfield, 1966).

In the context of this study, the explanation of segmentation includes special attention to the demographic processes. Also, given the dependency of the population on subsistence agriculture, the effects of land tenure need to be explored. Land tenure, strongly, affects, basic economic and demographic processes involved in the transformation of the family farm structure (Bennett, 1982).

Demographic pressure on available resources may give rise to conflicts of interest within a family and may encourage some members to look for economic opportunities outside of the extended family. The size of the family may lead to interpersonal frictions between members of the farm family. Such situations can be very difficult to resolve and, consequently, may lead to a break-up of the extended family (Brown and Forde, 1967; Baily, 1959; Greenfield, 1966).

Land tenure describes the method through which operational rights on land are held and transferred (Raintree, 1987). that is, the ways in which land is allocated and used. Land tenure is among the most apparent elements affecting family life. Land tenure is presented as influencing aspects of family life as diverse as the age at marriage, the residency patterns, the cohesion of lineage and, the process of segmentation. Finally, land tenure seen from the perspective of demographic transition, explains change in fertility rates (Stockes and Schutjer, 1984, 1986). Through population change, land tenure relates to a particularly important

subject of this dissertation: the demographic pressure on land and its impacts on the farming efficiency of production units. Given the focus of this dissertation, only the effects of land tenure on segmentation, on the residency patterns, on the cohesion of the kin and, on the demographic transformations are considered.

The impact of land tenure on segmentation depends on the main production activity in a given society. In families that rely principally on subsistence agriculture, the availability of land provides a guarantee for the pursuit of their activity. When land is available and accessible, young couples separate more easily than when land is scarce and under family rule. In other words, abundance of land without too many restrictions makes it easier to set up a farm household, whereas land scarcity makes separation difficult at least for those who intend to continue farming (Lakshminarayana, 1982).

To what extent can people stay in the family when land is not available? For how long can land produce enough to feed a rapidly growing population? Responses to these questions are straight forward. It is likely that the over-exploitation of small-size holdings reulting from land pressure will lead to insufficient levels of subsistence production (Blaikie and Brookfield, 1987). Shortage of family resources, such as land, will force some members to look for opportunities outside the family, and encourage

separation, (Devanandan and Thomas, 1980; Murray, 1981; Feder, 1971). Empirical data (Devanandan and Thomas, 1980) support the idea that land shortage leads to family segmentation by undermining the extended family. Their findings indicate that the nuclear family in India is known especially among the lower castes, most of whom are not landowners.

Concerning the impact of land tenure on residency patterns, the argument is made that, where land is abundant, unilocal residence rules develop, (Collier, 1957; Tambiah, 1952; Ryan, 1958). In other words, families with available land are less likely to separate. All those who look for a share of the family holding may stay as long as access to land is guaranteed.

Closely related to the residency pattern is the cohesion of the lineage. In agricultural societies, particularly, families are more likely to be stable and to increase in size if membership gives rights to land. This leads to the argument that, when the lineage has control over land, it will have greater generational depth and, therefore, greater unity and strength (Gough, 1956; Worsley, 1956; Nayacakalou, 1960; Fallers, 1965). In light of this argument, changes in the direction of more individual forms of landholding would weaken the lineage.

In societies which rely heavily on agriculture for living, an increase in population that results from high fertility

while mortality is falling may create greater demand for food supply as well as pressure on land. Population pressure on land, in turn, will lead to fragmentation of holdings and may give rise to the breakdown of redistribution arrangements, i.e., practices like pledging land can develop. The way tenure arrangements are organized determines significantly the manner in which land is obtained and used. It suggests also that the extent to which land may be protected, that is, the right a person has to land will determine the level of investment he will undertake to protect it by conservation measures. One must recognize, however, the limits of land protection when population pressure increases. In other words, land cannot be properly cultivated under conditions of high population pressure. This is the case in most rural areas of Senegal. Moreover, rural Senegal is witnessing a significant change in the structure of agriculture characterized not by a widening of the gap between small and large family farms, but by a general reduction of landholding and other factors of production as a result of State policy.

Most of the studies concerning the Serer and Wolof have focused on social and political stratification (Diop, 1968; Ralf, 1981; Gravrand, 1983 Gastellu, 1970 Lericollais 1970, 1972). Documentation on specific studies on the causes and patterns of segmentation has not been available. Yet, definitions of segmentation are given and its impact in

relation with land tenure presented.

Segmentation is defined as one process of change of family structure from which new family farms are created (Venema, 1978; Cattin, and Faye (1981). It is viewed also as the process by which new economic leadership is created within a residency unit (Albenque, 1974).

The impact of segmentation on land tenure is also considered. Segmentation in the Senegalese context of Serer and Wolof involves a process of definitive land allocation to the new head of production unit by his father (Pelissier, 1956). As a result of the fathers' obligation to allot land to their sons when they become heads of family farms, the amount of land available for family needs has become in many cases insufficient (Faye, 1982). None of these studies explored the causes and differences in patterns of segmentation, nor did they investigate the interactions that might exist between new family farms and family farms of origin.

In conclusion, families present different forms of structure from the primary nuclear family of a husband, his wife and children to the stem or extended family. Family development life cycle focuses on areas such as family structure, family organization, family size, family formation, family dissolution, and family economic behavior. These different aspects are affected by elements internal, but also external to the family.

II-2. Methodology

II-2-1. Research Questions and Hypotheses.

Three expressions describing patterns of segmentation are locally used: 1) "Gerem la ber la"; 2) "Mere la ber la"; 3) "mer beru".

"Gerem la ber la" occurs when a father, satisfied with his married son's skills and services, allows him to control a production unit of his own. "Mere la ber la" and "mer beru" refer to a situation of conflict between a head of a unit of production and his dependent that ends in the break-up of the unit of production affecting the residence pattern. In "Mere la ber la" the head of the unit of production makes the decision. In "Mer beru" the decision to separate is made by an angry dependent producer. "Mere la ber la" and "mer beru" may be obstacles for close interaction between the newly created unit of production and the unit of production of origin.

Segmentation is a result of different, but related factors: demographic (size of population), economic (level of productivity) and interpersonal relationships (degree of conflict). A family farm with a large population may be difficult to manage because of differences in goals and attitude of its members. There may also be a low level of resources available, potentially leading to difficult

interpersonal relationships in the family. Conflicting goals, quarrels among family members, may develop, e.g., between brothers, fathers and sons, mothers-in-law and daughter-in-law,. In other words, segmentation of family units of production can occur as a natural social process of the family developmental cycle. It can also result from different goals and strategies linked to new economic, and political changes in the traditional system. Whatever the context within which a new production unit emerges, its establishment is an important decision since its survival will depend on its ability to meet family needs (food and other expenses).

Units of production created after the Government's decision to stop the Programme Agricole (PA) through which farmers were obtaining equipment, are frequently under equipped. Second, the approach of the outreach agencies which only dealt with the heads of units of production for training, did not directly benefit new heads of family farms. Consequently, many of those who are becoming a head of unit of a production may have lower technical skills. Managerial ability and technical skills in farming may develop as the number of years in farming increases. It is also likely that additional labor will be secured as the family grows. The availability of land remains critical, however, particularly for those who are newly independent. Indeed, only the combination of land with other farm resources such as labor,

capital and management skills will determine the level of farm output. These considerations and the conditions within which segmentation may occur suggest several research questions and hypotheses:

1) To what extent does segmentation occurring as a result of conflict affect the readiness of the new head of production unit to separate?

When segmentation results from a conflict situation, the new head of a family farm may not be prepared to manage. This is particularly the case when the new head had no role in the management of the farm family of origin. Usually, the eldest becomes more are more involved in farm management with his father. Also, because of the conflict situation, a new unit of production and the unit of production of origin may have low levels of interaction. This will affect the new unit of production especially since it may have inadequate means of production. In other words, the conditions under which a new unit of production emerges will determine its ability to survive. Only interaction with other related or neighboring production units will mitigate these circumstances. Exchanges and mutual support between a father and his son are more likely to be limited if segmentation occurs because of conflict.

2) To what extent does a rapid increase in rural population and the continual fragmentation of land affect the performance of newly created production units?

For both the Serer and Wolof, the traditional system of land tenure makes it possible for a male to be allotted a portion of land from the family holding. Such a redistribution suggests that the later a unit of production is created, the smaller the portion of allotted land. And the smaller the size of holding available, the lower the production potential of the farm family. Limited land holding combined with a rapid demographic increase (about 2.9 per year for the whole country) that characterizes rural areas of Senegal may lead to over exploitation of land causing impoverishment. Agriculture being by far the main source of income and food production, the lack of land jeopardizes the ability of the head of a new unit of production to satisfy his family's basic needs or to reinvest in production activity.

3) <u>To what extent do different patterns of segmentation affect the interactions among family farms?</u>

It is important to investigate how the different patterns of segmentation affect the relationships between the family farm of origin and the new farm. Also important are the interactions among family farms that have same origin and, finally, the relationships among family farms in the context. of a village.

4) In rural Senegal, taking out loans is not developed out of the informal sector of villages. People in need of money or food can only get it from the trader of the village or

from other well off farmers. This category of well off farmers is diminishing, the need to develop survival alternatives aimed at providing family members with basic needs became a necessity. In that respect, we hypothesize that:

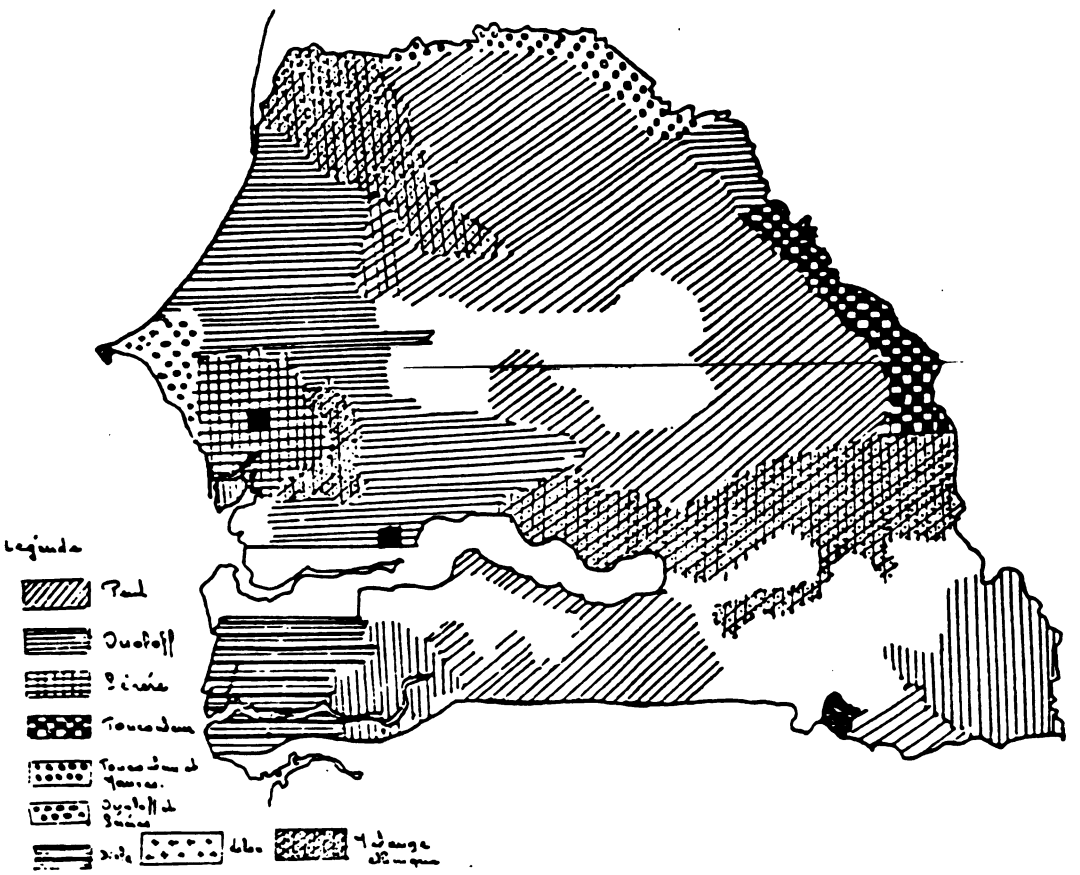
a) Members of units of production with a small size of land available are more likely to be found in off-farm activities within or outside their farm. Similarly,

b) Migration from villages is expected to be higher among landless production units than those with land.

II-2-2. Research Setting

The study occured conducted in two localities (Map. 1) where the Senegalese Institute for Agricultural Research (ISRA) has conducted research for many years: the villages of Sob and Ngayokheme in the district of Niakhar for the Serer and the villages of Dialacouna, Ndakhar, Ndiba, Ndimb-Taba and Thysse Kaymor in the District of Medina Sabakh for the Wolofs were selected. While access to the Serer zone is relatively easy, the lack of improved roads made the Wolof zone of Kaymor very difficult to access during the rainy season.

CARTE ETHNIQUE



II-2-3. Sampling Procedure.

The unit of production is the sampling unit and the unit of analysis. The unit of production is the most important recognizable entity for the study of micro level production processes. It has multidimensional functions composed of the level of organization of the production, the level of labor allocation and sometimes, the level of consumption. Several units of production may share the same residency unit (Pelissier, 1965; Martin, 1970). Consequently, all production units composing a residence unit were selected. Such a choice, we believe, would enable us to determine interactions that are performed between independent economic decision making units. It would also show production units that are under the same moral authority and finally, help identify the trajectories or historical evolution of units of production. Production units were randomly selected from village records available at the district level. Once a unit of production is selected, all units of production with the same origin were placed in the sample. Limited logistical support forced us to limit our sample to one hundred (100) units of production for each ethnic group, for a total sample of two hundred family farms surveyed.

II-2-4. Data Collection.

Two procedures of data collection were used. First, interviews were conducted based on a questionnaire (Appendix 2) addressed to all heads of the selected units of production. These interviews were done by two highly experienced enumerators who have been working in the area for a long time. Second, we recorded discussions on the topic of access to the status of head of production in general, and on segmentation on its causes and patterns. Using a guide for discussion (Appendix 1), we held group discussions in two villages, one a Serer village and the other, a Wolof village. Two levels of discussion occurred, one with adults who have gone through the segmentation process and the other with economically dependents adolescents. Besides questions on the access to the status of head of production unit: When does it happen? What are its causes? What are its patterns, and effects? Our purpose was to capture the perception each particular group has about segmentation, its evolution and future.

Data collection in the field lasted five months from March to July 1989.

II-2-5. Data Analysis.

To identify how the Serer and the Wolof compare, we provide general information for the total population of respondents and specifics features for each ethnic group is provided.

Frequencies and crosstabulations are used for generating descriptive statistics. Correlations among variables are calculated using SPSS.Pc+. The association of the size of landholding with age of the head of production unit, the year segmentation occurs, the patterns of segmentation, the size of the family farm, the level of equipment and the performances will be considered. Finally, a model focusing on the impact on the performance of units of production of variables such as the level of available resources, the pattern of segmentation, the ethnic group, the year of segmentation and the degree of interaction is tested using several indices. Following our hypothesis, we believe that the year of segmentation has an effect on the pattern of segmentation. In other words, one pattern can be more frequent among people who became head of a unit of production later as compared to those who completed the process earlier.

Two factors may significantly affect the level of resources available for newly created units of production. These are the redistribution of land to people who become head of a unit of production and the difficulties of access

to factors of production since the end of the Programme Agricole in 1980. Some rather recent patterns such as "mer beru" and "mere la ber la" may limit also the degree of interaction between the newly created unit of production with the unit of production of origin. These preceding variables are determinants of the performances of the units of production. Finally, low performances may push the units of production to look for alternatives in migration or in the practice of off-farm activities.

- By low performance we mean the inability of units of production to produce enough for food, other family's expenses and for reinvesting in farming.
- The level of resources available includes labor, size of land, level of equipment and the level of technical knowledge.
- The degree of interaction suggests the extent to which economically independent production units develop mutual support. Interaction varies by the frequency of visits, the frequency of exchange of labor, of equipment, of food support, and financial support.

II-2-6. Limitations of the Study.

The conditions under which the study was conducted have resulted in certain limitations. It is our conviction that proceeding to measurements would provide more meaningful

information instead of relying in peasants estimations for determining the size of holding, the degree of interactions, the frequency of food self-sufficiency. Such measurements would not only require a longer stay in villages but a longitudinal study that provides time series data for a an appropriate analysis of the evolution of farm families circumstances.

Despite the fact that women are not directly (or very rarely) involved as actors in the process of segmentation, their opinion on the subject could have help for a better understanding of segmentation.

CHAPTER III. PROCESSUS OF SEGMENTATION OF FARM FAMILIES.

III-1. Causes and Patterns of Access to Farm Operator Status.

III-1-1. Overview of Access to Farm Operator Status.

Group discussions held with both ethnic groups suggest changes in the pattern of access to the status of the farm operator. They also reveal differences in the way segmentation is perceived by young men who have not experienced it yet on one hand, and on the other hand, by heads of family farms. For the latter particularly, changes in the family structure by the creation of new economic decision-making units or production units have always existed. What is new, they say, are the circumstances under which these changes are occurring now and the patterns that have developed. For older people in villages, two forms of access to farm operator status have always existed or at least, have been largely dominant, namely succession and or retirement and recommendation.

Succession as indicated does not imply the division of the production unit into several family farms. It describes the situation when a head of a family farm is dead and is replaced at the head of the production unit by his brother

or his eldest son. It is different from retirement where the former head of family farm is still alive but does hold economic leadership anymore because of sickness or because of advanced age. Another difference between retirement and succession is that with retirement, factors of production owned by the former head of family farms such as equipment are kept by the new farm operator at least as long as the father is alive. In case of succession, the equipment is sold and each son interested in buying had a rebate of 10% on the proposed price whereas land previously exploited by the father was inherited (divided) among the sons. It is rare that the family splits among brothers as long as the father is alive. In both cases, the role of farm operator is most of the time granted to the oldest son of a former ndiatigue.

Access to farm operator status as a result of the retirement of a former ndiatigue represents 15.5% of total cases among which 8.0% of Serer cases and 23.0% of Wolof cases (Table 3-1). In comparison, access to farm operator status after the death of the head of the family farm represents 29.0% of total Serer cases. It is the most frequent pattern from which Serer respondents have became head of a production, 45.0% in contrast with 13.0% of Wolof family farms.

Recommendation is considered to be a normal process of the access to farm operator status. It corresponds to the stage of family life cycle when the family gets too large to be

manageable. In such situations, eldest sons are granted the right to become heads of family farms. In other words, they are authorized to create their own production unit. If in the family lived brothers of the former head of production units, the eldest was granted this opportunity first. Segmentation of family farm through recommendation was planned and prepared. The claimant was notified far ahead, usually at the time of field preparation, that he would become responsible of his own family farm. At the time of field clearing, the person to whom farm operator status has been granted was allotted a field that he and his family would henceforth hold. Then, a decision was taken in a common agreement with the head of the family farm of origin either to provide food to sustain the new production until the following harvest or to continue subsistence through sharing of prepared foods until the next crop. Food was guaranteed to the new family by the production unit of origin for its first rainy season.

A symbolic ceremonial gathering of close family and relatives always accompanied the passage from the status of dependent producer to that of the head of production unit as economic decision-maker. During that ceremony, the former head of the family farm presented his best wishes of success to the new head of production unit. Also, he told the attendants of the ceremony about the hard working qualities and abilities of the person promoted to farm operator status

and, the extent to which he was confident that the freed sourga could go his own way. Also a high degree of interaction was maintained between the newly created production unit and the production unit of origin during all the first season. This interaction was in the form of help with labor from younger brothers, but also help and advice from the former head of family farm as reported during village discussions.

Cases of "watch" or recommendation (Table 3-1) represent 19.0% of total cases. This includes 28.0% of Wolof respondents as compared with 10.0% of Serer. This difference suggests that Wolof may be more open to letting sons or brothers to settle on their own. Beside this pattern of segmentation which occurs as a recommendation by the head of family farm to one of his dependents, other forms of production unit division are developed: personal request and conflict in the family.

Personal request and conflict are not new phenomena in the view of participants of village discussions. What is new is the extent to which their frequency is increasing. Personal request occurs when the son or other dependent producer demands the right to have his own production unit. Segmentation as a result of conflict, "mer beru or mere la ber la", describes the process of access to farm economic leadership as a result of a conflict in the family farm of origin.

Table. 3-1- Distribution of Respondents by Pattern of Access to Farm Operator Status and By Ethnicity.

Patterns of Access to Farm Operator Status	Ethnicity Serer	Wolof	Total
Personal Request	34.0%	29.0%	31.5%
After Recommendation	10.0	28.0	19.0
Retirement of Father	8.0	23.0	15.5
Death of Father	45.0	13.0	29.0
Conflict	3.0	7.0	5.0
total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

Participants to village discussions have provided several explanations why personal request and conflict occur. In the case of personal requests, heads of family farms invoke a change in the value system of the society. Young people are seen as having lost the sense of commitment to the family. As a result, youth regard themselves as being exploited by their parents. They do most of the work and

yet, receive very little for their efforts. What they want is a personalized share of the outcome of the work to which they have participated. The idea has become so strong that some young men show no enthusiasm working in family collective fields for which control of the production is exercised by the head of the family farm. Rather, they attach more importance to their own fields for which they have control over the income generated. A second argument largely shared by younger heads of family farms concerns the inability of most heads of production units to guarantee enough food for their family. When it was possible to produce enough for family sustenance and still have some surpluses, heads of production units could deal with dependent individuals needs such as financing the first marriage of their son. This is no longer possible and worse, some heads of family farms have no alternative than to rely on their dependents income for help.

For young and dependent producers, there are several reasons for leaving the family farm. All have a common denominator: economic opportunity. Young people are unwilling to stay in a family farm for the sake of family solidarity as they reported during village discussions. Also, they request having their own production unit when they contest the economic leadership of their elder brother to whom economic leadership is being granted. The economic leadership of a brother is questioned in terms of his ability to operate a

production unit efficiently. Half brothers frequently separate after the death of their father, each creating his own production unit with his unmarried younger brothers and sisters and his mother. Such a move is a reaction to the inheritance system in the patriarchal kinship in which only sons inherit from their father.

Those who are in the family farm of their uncle or half brothers cannot inherit anything upon the death of the uncle or half brother. The impossibility of inheriting things that you have worked on is a discouragement from staying too long as a dependent producer in a half brother or an uncle's production unit. Future security, then, is a major reason for segmentation. These causes in separation are not independent from the introduction of groundnut cultivation which created new expectations, new roles and even new consumption patterns.

With the cultivation of groundnut, women and dependent young men began to cultivate fields for themselves in addition to their contribution to family fields. Income from those fields was entirely under their control. It could be used for personal needs without affecting or interfering the obligation to the head of production unit vis a vis his dependents. While staying in the family, young men have became progressively self-supporting at least for buying clothes, cigarettes and even radios. These opportunities for personal economic gains also contribute to undermining the

cohesiveness of the family. Personal request then occurs as a result of the competition over scarce resources or goals and means to achieve those goals between a dependent and his father or between half-brothers. It is particularly common in the extended family or in the case of non family dependent producers who stayed for a long time in the family production unit. Also it happens among brothers after their father dies, especially when they have different mothers. In a few cases is there a personal request from a son to leave the family farm of his father.

When both Serer and Wolof respondents are considered, personal request is the most frequent mode of access to farm operator status (Table.3-1). Of all respondents indeed, 31.5% have became head of family farm after personal request. Within ethnic groups, personal request is the most frequent pattern of access to farm operator status for Wolof 29.0%. It represents 34.0% of cases of access to farm operator status for Serer respondents. Cases of personal request to separate from brother for Serers total 85.0% as compared to 12.0% of cases of personal request represented by a nephew, and only 3.0% from sons to their father. For Wolof respondents, personal request from sons represent 45% of cases, request from brothers 35% and from nephew 20%.

Segmentation as a result from conflict occurs when a dependent producer decides to separate as a result of disagreement with his Ndiatigue. The decision to separate

may also be initiated by a head of a family farm. This is the case when the head of the family farm can no longer stand the behavior of a dependent producer who does not comply with his way of managing the family farm. This happens when a dependent producer shows his unwillingness to fulfill his obligation to participate in working in collective fields compared to working in his own plots. Segmentation as a result of conflict represents 5.0% of all cases studied, most of them Wolof cases 7.0% as compared to 3.0% of cases of conflict for Serers. For Serer respondents, all three cases are cases of conflict between brothers. For Wolof respondents, three cases are conflict between spouses, two cases are cases of conflict between head of family farm and the dependent producer and, finally, two cases of misunderstanding between brothers. It must be indicated that disagreement between brother still under father's authority does lead to segmentation as it would be the case after his death.

The division of units of production which affects most of the newly created family farm is segmentation as a result of conflict between a dependent producer and his Ndiatigue. Here, the new farm operator only receives land if he separated from his father's family farm and if he stays in the village. Until the misunderstanding is settled down, he does not receive any further help from his former N'diatigue. The logic behind receiving land rests on the

right each member (son) has on the holding managed by his father by virtue of the land tenure system.

Figures 1 and 2 suggest that some patterns of access to farm operator status such as succession and to some extent personal request are more associated with Serer and others such as recommendation and conflict with Wolof. This indicates that Wolof tend to agree more easily to the departure of family members than Serer do and even to facilitate it. One reason could be, the findings by Martin (1970), that family cohesion seems to be more developed among Serer. A parallel to this can also be traced in the implementation of the Program "Terres Neuves Projects" aimed at reducing the population pressure in the Serer Zone by opening new land. Despite difficult conditions in their villages, Serer for the first years resented settlement in the Terres Neuves. It follows from these observations that the Wolof may particularly favor segmentation of family farms more than Serer will. The perception of Wolof and Serer respondents about segmentation shed light on this point.

Figure 1. PATTERNS OF ACCESS TO FARM

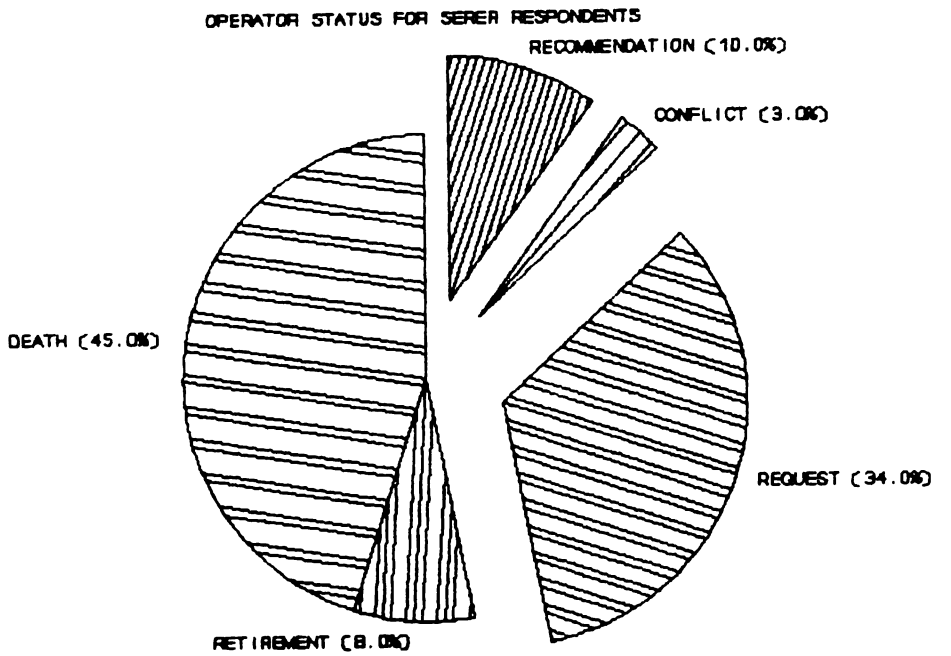
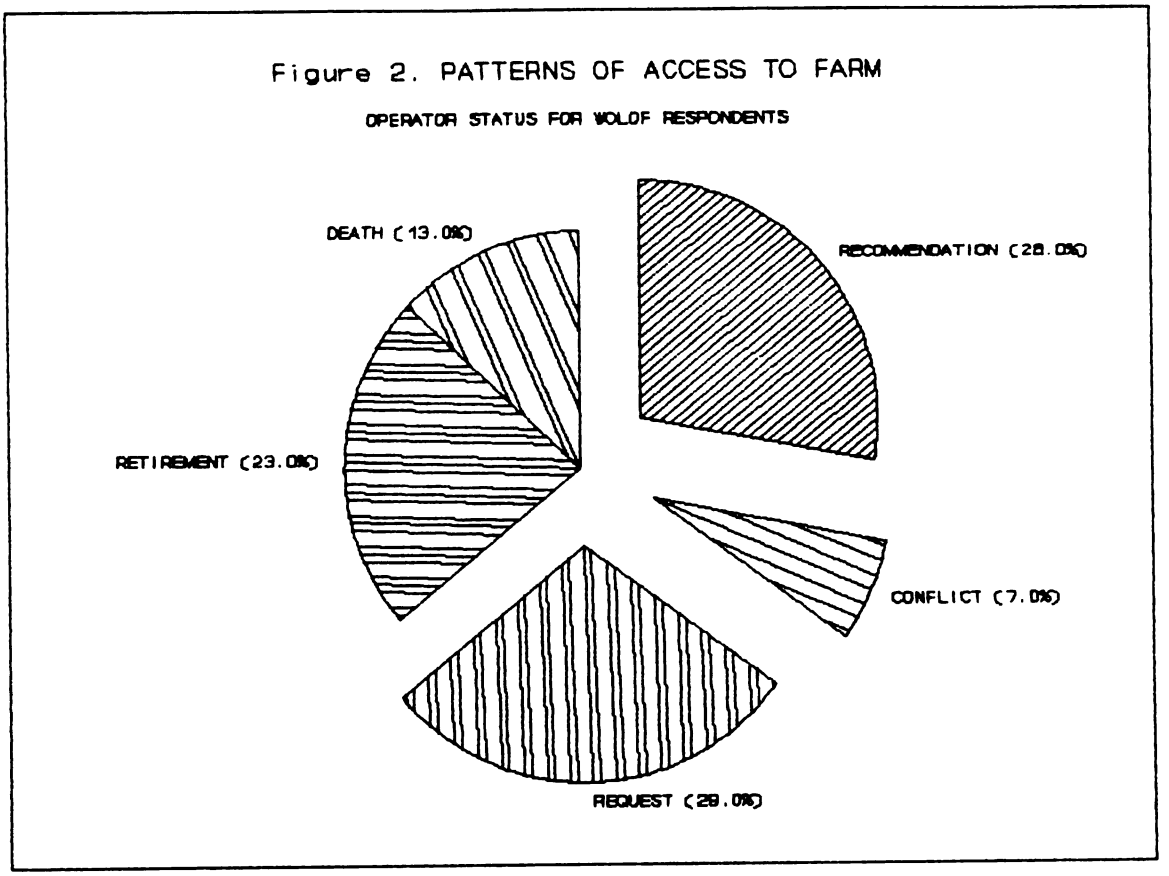


Figure 2. PATTERNS OF ACCESS TO FARM



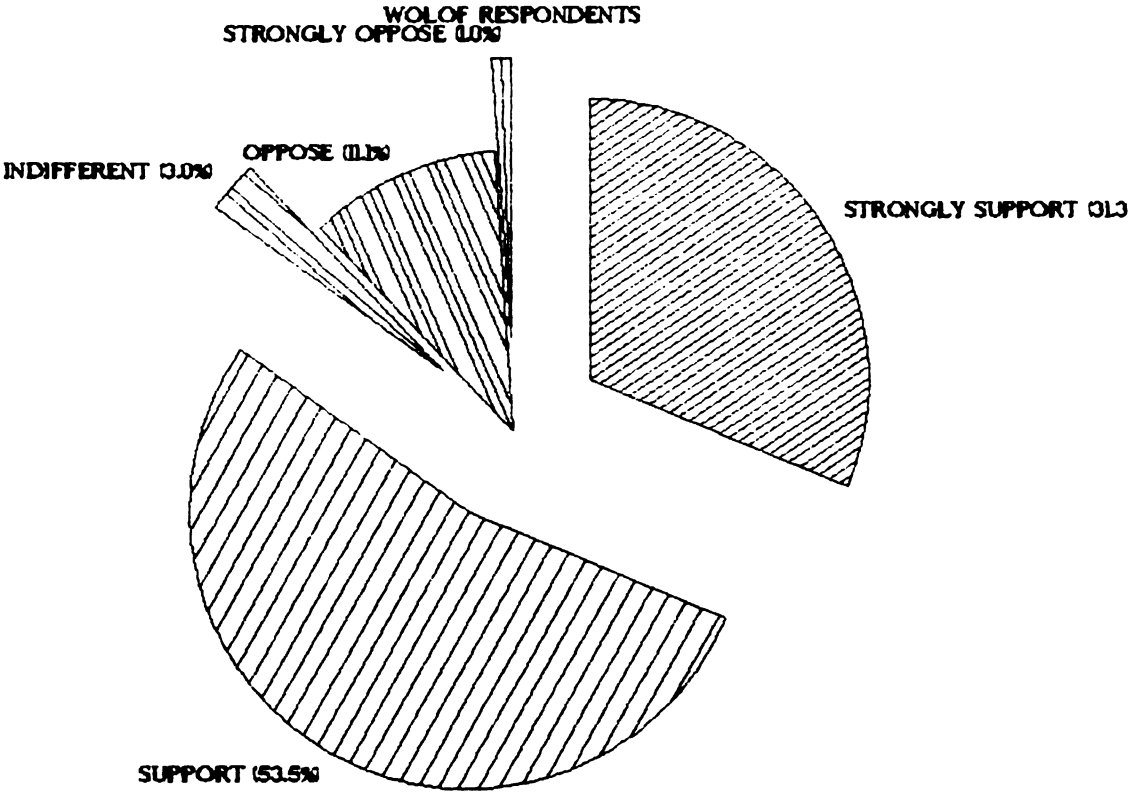
III-1-2. Respondents' Attitude about Segmentation.

Beyond the distribution of respondents by patterns of access to farm operator status this dissertation focuses the perception Serer and Wolofs respondents have about segmentation (Table 3-2). Table 3-2 indicates that 60.5% of all respondents are supportive of segmentation as compared to 34.0% who oppose it.

Table 3-2. Perception of Segmentation by Ethnicity.

	Ethnicity		
Perception of Segmentation	Serer	Wolof	Total
Strongly Support	13.0%	31.0%	22.0%
Support	24.0	53.0	38.5
Indifferent	7.0	2.0	4.5
Oppose	33.0	11.0	22.0
Strongly Oppose	23.0	1.0	12.0
No Response	0.0	2.0	1.0
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

Fig. 7 PERCEPTION OF SEGMENTATION BY



As indicated earlier, differences are observed by ethnicity (Figures 3 and 4). While most of Wolof respondents 84.0% including 31.0% who strongly support and 53.0% who moderately favor segmentation, only 37.0% of Serers among whom, 13.0% strongly favor and 24.0% moderately favor support segmentation. In contrast, 56.0% of Serer respondents oppose segmentation. Some of them, 23.0%, strongly oppose segmentation and 33.0% moderately oppose it. As far as Wolof are concerned, only 12.0% reported opposing segmentation.

III-1-3. Justification of the need to Segmentation

Those who favor segmentation give two principal justifications (Table 3-3), . First, some, 22.0% of Serer respondents and 17.0% of Wolofs respondents, consider farm family size as an important cause for segmentation. The greater the size of the family, the more likely conflicts between individuals may develop and the more likely segmentation will take place. For these people representing 19.5% of total respondents, segmentation is viewed as a strategy for avoiding conflicts between members. For others, 28.0% among whom 12.0% Serer and 44.0% Wolof, economic independence makes segmentation attractive. For those who oppose segmentation, respect of tradition (52.0% of Serer and 11.0% of Wolof) and the partition of resources (8.0% of

Serer and 12.0% of Wolof), are put forward as reasons. Finally, 11.0% of respondents, 6.0% of Serers and 16.0% of Wolofs, favor segmentation on the grounds that the claimant to any form of access to farm operator be ready and able to assume the responsibility involved. For these respondents, the time has passed when the former N'diatigue could provide help.

Table 3-3. Justification of the Perception of Segmentation by Ethnicity.

Justification of Perception	Ethnicity Serer	Wolof	Total
Size of the Family Farm	22.0%	17.0%	19.5%
Economic Independence	12.0	44.0	28.0
Respect of Tradition	52.0	11.0	31.5
Fragmentation of Resources	8.0	12.0	10.0
Readiness of the Claimant	6.0	16.0	11.0
Total	100.0%	100.0%	100.0
(N)	(100)	(100)	(200)

Today no family farm has enough resources for its own needs and therefore, cannot provide any assistance.

III-1-4. Evolution of Patterns of Segmentation.

This section focuses on the evolution of patterns that lead to the division of the family farm in several production units: personal request, recommendation and conflict. To capture this evolution, four periods were differentiated from the earliest a respondent became farm operator to the time the study was conducted. The first period concerns cases of segmentation between 1927 to 1942, the second period, cases of segmentation between 1943 to 1958, the third period from 1959 to 1974 and, the fourth period, from 1975 to 1988.

For both Serer and Wolof, there is an increase in the number of cases of segmentation particularly for patterns such as personal requests and recommendation (Figure 5 and Figure 6). However, differences are observed in the extent of increase.

For Serer respondents (Figure. 6), cases of personal requests have significantly increased from the second period. In comparison, the evolution of cases of recommendation that are reported only from the second period is irregular. Cases of conflict are reported only in the third period. As for Wolof respondents (Figure. 6) the

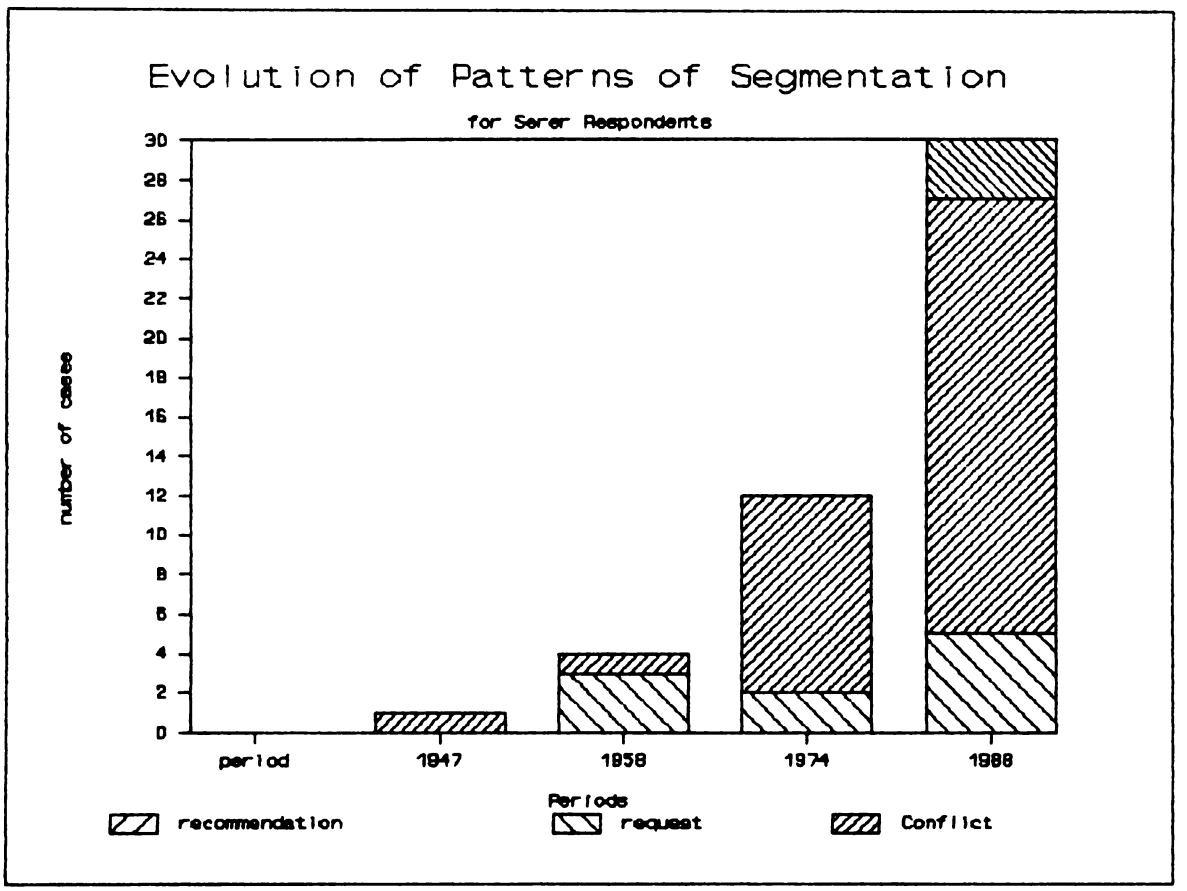
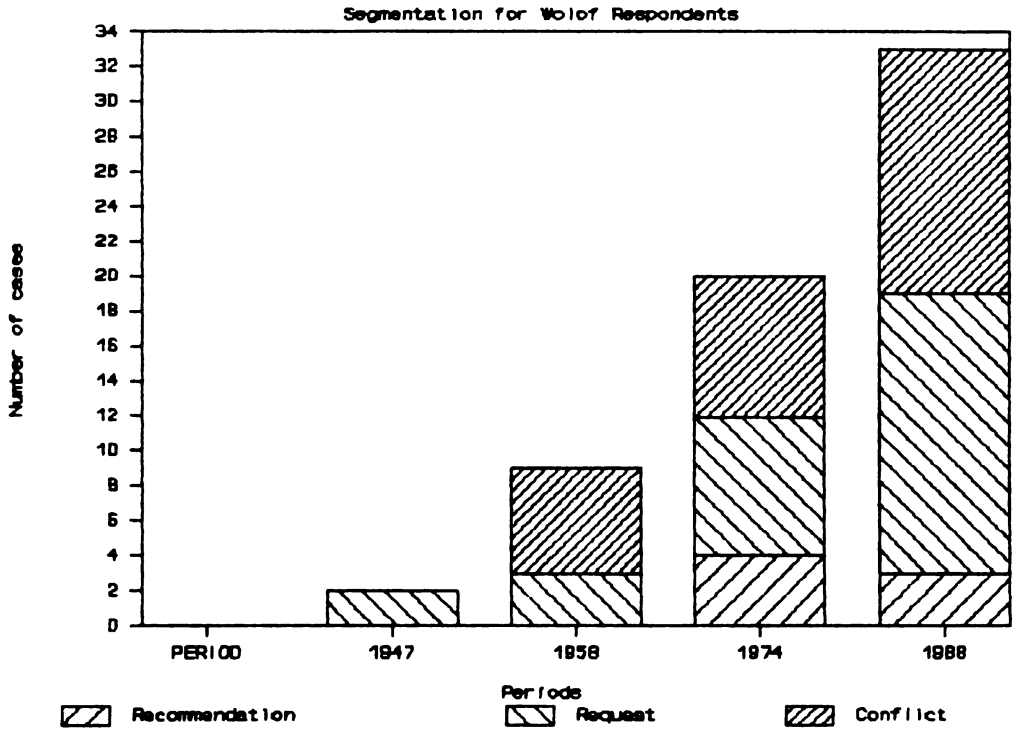

Evolution of Patterns of Segmentation
for Serer Respondents
number of cases
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
period
1947
1958
1974
1988
Periods
recommendation
request
Conflict

Figure 6. Evolution of Patterns of



second period is characterized by an important increase the number of cases of personal requests and cases of recommendation. Two factors explain the rapid increase of cases of personal requests for both Serers and Wolofs and the increase of the number of cases of recommendation for Wolof as well. First, the period from 1958 is characterized by the introduction of new opportunities in rural areas aimed at improving agricultural production (equipment, training, selected seeds of groundnut) and that could be individualized. By increasing the level of production, such efforts contributed to lowering the reliance of dependent producers on their fathers and/or ndiatigue. Also, the accessibility to factors of production outside the farm family encouraged dependent producers with strong desire of economic independence to claim having their own units of production. People who became head of a farm family could indeed register to cooperatives and have direct access to factor of production. The second factor consists in the pressure on the available resources for family farms particularly since the end of the Agricultural Program in 1980. In other words, the lack of resources preventing farm families to effectively play their role of security as a result of deteriorating condition of agricultural production is leading to accelerated family segmentation.

The data indicate that while Wolof are open to change and tolerate more the departure of family members, Serer seem to

favor less the fragmentation of the family by recommending the departure of some members. Such an attitude may lead to more efforts being put in managing conflict and thus contribute to lower cases of segmentation as a result of conflict.

In conclusion, one can argue that reduced resources have contributed to weakening the faith of young people in the ability of families to continue providing economic security. Rather, the dependence to the family leader is seen as an obstacle to personal economic development. It follows that having one's own production unit, particularly for Wolof respondents, is considered to be an alternative to staying dependent on a head of production unit who barely can feed his family and at the same time take care of individual needs. The way such a feeling is expressed and the rapidity with which one would like ownership of a production unit to occur lead, in some cases, to misunderstandings within family farm and to separation.

CHAPTER IV. CHARACTERISTICS OF FARM FAMILIES.

The following sections examine: 1) how the patterns of segmentation are associated with variables such as age of respondents and age at the time of segmentation; 2) how patterns of segmentation are affecting the characteristics of family farms namely size of holding, size of population, level of equipment, and level of resources available, and 3) how patterns of segmentation affect the farming performance of family farms.

IV-1. Characteristics of Respondents.

IV-1-1. Age of Respondents.

Respondents were selected to cover all ranges of age from those beginning to operate a family farm to those at the age of retiring from agricultural activities. Observation of the age distribution (Table 4-1) does not suggest significant differences between the two ethnic groups. This is confirmed by the analysis of means from which the average age for Serer head of family farms interviewed is 49.5 years old whereas the average age of Wolof is 50 years old. In both ethnic groups there is a wide range of age of respondents as indicated by the standard deviations of 13.2 for Serer and 12.6 for Wolof. Differences in age suggest differences in

farming management experience, in other words, the ability to use available resources efficiently.

Table 4-1 shows that 22.0% of Serer respondents are under forty as compared to 15.0% of Wolof respondents. This seems contradictory with the idea mentioned earlier that Serer tend to stay longer in the family than Wolof. The observation of the age distribution at the time of access to the status of farm operator (Table 4-2) provides an answer.

Table 4-1. Distribution of Respondents by Ethnicity and Category of Age.

Age Categories	Ethnicity		
	Serer	Wolof	Total
< 28	5.0%	3.0%	4.0%
29 to 40	17.0	12.0	14.5
41 to 50	33.0	44.0	38.5
51 to 60	24.0	23.0	23.5
> 60	21.0	18.0	19.5
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

It indicates that 40.0% of Serer respondents as compared to 59.0% of Wolof have acceded to farm operator status by the age of forty years. The presence of 6.0% of Serer respondents in the family farm of origin beyond 60 years can be interpreted as an indicator supporting the longer presence of Serer in the family farm of origin despite the fact that the analysis of mean ages gives an average age of access to head of production unit of 31.7 years old for Serer and 32.2 years for Wolof 2/ .

Table 4-2. Age Distribution of Respondents at the Time of Access to farm Operator Status by Ethnicity.

Age at Segmentation	Ethnicity		
	Serer	Wolof	Total
< 28	27.0%	18.0%	22.5%
29 to 40	40.0	59.0	49.5
41 to 50	23.0	18.0	20.5
51 to 60	4.0	5.0	4.5
> 60	6.0	0.0	3.0
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

Finally, this table confirms that it is now common to find people who become head of family farm before age thirty -- 22.5% of total respondents (27.0% of Serer and 18.0% of Wolof) have risen to the status of farm operator before age twenty nine.

At the time of access to farm operator status, the average age of access for each pattern was examined. Tables 4-3 and Table 4-4 present respectively for Serer and Wolof the distribution of respondents according to their age at the time of access to the status of head of production unit. Concerning Serer respondents (Table 4-3), there is no real concentration in a given age. Patterns that lead to division of the family farm (personal request, recommendation and conflict), occur in a larger range than is the case for Wolof respondents. Even though becoming head of family farm at after age fifty may seem extreme nowadays, these are not isolated cases if one refer to remarks made during village discussions. Table 4-4 shows a concentration of Wolof cases in the range of age 26 to 36 years old for all patterns of access to the status of head of family farm. Also cases of lowest class of age for which the number of cases is high (34.9% and 23.1%) are unexpected cases of succession. This may suggests two things. First, that beyond a certain age, twenty six years old, people are believed to have accumulated experience that makes it more acceptable to let

them go on their own. Also it can be that by the time people reach this age, the family farm of origin has enough labor so that the departure of one dependent and his family will not seriously affect the family labor.

Table 4-3. Age Distribution of Serer Respondents by Pattern of Access to Farm Operator Status

	Age Categories					
Patterns of Access	15-25	26-36	37-47	48-58	>58	total
Personal request	26.5%	35.3%	32.4%	2.9%	2.9%	100.0% (34)
Recommendation	30.0	30.0	20.0	10.0	10.0	100.0 (10)
Retirement	25.0	75.0	0.0	0.0	0.0	100.0 (8)
Death	26.7	42.2	17.8	4.4	8.9	100.0 (45)
Conflict	33.3	0.0	66.7	0.0	0.0	100.0 (3)

Table 4-4. Age Distribution of Wolof Respondents by Pattern of Access to Farm Operator Status.

Patterns of Access	Age Categories 15-25	26-36	37-47	48-58	total
Personal Request	3.4%	65.6%	27.6%	3.4%	100.0% (29)
Recommendation	17.9	53.6	21.4	7.1	100.0 (28)
Retirement	34.9	56.5	4.3	4.3	100.0 (23)
Death	23.1	61.5	7.7	.7	100.0 (13)
Conflict	14.3	57.1	14.3	14.3	100.0 (7)

A final illustration of the age at the time of access to the status of head of production unit is expressed by an analysis of means which gives the average age for each pattern of segmentation controlling for ethnicity (Table 4-5).

Table 4-5. Age at the Time of Segmentation by Ethnicity and Type of Segmentation.

Personal Request.

	Serer	Wolof	Total
Mean Age	32.8	33.9	31.9
Std. Deviation	10.3	6.1	9.3
Number of cases	34.0	29.0	63.0

Recommendation.

	Serer	Wolof	Total
Mean Age	35.0	32.8	33.4
Std. Deviation	12.3	8.3	9.4
Number of cases	10.0	28.0	38.0

Conflict.

	Serer	Wolof	Total
Mean Age	32.0	33.7	33.2
Std.Deviation	14.0	8.6	10.7
Number of cases	3.0	7.0	10.0

Average age for cases of recommendation 33.4 years old is higher than the average age for cases of personal request 31.9 and the average age for cases of conflict, 33.2 years old. The table also indicates that recommendation for Serer respondents occurs at a later age than for Wolof. The difference in average age for personal request and conflict between Serer and Wolof is negligible.

IV-1-2. Technical Knowledge of Heads of Family Farms.

By technical knowledge is meant the "know-how" of farm operators which, combined with other factors of production, may determine farming efficiency. Technical knowledge includes farm management capabilities. It also includes practical techniques concerning the use of equipment and techniques of cultivation. Family experience and training by state intervention through outreach agencies are the ways through which technical knowledge is acquired.

As far as family experience is concerned, the time a person is involved in agricultural activity helps him gain some experience not only in conducting practical activities but in managing a production unit. In other words, it is likely that the longer an individual stays in the family farm of his father, the more farming experience he builds.

In rural Senegal where formal education is not widespread

particularly among older people, different institutions have integrated a training aspect to their interventions. The National Outreach Agency for Development (SODEVA) and the Senegalese Institute for Agricultural Research (ISRA) have provided farmers with training aimed at improving their production by use of new techniques of cultivation. By means of discussion and field demonstrations, farmers were taught techniques as diverse as the use of fertilizer, use of animals for cultivation, assembling and use of equipment. These actions which were supported by facilities offered to farmers, i.e., access to equipment and other production factors needed trough cooperatives. Most of the respondents of this study benefitted from these programs as indicated in Table 4-6.

A high percentage of Serer and Wolof respondents 72.5% have benefitted from direct training through SODEVA AND ISRA. This gives an indication of the importance put on improving farmers' conditions of production particularly in the zone where groundnut cultivation was developed. Table 4-6 suggests differences among Serer and Wolof. First, most of the respondents who reported not having received direct training are Serer respondents, 38.0% as compared to Wolof respondents 16.0%. The second difference concerns the sources of training. It appears indeed that Wolof respondents have had more opportunities provided by the presence of ISRA, SODEVA, and SODEFITEX South of the Kaolack

region where programs were being conducted while in the North only SODEVA had a program accompanied with a training part. Concerning the nature of the training, the package of techniques offered has been similar even though each institution used different approaches.

Table 4-6. Distribution of Farm Operators by Ethnicity and Training Institution.

Training Institution	Ethnicity Serer	Wolof	Total
I.S.R.A.	0.0%	44.0%	22.0%
SO.DE.VA.	61.0	12.0	36.0
I.S.R.A./SO.DE.VA.	0.0	24.0	12.0
SO.DE.VA./SO.DE.FI.TEX	0.0	4.0	2.0
No Formal Training	38.0	16.0	27.0
No Response	1.0	0.0	0.5
Table	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

In comparison to other institutions, the Senegalese Institute for Agricultural Research (ISRA), through the

Experimental Unit Project provided some farm management training besides the traditional technological package to be implemented.

As indicated, access to inputs necessary to the implementation of such programs was facilitated by the cooperatives where not only family farms could get factors needed but also where they could sell their production of groundnut. Membership to these cooperatives was, however, limited to farm operators. Dependent producers as well as women were not granted membership to these cooperatives and, as a result, did not have direct access to factors of production. A dependent producer who wanted to get his own factors of production, in preparation of his future role, had to rely on his father or on the head of production unit he depended on. Also, the training programs did not directly address to all heads of family farms because of limited logistical resources, but also because of the criteria that had to be satisfied before a family farm was selected for participation in the program. In this selection, family farms with large holdings and which had labor available were advantaged. What this approach suggests is that training programs have favored those production units that already had a good level of resources available, leaving aside those production units that needed help the most. The program through which ISRA was providing training stopped in 1980. Similarly, the Cooperatives have disappeared. SODEVA's

activities have been reduced and have shifted from outreach to simply monitoring maize production contracts. Moreover, the new agricultural policy (NPA) introduced in 1984 leaves full responsibility to farmers for the acquisition of inputs necessary for their production.

These considerations suggest a deterioration of the conditions of production as far as the acquisition of factors of production is concerned. Also the level of technical knowledge may be declining as those who are becoming head of family farms may not have had previous training but only family experience. Important questions can be raised for the changes introduced. First, are farmers sufficiently trained to insure efficient and sustainable practices of agriculture, that is to say, producing enough food while protecting the environment? Do farmers have a level of capital that would guarantee the acquisition of needed factors of production? Finally, do they have access to factors of production without government intervention? This dissertation cannot answer these questions, but they are of particular importance because of the perception respondents have of training in agriculture. For 85.0% of respondents, there is no doubt that training is important. Yet they say as do the other respondents that technical training does not really help when conditions are as hostile as they are: hazardous and insufficient rainfall, lack of equipment, no fertilizer and so on. As reported during

villages discussions, one can hardly differentiate farmers who have had formal training from those that did not.

Why is there no difference? It is because the conditions of production are delicately balanced at a survival stage. The stage at which Serer and Wolof family farms in Senegal find themselves particularly in the groundnut basin where the respondents are located. Under such conditions, people tend to turn toward techniques that have secured subsistence. They may do so by using improperly introduced tools. By classifying family farms according to factors of production available, the following sections give indications about what their farming performances, their ability to produce enough for food and for investment in agriculture, might be. Also we examine the extent to which differences in the patterns of segmentation are impacting the level of available resources.

IV-2. Characteristics of Family Farms.

Size of land available and labor are generally considered as key elements in elaborating typologies of family farms. Yet, it is the way they combine with such factors as capital and management, that determine the farming performances. Capital includes livestock and equipment, and management suggests the ability to combine available factors efficiently.

The following sections examine all these factors. Particularly, they examine the extent to which they are associated with patterns of segmentation and with the ethnicity of respondents.

IV-2-1. Patterns of Residency of Family Farms.

In the introduction, we have differentiated "M'bind from N'gack" for Serer and "Ker from N'diel" for Wolof. M'bind and Ker designate the residency unit, the physical habitation, N'gack and N'diel represent the family production unit considered in this paper as the unit of analysis. Within a M'bind or Ker, separate n'gack or n'diel can coexist. In some cases however, m'bind and Ker represents the physical residency unit at the same time that they are the family production unit (Table 4-7). Such cases where the residency unit corresponds to the family farm are predominant in both ethnic groups (67.4%). In village discussions, the farmers reported that more and more people after they became head of production unit choose to have their own residency unit. Those who were granted the status of farm operator used to stay in the same residency with their family of origin, at least for a given period of time.

Table 4-7. Distribution of Residency Unit by the Number of Family Farms and Ethnicity

Number of Family Farms by Residency Unit	Ethnicity Serer	Wolof	Total
One Family Farm	70.0%	64.7%	67.4%
Two Family Farms	20.0	26.5	23.2
Three Family Farms	8.6	5.9	7.2
More than Three Family Farms	1.4	2.9	2.2
Total	100.0%	100.0%	100.0%
(N)	(70)	(68)	(138)

With the development of new patterns of segmentation there is a trend for newly created family farms to settle on their own. Such a move reflects the desire of independence of young people vis a vis their parents. The separation of a residency unit strengthens economic independence vis a vis the family farm of origin. It also gives social authority to the production unit head on matters internal to the residency. In other instances, the new family farm will be represented by his father, older brother, or uncle living in

the same village.

Data collected for residency units with several family farms show the relationships between heads of family farms (Table 4-8). Residency units with family farms of brothers of the head of the residency unit are more frequent among cases of co-residency for the two ethnic groups but particularly among Serer cases. They represent 86.7% of cases of co-residency among Serer as compared to 37.5% of total Wolof cases. In contrast, Wolof have the highest frequency (21.9%) of residency with production units of sons of the father. Such cases are rather rare among Serer. Similarly, Wolof residencies are more open to people outside the family, i.e., nephews, and cousins (31.2%).

Concerning the structure of residency units, Table 4-8 suggests different types of family structure composition indicating that family farms are not necessarily simple nuclear families but they may be formed around other important relationships. First, there is horizontal composition type where the residency shelters family farms of brothers of the head of residency. Second, there is a vertical type of family farm composition indicating that father and sons share the same residency unit.

Table 4-8. Relationship Between Farm Operators Within the Same Residency Unit by Ethnicity.

Relation Between Farm Operators	Ethnicity Serer	Wolof	Total
Father and Sons	6.7%	21.9%	14.5%
Brothers	86.7	37.5	61.3
Nephew and/or Cousins	3.3	31.2	17.7
Father Brothers Sons Nephew	3.3	9.4	6.5
Total	100.0%	100.0%	100.0%
(N)	(30)	(32)	(62)

A third mode, that integrates nephews and/or cousins, would be a combination of both horizontal and vertical types of demographic composition within the residency unit. Similar composition of the population exist for cases where the residency corresponds to the family unit.

IV-2-2. Size of Family farms.

The size of Serer and Wolof family farms is examined in Table 4-9. Serer family farms are smaller than their Wolof counterparts. First of all, 51.5% of family farms, Serer and Wolof combined have a total population between one to ten inhabitants. These include, 57.0% of Serer family farms and 46.0% of Wolof family farms. When family farms of 6 to 10 inhabitants and 11 to 15 inhabitants are taken separately, no difference is found between Serer and Wolof family farms size. Wolof family farms with a population size beyond fifteen inhabitants represent 37.0% as compared to Serer family farms of the same size 15.0%.

The analysis of means (Table 4-10) indicates that Serer family farms are smaller than Wolof family farms. The mean size for Serer family farms seems to contradict the idea that Serer tend to stay longer in the family farm of origin. Indeed, the later the division of a family, the larger the size. In the present case however, one must consider circumstances that make the Serer family a smaller size than the Wolof family. Some actions such as family planning programs implemented in the zone where Serer are

Table 4-9. Distribution of Family Farms by Size and Ethnicity.

Size of Family Farms (Number of Inhabitants)	Ethnicity Serer	Wolof	Total	Cum
1 to 5	19.0%	9.0%	14.0%	14.0%
6 to 10	38.0	37.0	37.5	51.5
11 to 15	28.0	27.0	27.5	79.0
16 to 20	8.0	17.0	12.5	91.5
> 20	7.0	10.0	8.5	100.0
Total	100.0%	100.0%	100.0%	
(N)	(100)	(100)	(200)	

located may have had an impact on lowering of the size of family farms. Also, an undeclared epidemic of cholera spread for two successive years (1987 and 1988) may have had impact on the size of family farms. The data suggest an association between the size of holding and the size of family farms. When both ethnic groups are considered, the data indicate a positive association r=.431** (Table 3-21) between the total size of holding and the population size of the family farms. This suggests that the more land a family farm has, the more

likely its population will be high. It must be noted that the magnitude of the association between population size and size of holding is different when ethnicity is considered.

Table 4-10. Population size of Family Farms by Ethnicity.

Statistics	Ethnicity		
	Serer	Wolof	Total
Mean Size	10.9	12.3	11.6
Maximum Size	28.0	35.0	35.0
Minimum Size	2.0	2.0	2.0
Standard Deviation	6.5	6.2	6.4

Thus, the correlation for Wolof respondents is relatively high (r=.569**) while it is lower for Serer but still positive (r=.245*).

IV-2-3. Characteristics of the Population of Family Farms.

Concerning the age distribution of family farm members, three age classes are differentiated Table 4-11. The age distribution of the population of family farms suggests a particularly young population -- 52.0% of the total population of Serer and Wolof production units are under sixteen years old. When considered at the level of each ethnic group, this population under sixteen represent 55.7% of the total population of Wolof family farms including 32.4% who are less than eight years old and 23.3% between eight and fifteen years old. As compared, 48.0% of the total population of Serer family farms are under sixteen years old. This includes 27.3% who are under eight years old and 20.7% between eight and fifteen years old.

Such a high percentages of youth raise an additional observation. First, it suggests that fertility rate among Serer and Wolof is still high. Among Serer, more than average of the population are in the category over fifteen years old, 52.0% as compared to 44.3% of the Wolof population who are in the same category. This may have resulted from a lowering of the fertility rate. Secondly, given the unfavorable context of agriculture, it raises for heads of production units the problem of bringing more and more land into cultivation in order to accommodate the needs

for food of the growing population. Finally, one may ask what type of future in farming lies ahead for these young people in terms of available land for establishing their own farms.

Table 4-11. Distribution of the Population by Age and Ethnicity

Classes of Age (years old)	Ethnicity Serer	Wolof	Total
1 to 7	27.3%	32.4%	30.0%
	(297)	(400)	(697)
8 to 15	20.7	23.3	22.0
	(225)	(287)	(512)
more than 15	52.0	44.3	48.0
	(567)	(547)	(1114)
Total	100.0	100.0	100.0
(N*)	(1089)	(1234)	(2323)

* Number of persons in the age class.

IV-2-4. Active Population of Family Farms.

One characteristic of the family farm is that the labor is primarily provided by members of the family. The active population then represents the available labor of the family farms, persons who have reached an age at which their participation in family collective work is expected. The active population of family farms differs according to the norm used 4/. National Norms (NN) used for determining the active population consider active all persons, male and female, from fifteen to sixty years old. Table 4-12 presents the distribution of family farms by the importance of the active population. The size of the category of population under fifteen is not considered active by National Norms. This affects the active population for family farms and particularly Wolof family farms. This explains why 39.5% of total family farms have between 1 and 6 active members, representing 36.0% of Serer family farms and 43.0% of Wolof family farms. The active population of family farms is related to the age of the farm operator. In other words, the younger the farm operator, the smaller the size of the active population. Such an association does not hold, however, when the farm operator has replaced his father without the family farm being divided. All of this active population is not always available during the period of agricultural activity as indicated by responses to the

question. Did anyone of the family farm members leave for a relatively long period (more than three months) during these last two years?

Table 4-12. Distribution of Family Farms by Importance of Active Population.

Importance of Active Population	Ethnicity Serer	Wolof	Total
1 to 3	33.0%	28.0%	30.5%
4 to 6	36.0	43.0	39.5
7 to 9	18.0	15.0	16.5
10 to 12	9.0	11.0	10.0
> 12	4.0	3.0	3.5
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

Data suggest that 23.0% of Serer family farms and 16.0% of Wolof family farms have witnessed movement of members for the period considered. Such movements (Table 4-13) concerns all status within families, both heads of production units

and dependent producers including males and females.

Table 4-13. Distribution of Family Farms by Status of Migrants and Ethnicity.

Status of Migrants	Ethnicity		
	Serer	Wolof	Total
Headship of Family Farm	8.7%	6.3%	7.7%
Married Dependent Alone	13.0	12.5	12.8
Whole Family Farm	13.1	12.5	12.8
Single Dependent Male	26.1	62.4	41.1
Single Dependent Female	39.1	6.3	25.6
Total	100.0%	100.0%	100.0%
(N)	(32)	(16)	(39)

The movement from villages involves primarily single dependent people, 66.7% of cases of migrants. The movement is dominated by single dependent people 41.1% including 62.4% of cases of Wolof migrants in comparison to 26.1% of Serer. In contrast, Serer dominate the movement of females moving alone, 39.1% of total Serer migrants as compared to only 6.3% for Wolof migrants. Also, the movement in some

cases concerns not only bachelor and/or non accompanied married people but also whole households, 13.1% of Serer and 12.5% of Wolof migrants.

The period and destination of migration are different. While men move from one rural area to another and during the rainy season, most of women move to urban cities from harvest time to the beginning of the rainy season. As far as agricultural activity is concerned, the migration of men which generally begins during the rainy season affects the level of labor available to some family farms during peak periods of agricultural activity. Why is it then that, at the eve of intense agricultural activities people leave their village for other rural areas where they will be involved in similar activities as if they stayed home?

One reason frequently given for the migration of single dependent men is the flight from compulsory work they would have to do for their n'diatigue and for their step parents as well if they stayed in their respective village (Sarr, 1983). This alone cannot not explain their movement because they will very likely integrate into another organization of agricultural activity where they will be compelled into a work obligation vis a vis the person who host them. More importantly, the destination to another rural area where land is still available suggests that those who migrate may be also stimulated by shortage of land. That is particularly the case of migrant heads of family farms moving alone or

with their families. In other words, seasonal migration of males, particularly of married men moving alone or with their household, very likely relates to the size of landholding available for production units to which they belong.

IV-3. Landholding.

Two objectives are pursued in this section. First, variations of the size of holding between ethnic groups as well as variations within the same ethnic group are examined, 5/. Secondly, this section focuses on the relationship between size of holding and age of respondents, and on the relationship between size of holding and patterns of segmentation.

IV-3-1. Size of Landholding for Family Farms.

Both the Serer and the Wolof have adopted similar land tenure arrangements. In this system, land is distributed within distinct territorial units called "lamanats" which are under the authority of a person designated as laman. The laman assigned to distribute land, had to belong to the family who first installed the village, (Diop, 1968; Diagne, 1979; Verdier, 1965; Pelissier, 1965). These laman only gave cultivation rights to families. In this traditional land

tenure system, land is lineage owned. Each male family member when creating a production unit receives part of the family holding that in turn he will share with his sons and so on. It follows a squeezing of landholding as the population increases and as new production units are created given that family holdings are limited. Borrowing has been a recourse for families with insufficient land. As a result of increasing land shortage, some family farms began developing practices such as pledging land (tayle).

In order to eliminate such practices, the Law of June 1964, The Law on National Domain was passed 2/ is implemented in cases where land conflict occurs and is not settled at the level of the village. Moreover, the Law has had some negative impacts for family farms with or without a very limited landholding. Indeed, some landholders resent granting use rights, even on a temporary basis, to someone else for fear that the tenant or land borrower might take advantage of the Law to appropriate the land. Because of the provision of the law which gives authority, at the district level to the "Rural Council", to expropriate land that is no longer exploited personally by the holder of the right or that remains idle, landholders have developed the strategy of occupying all land they range in their holding. This adds to population pressure by not only eliminating fallows, but cultivating swamps and extending cultivation to the slopes of hills. The result is water erosion and reductions of

villages animal stocks by elimination of grazing land.

For subsistence oriented Serer and Wolof family farms, land constitutes a guarantee for continued farming activity. Yet, as reported by all respondents, it is becoming more and more insufficient. Among reasons explaining this evolution, is the rapid demographic increase which has as a corollary, the exploitation of larger land areas. A second reason is the progression of erosion that is attacking fields and villages as well in the Wolof zone.

As reported, the zone of Niakhar where Serer villages are located is characterized by the highest rural density of population in the country, 106 hbts/km2 inhabitants per square kilometer, 6/. The situation in the Wolof zone is far less dense (62 hbts/km2) but still high, 7/. This also reflects differences of the pressure on land for Serer and Wolof as seen in Table 4-14. Five categories are distinguished: landless family farms including family farms with a size of holding less than one hectare, small size family farms from 1 to 5 hectares; medium size family farms from 5.01 to 10 hectares; large size family farms from 10.01 to 15.0 hectares; and very large family farms, more than from 15.01 hectares. Landless family farms, 4.0% of total production units entirely rely on borrowing land from other production units. This category includes 6.0% of Serer family farms as compared to 2.0% of Wolof family farms. Serer family farms but also Wolof family farms concentrate

in categories of small and medium size family farms. Small size family total 42.5% including 45.5% of Serer family farms and 40.0% of Wolof family farms whereas medium size family farms 35.0% is composed of 37.0% of Serer and 33.0% of Wolof family farms. The percentages of Wolof family farms in the categories of large and very large farm size are higher than are those of Serer family farms. They respectively represent 14.0% and 11.0% as compared to 6.0% and 6.0% for Serer family farms.

Table 4-14 indicates that in general, both Serer and Wolof family farms have limited holdings as shown by the high percentage of family farms with less than 10 hectares, say 88.0% (6.0 + 45.0 + 37.0) of Serer family farms and 75.0% (2.0 + 40.0 + 33.0) of Wolof family farms.

Table 4-14. Distribution of Family Farms by Size of Holding and Ethnicity.

Size of Landholding (ha)	Ethnicity		
	Serer	Wolof	Total
< 1.00	6.0%	2.0%	4.0%
1.01 to 5.00	45.0	40.0	42.5
5.01 to 10.00	37.0	33.0	35.0
10.01 to 15.00	6.0	14.0	10.0
> 15.00	6.0	11.0	8.5
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

The analysis of means size of holding, Table 4-15, suggests differences in the mean size of holding in favor of Wolof family farms. The small size of the standard deviation within each ethnic group reinforces the idea of concentration of family farms as mentioned earlier. The situation of landholding particularly in the Serer zone has largely contributed to destabilizing the farming system of peasants.

Table 4-15. Size of holding by Ethnicity

Statistics	Ethnicity		
	Serer	Wolof	Total
Mean (ha)	6.3	7.8	7.1
Maximum	20.0	30.0	30.0
Minimum	0.0	0.0	0.0
Standard Deviation	4.2	5.7	5.1

It has resulted in a competition for agricultural land and also for grazing land to maintain animals that were used for manuring fields.

When asked about the perception of the size of their holding compared to family needs, 70.0% of total respondents affirm not having enough land, whereas 29.0% estimate their holding sufficient for family needs. Beside asserting insufficiency of land, respondents also argue that land shortage has become more of a problem because of difficulties in borrowing land resulting from the fear of losing land to a dishonest borrower under the Law on National Domain. For these reasons it is more and more difficult for landless families to borrow land for

cultivation and for "land poor" families to make up their land shortage.

Even the pattern of lending has somewhat changed, one can obtain land only from someone whom you trust and mainly someone you can have control over. Also the time frame of borrowing has been reduced to no longer than two seasons in order to meet the exigencies of the Law. Yet, borrowing remains the only way out for many family farms unless they move to localities where land is still available. Participants in village discussions noted that it has became particularly difficult to borrow land from someone living in another village, what used to be common practice. The survey supports this argument by indicating that 70.0% of the cases involve borrowing from a neighbor. Total size of landholding does not fully reflect the pressure exerted on land. Rather the ratio landholding to total population reflects the family farms exercise on land. The ratio landholding to total population of family farm (Table 4-16), does not indicate important differences in ratio between Serer and Wolof family farms. The average ratio for Serer is (.750) hectares per family member and for Wolof, (.650) hectares per family member.

Table 4-16. Distribution of Family Farms by Size of Holding per Person and Ethnicity.

Size of Holding per Person (Hectares)	Ethnicity Serer	Wolof	Total
< .50	50.0%	47.0%	48.5%
.51 to 1.00	27.0	39.0	33.0
1.01 to 1.50	13.0	11.0	12.0
1.51 to 2.00	5.0	1.0	3.0
2.01 to 2.50	5.0	2.0	3.5
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

The average holding per active person (between fifteen and sixty years old) for all Serer and Wolof respondents is 1.54 hectares with a standard deviation of 1.25 (Table 4-16). At the ethnicity level, the average holding per active member for Serer is 1.37 hectares as compared to Wolof 1.54 hectares. As shown (Table 4-17) more than 50.0% of all family farms have a ratio of total holding over active population less or equal to 1.00 hectare, Such a level

obviously cannot sustain a person in the conditions under

Table 4-17. Distribution of Family Farms by Area Available for Active Person and by Ethnicity

Holding by Active Person (hectares)	Ethnicity Serer	Wolof	Total	Cum
\< 1.00	57.0%	45.0%	51.0%	51.0%
1.01 to 1.50	16.0	13.0	14.5	65.5
1.51 to 2.00	16.0	27.0	21.5	87.0
2.01 to 2.50	1.0	3.0	2.0	89.0
> 2.50	10.0	12.0	11.0	100.0
Total	100.0%	100.0%	100.0%	
(N)	(100)	(100)	(200)	

which agriculture is conducted in both ethnic groups. Indeed, 51.0% of total family farms including 57.0% of Serer and 45.0% of Wolof have less than one hectare of land available per active person. To what extent will family farms survive with such a limited size of holding impacted by unfavorable environmental conditions (irregular rainfall

particularly in the Serer zone, extensive water erosion in the Wolof zone), lack of fertilizer, reduction of livestock for manuring, varying quality of seeds? What level of management will be required by these conditions? Have Serer and Wolof producers reached that level? What alternatives exist or can be created to help face such difficult conditions? For 27.0% of Serer family farms and 42.0% of Wolof family farms that have more than 1.50 hectares for each active member, the situation seems for now tolerable. The future, however, for most production units is not bright unless changes in conditions of production (access to factors of production) are introduced.

As long as the fear of losing land that is uncultivated for a given period is associated with the pressure of population and the misuse of mechanical tools to encourage overuse of land with fallow periods, the future of many family farms will remain uncertain. It is also widely accepted that because of time limitations and, because they may not fully benefit from their investment, those who borrow land resent undertaking any action aimed at protecting the land. This relates to farmers' attitudes considered (Harris, 1988) as one of the variables acting on the adoption of technique of conservation. What this suggests is that the lack of protective measures to restore land productivity will make land problems still more precarious.

IV-3-2. Determinants of the Size of Landholding.

One hypothesis upon which this study is built is that the later a family farm is created, the smaller the size of holding.

As indicated earlier, a positively moderate association exists between the size of holding and the population size of family farms, r=.431**, (Table 4-18).

This section examines how size of holding is associated while controlling for ethnicity with variables such as age of respondents, pattern of segmentation, year of access to farm operator status, controlling for ethnicity.

Concerning the age of respondents, the Pearson correlation indicates a weak but positive association between actual age of respondents and the size of holding available, r=.203*. This correlation suggests that the older someone is in a family farm, the more likely he will have a larger size of holding. For Wolof respondents. The correlation is particularly weak and not significant r=.111. Age and size of holding however are significantly associated for Serer respondents despite a weak correlation r=.302*.

Table 4-18. Matrix of Correlation Coefficients of Age of Respondents and Characteristics of Family Farms.

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Age	1000	-.548**	.054	-.020	.203*	.223**
(2) Year		1000	-.112	.044	-.296**	-.287**
(3) Pattern			1000	.138	-.035	-.043
(4) Ethnicity				1000	-.108	-.197*
(5) Total Landholding					1000	.431**
(6) Family Size						1000

1 Tailed Signif: * -.01 ** -.001.

The differences in the significance of correlations has to do with what we described as the propensity of Wolof to let dependent producers more easily leave the family farm. Also rules of seniority seem to be followed less.

As shown Table 4-19, and Table 4-20, there is no significant relationship between the pattern of segmentation and the size of holding. Pearson correlation r=.035 (Table 4-18) confirms such a conclusion. Such a situation follows from the tenure system which guarantees access to land where it is available to heirs.

Table 4-19. Distribution of Serer Family Farms by Size of Holding and by Pattern of Segmentation

Access to Farm operator status	Size of Holding (ha) 1-5	6-10	11-15	16-20	>20	Total
Request	8.8%	32.4%	52.9%	5.9%	0.0%	100.0% (34)
Recommendation	0.0	50.0	30.0	10.0	10.0	100.0 (10)
Retirement	12.5	50.0	37.5	0.0	0.0	100.0 (8)
Death	2.2	53.3	26.7	6.7	11.1	100.0 (45)
Conflict	33.3	33.3	33.3	0.0	0.0	100.0 (3)

Table 4-20. Distribution of Wolof Family Farms by Size of Holding and Pattern of Segmentation

Access to Farm Operator Status	Size of Holding (ha) 1-5	6-10	11-15	16-20	>20	Total
Request	0.0%	44.8%	31.0%	10.4%	13.8%	100.0% (29)
Recommendation	0.0	53.6	21.4	10.7	14.0	100.0 (28)
Retirement	0.0	21.7	43.5	26.1	8.7	100.0 (23)
Death	7.7	23.1	53.8	7.7	0.7	100.0 (13)
Conflict	14.3	57.1	14.3	14.3	0.0	100.0 (7)

The data for both Serer and Wolof family farms show a negative moderate but significant correlation, r=-.296** between size of holding and the year someone becomes head of a production unit (Table 4-18). This suggests that the later the segmentation, the smaller the size of holding. This correlation supports the postulated hypothesis that the

latter the year of access to farm operator status, the smaller the size of landholding. At the ethnicity level, year of access to farm operator status and size of holding are not significantly associated for Serer respondents r=-.153 as opposed to their correlation for Wolof respondents r=-.428**.

Examining how variables such as age and year of access to farm operator status affect the size of holding is important, so is focusing on the extent to which size of holding affects a variable such as the level of equipment of family farms. In conclusion, land, the most important asset for Serer and Wolof agriculture subsistence, has become an enigma for farm operators, particularly those of the groundnut basin. Not only is land rare, but the pressure of population and extensive cultivation of groundnut have contributed to serious soil depletion. Given the very small size of land holding available per person in family farms, the time has come for farmers to seriously consider alternatives capable of alleviating the disequilibria they have contributed in creating in their struggle to feed a rapidly growing population. Not only is the size of holdings for family farms small particularly for Serer, land is also not properly managed. In the Serer zone, manuring fields is now reduced to its minimum because of the lack of animals in the territory. In the Wolof zone of Kaymor, extensive techniques of cultivation have contributed to increased

water erosion from the hills menacing both fields and villages.

IV-4. Equipment of Family Farms.

Because of the precarious rainfall conditions, sowing occurs, as soon as possible after an amount of rainfall that is considered the minimum necessary for sowing. It is the conviction of most of ISRA's agronomists that differences in the date of sowing result in differences in the crop yield. Whatever the real impact, owning a seeder and weeding equipment is very important. It provides family farm operators the possibility of quickly sowing groundnut in moist soil. Those who rely on borrowing have to wait until seeder owners finish sowing and or weeding their fields and those of their dependents, otherwise they have to manually sow their fields, a practice that has became very rare since the introduction of the seeder.

Equipment of family farms is principally composed of draught animals: oxen, horses and donkeys. The type of animal depends on the resources available to the farm operator to purchase these animals. Equipment also includes tools: weeders, seeders, and groundnut lifters. For most family farms, there is no grouping of fields that is to say fields of a family farms may be scattered throughout the village territory. As a result, moving from one field to another may

not be very easy and is particularly time consuming. Therefore, owning a cart for transportation is important. Carts are also used to transport crops from fields to the village for storage or to the center for groundnut commercialization. These different tools used to be available and accessible through cooperatives. The programs that provided these tools stopped in 1980. Today, units of production that farm equipment must acquire them on their own. They must have available capital to pay for tools, know where to get them and do everything required to get them. As a consequence most of the equipment found in family farms, need repair and in many cases, are not working any more. To repair the equipment farmers must find spare parts which means very often that they cannot have it repaired in their village. As expressed during group discussions, the end of the Programme Agricole that provided the equipment package means no equipment overhaul. It suggests difficulties for renewing equipment acquired before the end of the PA. It also translates into no access or at best, very little access to equipment for those who became heads of family farms after the program stopped. Farmers find it very difficult indeed, when basic needs of food are hardly or not at all covered to have the means to invest in farm equipment. If this analysis is correct, it would suggest that people who became farm operators after the closure of the Programme Agricole have less equipment.

This section examines the level of equipment of family farms surveyed. Also it investigates the strategies developed by farmers with and without a low level of equipment. Finally, the association between the year of access to farm operator status, the size of holding, and the pattern of access to farm operator status with the level of equipment will be studied controlling for ethnicity.

IV-4-1. Level of Equipment of Family Farms.

Referring to norms establishing sowing and weeding capacities of family farms, four levels 8/ of equipment are differentiated (Table 4-21): well equipped, average equipped, under equipped and without equipment. Well equipped family farms have at least two complete cultivation teams and one or several incomplete cultivation teams. A cultivation team is made of a seeder, a weeder, a draught animal and a cart. For both ethnic groups, 20.0% of family farms are well equipped. This includes 18.0% of Serer family farms and 22.0% of Wolof family farms. Family farms with a total holding between eight and ten hectares and which have two complete cultivation teams are classified as having an average level of equipment. They represent 40.0% of all family farms and include 37.0% of Serer family farms and 43.0% of Wolof family farms. Wolof family farms also dominate this category (54.4%). As the data show, 45.0% of

Serer production units are either under equipped 35.0%, or without equipment 10.0%. As compared, Wolof family farms of the same levels of equipment represent 35.0% among which 30.0% are under equipped and 5.0% without equipment.

Table 4-21. Distribution of Family Farms by Level of Equipment and Ethnicity.

Level of Equipment	Ethnicity		
	Serer	Wolof	Total
Well Equipped	18.0%	22.0%	20.0%
Average Equipment	37.0	43.0	40.0
Under Equipped	35.0	30.0	32.5
Without Equipment	10.0	5.0	7.5
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

Under equipped and those family farms without equipment, must borrow equipment in order to cultivate. Two reasons are considered that may justify the difference in the level of equipment for the Serer and Wolof. First, this difference results from the opportunities offered through the ISRA

project of "Unites Experimentales" which facilitated the acquisition of equipment by farm family heads of Wolof villages covered by the study. The second explanation examines the association between the level of equipment and the size of holding and the year of access to farm operator status.

As to the relationship between the level of equipment and the pattern of access to farm operator status (Tables 4-22 and 4-23) it must be recalled that after the death of a father, the equipment he owned is not directly inherited. It is sold and the money from the sale distributed among heirs. However, if a son was interested in buying the equipment, he is eligible for rebate of 10% on the proposed price. In the case of retirement for both Serer and Wolof, as the father is still alive and the family farm is not divided, the person who takes over the management keeps the equipment. Most of farm heads who requested to become independent farms operators tend to have an acceptable level of equipment (Tables 4-22 and Table 4-23). This means that they planned for it. Serer respondents who requested to become farm operators have either an average level of equipment, 35.3%, or they are well equipped, 26.5%. As compared, 44.8% of Wolof respondents who requested have an average level of equipment whereas 24.1% are well equipped. For other patterns, recommended and death, Serer respondents tend to concentrate in the categories of under equipped and average

equipped while Wolof respondents are rather well distributed within categories in general except the category of family farms without equipment.

Table 4-22. Distribution of Serer Family Farms by Level of Equipment and Pattern of Access to Farm Operator Status

Patterns of Segmentation	Level of Equipment: Without Equipment	Under Equipped	Average Equipment	Well Equipped	Total
Request	14.1%	24.1	35.3	26.5	100.0% (34)
Recommendation	20.0	40.0	30.0	10.0	100.0% (10)
Retirement	0.0	37.5	50.0	12.5	100.0% (8)
Death	4.4	42.2	37.8	15.6	100.0% (45)
Conflict	33.3	33.3	33.4	0.0	100.0% (3)

Table 4-23. Distribution of Wolof Family Farms by Level of Equipment and Pattern of Access to Farm Operator Status

Patterns of Segmentation	Level of Equipment: Without Equipment	Under Equipped	Average Equipment	Well Equipped	Total
Request	3.5%	27.6	44.8	24.1	100.0% (29)
Recommendation	3.6 %	28.6	35.7	32.1	100.0% (28)
Retirement	0.0%	30.4	41.8	21.8	100.0% (23)
Death	7.7%	38.5	46.1	7.7	100.0% (13)
Conflict	28.6%	28.6	42.8	0.0	100.0% (7)

Cases where segmentation resulted from a conflict for both ethnic groups in which they are without equipment or under equipped account for 60.0% of total cases of conflict (66.6% of Serer cases of conflict and 57.1% of Wolof cases of conflict).

Finally, this work examines the relationship that would exist between the year of access to head of a production unit and the level of equipment. Given that state intervention aimed at helping family farms acquire factors of production among which equipment has been stopped in 1980, it is hypothesized that family farms created after the Programme Agricole was stopped were more likely to have a low level of equipment.

Table 4-24. Distribution of Family Farms by Period of Access to Farm Operator Status and level of Equipment.

Level of Equipment	Number of Family Farms Before 1980	After 1980
Average and Well Equipped	84	34
Under Equipped and Without Equipment	60	22
Total	144	56

Yules' Q = .049.

Data gathered (Table 4-24) give the distribution of family farms according to their level of equipment and the year at which their production unit was created. The Yules' correlation Q=.049 indicates a negligible association suggesting no significant difference in the level of equipment between family farms created during and before the agricultural program (before 1980) and those created after the program was stopped (after 1980). One explanation lies on the argument presented during group discussions according to which, not only the equipment acquired during the Programme Agricole is used but most of it needs repair or is not working at all. Also, facilities given to sons to buy equipment at a reduced price when their father dies have, to some degree, aided new heads of family farms to get some equipment.

IV-4-2. Strategies For Access to Farm Equipment.

Families with or without a low level of equipment develop similar practices for getting equipment when needed. The most frequent strategy is borrowing, "loubind" and "able" respectively in Serer and Wolof language. About 85% of family farms under equipped or without equipment rely on borrowing. Another strategy is cooperative work between different production units. In most cases, it brings together family farms without equipment and family farms

with equipment but with a shortage in labor. This practice Serer call it "n'damir" and Wolof, "lonko". It can take two different aspects. First, it consists of putting together a draught animal and a tool individually owned to work successively in each one's fields. It is particularly developed in transportation as many family farms own animals without carts. The second form of this practice consists, for somebody who has equipment but not enough labor, to associate with someone who does not possess equipment. The last strategy for access to equipment reported is renting, i.e., renting a cart for transporting crop to the village or to the commercialization point.

The proportion of family farms that rely on either of these practices is high in both Serer and Wolof family farms, respectively, 73.0% of Serer family farms and 76.0% of Wolof family farms. Besides determining the strategies developed by farm operators of access to equipment, this study has examined the relationship that exists between borrowers and the family farm from which they get equipment most often (Table 4-25). As in the case of land, neighbors are the most frequent source of equipment. This does not mean that there is no interaction developed between relatives. Unless a conflict situation separates members of the same family into different production units, there is exchange and support as far as resources allow. Concerning borrowing from a father in law, there are differences between ethnic groups. Serer

are less likely to rely on the father-in-law (2.7%) for equipment than Wolof (17.1%).

Table 4-25. Relation to the More Frequent Supplier of Equipment by Ethnicity.

Relation to Equipment Supplier	Ethnicity Serer	Wolof	Total
Direct Relatives	30.2	23.7	26.8
Father in Law	2.7	17.1	10.1
Neighbor	67.1	52.6	59.7
No Response	0.0	6.6	3.4
Total	100.0%	100.0%	100.0%
(N)	(73)	(76)	(149)

Even if other justifications may exist, it has been considered shameful to turn toward parents-in-law for help when you have to take care of their daughter and grand-children. It is important to note that though some families are well equipped, the larger part of family farms in this study are having problems not only getting equipment but of finding needed spare parts. When spare parts are available,

repairing existing equipment will generate further problems given the rudimentary equipment available to village blacksmiths. What this suggests is a more significant marginalization of production units for making borrowing more and more difficult. Finally, borrowing land and/or borrowing equipment is the only recourse to which more and more family farms are turning to. In other words, this has led to changes in the relationships between family farms that we will explore in the following section.

IV-5. Interactions Between Family Farms.

The level of equipment of family farms and the size of holding suggest that many production units could not survive unless interactions with other related or neighboring production units mitigated these circumstances. This section focuses the extent to which these interactions are developed.

What is meant by interaction is a reciprocal and interdependent activity characterized by some complementarities among the actors. For the purpose of this work, social interaction is differentiated from economic interaction. Social interaction describes processes of visiting, sharing meals and, sharing residency whereas economic interaction concerns aspects such as support with labor, support with equipment, cooperative work, financial

support and lending land. Social interaction is very much developed between related families. In some cases, there may not be immediate response in the form of action yet some expectations of what the response would be are developed. As measures of interaction, it is more meaningful to measure social interaction by recording the time spent in visiting and, to measure economic interaction for economic interaction in terms of quantities exchanged in the process. The conditions under which the study was conducted did not allow measurements such as those which require prolonged stays in villages. Interactions between family farms therefore are expressed in terms of their frequency of occurrence.

IV-5-1. Interaction Between Related Family Farms.

Are concerned families of respondents who became head of production unit after segmentation, after they requested for it (31.5%) of total respondents, after recommendation by former ndiatigue (19.0) and as a result of conflict (5.0%) say 55.5% of total respondents.

a) Patterns of Residency after Segmentation.

Three patterns of residency after segmentation are reported (Table 4-26). First, the decision of segmentation is accompanied by the decision to settle on his own (15.3%). In other words, the individual who becomes head of a production unit leaves the father residence to settle into his own residence. Some respondents continued to live in the same residency for a limited period after they became farm operators (19.8%). Finally, and by far the most common pattern, people who become head of family farms stay

Table 4-26. Residency Patterns by Ethnicity.

	Ethnicity		
Patterns of Residency	Serer	Wolof	Total
Own residency	12.8%	17.2%	15.3%
Limited Period	12.8	25.0	19.8
Still in Residency	74.4	56.2	63.9
No Response	0.0	1.6	1.6
Total	100.0%	100.0%	100.0%
(N)	(47)	(64)	(111)

in the residence of origin (63.9%). This concerns 74.4% of Serer respondents and 56.2% of Wolof respondents (Table 4-26). This suggests that, as far as residence is concerned, Serer tend to have greater family cohesion than Wolof. The cross-tabulation of residence by the pattern of segmentation indicates that while most cases of recommendation (71.4) and of personal request (60.5%) are still living in the residence of origin, those who became head of the family farm as a result of conflict tend to separate from the residency of their former n'diatigue. Two out of three cases of Serer in this category have left the residence after segmentation occurred. Similarly, four out of seven Wolof respondents have left the residence of origin as soon as they became heads of family farms, while two stayed for a limited period and, one did not provide any response. This suggests that the pattern of segmentation affects the pattern of residence even though respondents argue that no one can be forced to leave the residence. The custom indeed is for people to be allowed to stay in the residence of origin unless they voluntarily leave. However, pressure may be exerted to "encourage" the person to leave. Separated residency does not mean that interaction stops. Families continue, in many cases, to visit each other, to support each other with labor and, with equipment when resources are available to allow for such transactions.

b) Family Visiting.

Segmentation dissociates members of the same family into several families farms. Yet, in villages, people from the same family of origin keep very close social ties that bind them together. In this process, mutual visits are important. In contrast with residence, the pattern of segmentation have little impact on the frequency of visits (Table 4-27). 75.0% of respondents who separated from the residence of origin reported frequent visits to the family farm of origin.

Table 4-27. Distribution of Family Farms by Frequency of Visit and by Pattern of Segmentation.

	Patterns of Segmentation			
Frequency of Visits	Request	Recommendation	Conflict	Total
Often	82.1	73.2	71.8	75.0
Sometimes	14.3	9.8	6.3	9.0
Rarely	3.6	7.3	18.8	10.0
Never	0.0	7.1	5.3	5.0
Total	100.0%	100.0%	100.0%	100.0%
	(63)	(38)	(10)	(111)

Visits may not be frequent in the first years following family dissociation after conflict. Most disputes between family members end in conciliation resolutions. Beside, visits may not be directed to the person with whom there is conflict.

c) Sharing of Meals.

The dissociation of a family into several production units does not always translate into changed patterns of consumption as long as the residence is shared. Among Serer respondents who stay in the residence of origin, 50.0% are in the same consumption unit with the family farm of origin as compared to 44.1% of Wolof respondents. Two patterns are differentiated in the organization of the consumption unit within the residency. In some cases, meals fixed by each production unit are pooled together. For the second pattern, cooking is organized in rotation. The size of the population of the residence determines the organization of meal preparation. In residencies with a large size of population, cooking is done at the level of each production unit then meals are pooled together in front of the house of the head of residence. In case production units of the same residence not sharing meals, each spouse must hand in a meal to the head of the residence unit. This can be interpreted as a mark of recognition of his authority by all inhabitants of

the residence. Sharing residence and, moreover, being of the same consumption unit can keep members of different production units closer. It can facilitate exchanges between farm operators, especial exchanges of factors of production such as labor and equipment.

d) Support with Food.

Food support seems to be an aspect for which the family farm of origin and newly created production units are engaged in particularly in the first years that a production unit is created.

To determine the level of food support between family farms, we have considered family farms that were created after segmentation and which reported sharing meals only occasionally with the family farm of origin. This represents respectively 63.8% and 75.0% of Serer and Wolof family farms. The data show only 36.1% of farm operators occasionally receiving food from their family of origin. Among these 43.7% are Serer family farms and 56.3% are Wolof. This, in the view of participants in village discussions, does not indicate an unwillingness to help. reflects of food shortages. However, food support is associated with the pattern of segmentation. As indicated earlier, the new head of production receives food support from his former ndiatigue in case segmentation is

recommended. There are no cases of support with food where cases of segmentation after conflict occurred yet farmers say is not excluded once the conflict is settled.

e) Transactions of Equipment.

The level of equipment of family farms as described is particularly low. The data also indicate that only 30.2% and 23.7% respectively of Serer and Wolof family farms borrow equipment from their direct relatives described to include father, brothers, uncles, cousins. Transactions of material between a new production unit and the production unit of origin are not affected by pattern of segmentation (Table 4-28). When ethnicity is considered, 73.4% of Wolof reported not having received help from the family of origin as compared to 89.4% of Serer.

A similar situation occurs when financial support and/or seeds are provided to former dependents, particularly since the abolition of the "Programme Agricole". The fundamental reason why interactions between family farms from the same origin are not important is the low or lack of available resources that characterizes most of Serer as well as Wolof family farms. As opposed, family farms of origin provide support of labor to the new production units created. Also former n'diatigues advise new heads of production units on how to deal with their new responsibilities.

Table 4-28. Transactions of Equipment Between Family Farms and Family Farm of Origin.

Patterns of Segmentation	Frequency of Transactions				
	Often	Sometimes	Rarely	Never	total
Request	11.1%	4.8	4.8	79.4	100.0% (63)
Recommendation	10.5%	13.2	0.0	76.3	100.0% (38)
Conflict	20.0%	0.0	10.0	70.0	100.0% (10)

f) Support with Labor.

Family farms may not have enough labor during the first years of existence. In such a situation the support of labor they may receive will be a determinant of production. The data show that 64.0% of Serer and 67% of Wolof family farms have a total population between one and fifteen inhabitants at their beginning. The average age at the time of segmentation is 32 years old, and the average age for

marriage for men in rural Senegal is approximately 25 years old. Therefore, family farms at their beginning may not have enough labor and, as a result, may need help with labor during bottleneck periods of the active season. One must recall, however, that one consequence of segmentation is the division of labor previously available for one family farm between several production units. This suggests that the new family farm as well as the family farm of origin can have a shortage of labor as a result from segmentation. Help with labor for both Serer and Wolof (Table 4-29) is very much affected by the pattern of segmentation. The help received comes mainly from young brothers sent by the former n'diatigue or after demand from the new farm operator. A person can also decide to help his emancipated brother without the consent of his head of production unit on days scheduled for work in his own fields 8/.

Table 4-29. Distribution of Family Farms by Pattern of Segmentation and Frequency of Help with Labor.

Frequency of Help With Labor.	Patterns of Segmentation			
	Request	Recommendation	Conflict	Total
Often	3.2%	10.5%	0.0%	5.4%
Sometimes	74.6	86.9	30.0	91.0
Rarely	20.6	2.6	20.0	4.5
Never	1.6	0.0	50.0	5.4
Total	100.0%	100.0%	100.0%	100.0%
(N)	(63)	(38)	(10)	(111)

In conclusion, there is little interaction between the family farm of origin and the derived family farm except for labor. The reason, as indicated, is not unwillingness to do so. The level of available resources does not allow such interactions. Because of the generalized lack of resources, most families can no longer count on related families for survival. Internal survival strategies are, then, needed among which animal raising, off-farm activities, and seasonal forms of migration from villages are important.

Table 4-30. Matrix of Correlation Coefficients between Family Farms Resources

	1	2	3	4	5	6	7
(1) Total Holding	1000	-.108	.035	.265**	-.013	-.035	-.051
(2) Ethnicity		1000	.035	.132	.076	-.049	.015
(3) Pattern of Access			1000	.037	.023	.129	.007
(4) Cattle Ownership				1000	.106	.037	.049
(5) Small Ruminants Ownership					1000	.042	.122
(6) Food Self-sufficiency						1000	.169*
(7) Technical Knowledge							1000

1 Tailed Significance: * -.01 ** -.001

In conclusion, three points have been examined in this chapter: the patterns of access to the status of farm operator, the characteristics of respondents and the characteristics of Serer and Wolof family farms.

Access to farm operator status, does not occur as a result of marriage. For the most common, it follows from the death of a father or the incapacity of a father to continue his economic` leadership of the family farm. Other forms of

access to farm operator status exist. Separation of half brothers after the death of the father reflects the resentment of younger brothers in accumulating capital they or their sons will not benefit from, given the current system of inheritance. Also important is the lack of faith more young people have in considering the family as providing economic security. These two elements contribute to the increase of cases of segmentation by personal request and, in some cases, of segmentation after conflict.

As to the characteristics of farm operators, age and technical knowledge are important. Age here includes age of farm operators at the beginning of managing a family farm and the age of retiring from agricultural activities.

In terms of family farms characteristics, Serer and Wolof families are resource limited. The level of equipment is particularly low and the size of holding is also small for most family farms. To that one can add a rapidly growing population for which more and more food is required. The low level of equipment and the limited size of holdings put limits on the interactions between family farms. Family farms also lack the capital necessary to buy inputs that would enhance their production. Finally, to reduce risks associated with uncertainty of conditions of production in both zones, farmers invest any surplus they have in buying livestock particularly goats and sheep.

To what extent do farm operators and family farms

characteristics affect farming performances and what strategies are developed in case of food shortage are examined in the following chapter.

CHAPTER V. FARM CHARACTERISTICS AND THEIR IMPACTS FOR AGRICULTURAL PRODUCTION .

An important element of development consists in the relationship between demographic processes, their impact on resources and therefore, on agricultural development. Given the high rate of population increase 2.9%, rural Serer and Wolof farm families are growing faster than available resources and land.

The preceding chapter identified the characteristics of farm operators (age, and technical knowledge) and those of farm families (size of population, size of holding equipment). This chapter examines the relationships between those farms and farm operators characteristics, the patterns of access to farm operator status with the agricultural output. In other words, we focus on the determinants of the performance of farm families. Performance involves the ability of family farms to produce enough food, meet other needs of family members and for reinvestment in farming.

Two procedures are used to assess family farm performance. First, respondents were asked to give estimates of the frequency the frequency with which they produce enough (from one crop to the following) to cover family food needs since they became heads of family production units. Secondly, estimated production from the two main crops providing subsistence: cereals and groundnut for the campaigns 1986/87

and 1987/88 were considered and converted into local currency, the Central African Franc (CFA). The objective was to estimate the annual income for each family farm. This estimate will be compared to a standard estimate of how much is needed for a person to sustain him/herself.

V-1. Determinants of Levels of Production.

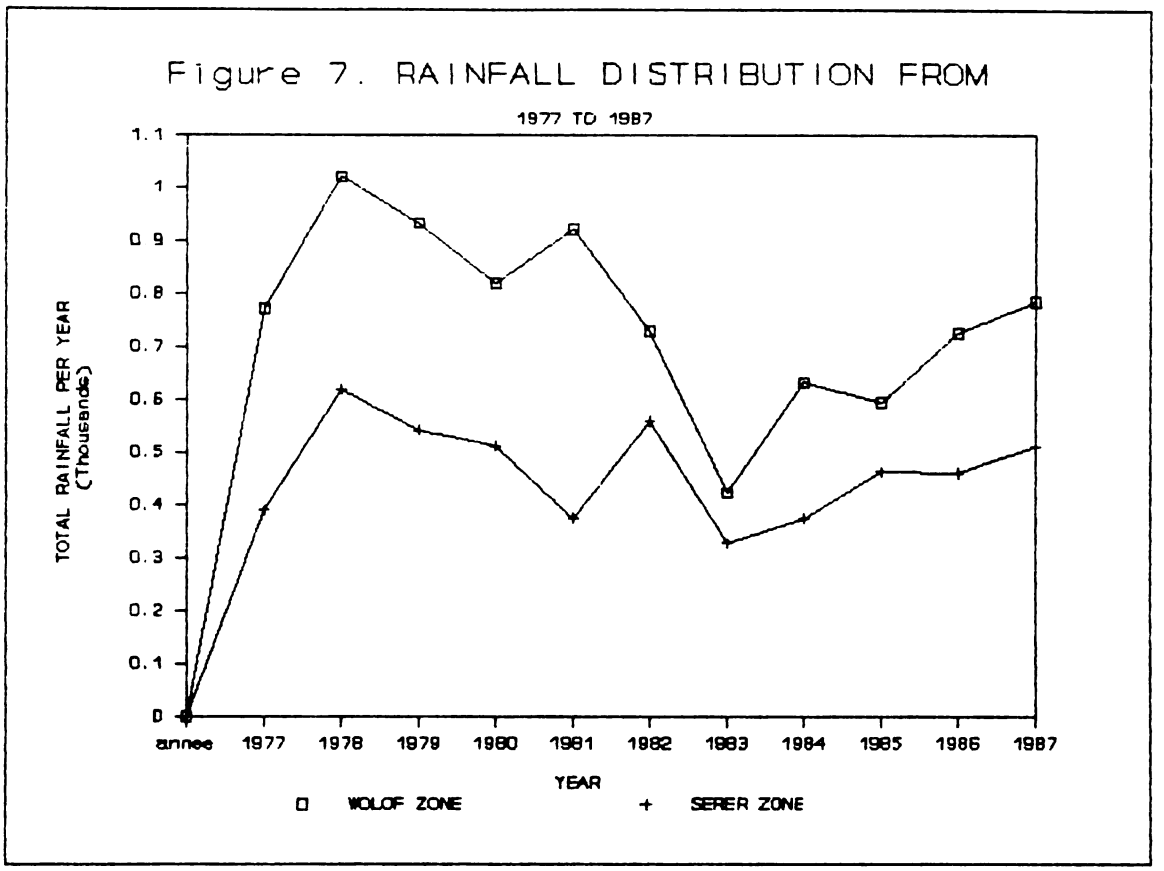
Agricultural output depends heavily upon the amount of available resources for production namely land, labor, capital and management. One characteristic of the subsistence nature of the Serer and Wolof is that almost all production is consumed except for groundnut. Capital does not really enter the system and money generated from this sole cash crop is transformed into livestock or used for other farm purposes. Management describes the ability of the farm operator to efficiently combine these factors of production. It must be noted that these factors are not isolated in this sense that other external factors affect farm operation such as rainfall and governmental policy decisions that intervene in agricultural production. This section aims at examining the impact of internal and external factors on the level of agricultural production of family farms.

V-1-1. Factors of Production External to Farm Families

a) Physical Environment.

Physical limitations, especially rainfall and soil in the Serer zone seriously reduce the production of certain crops. The agroclimatic conditions in the zones of the study are characterized by a relatively short season with low and highly variable rainfall. Frequent droughts make agriculture more and more questionable. Concerning the evolution of rainfall, Figure 8 shows, for both Serer and Wolof zones, peaks in the evolution with an important one in 1983. It also suggests differences in the quantity of rainfall for the two zones. In that respect, one observes a net advantage for the Wolof zone, Kaymor. For the period from 1977 to 1987, the Wolof zone has received on average 761.1 mm 15/ as compared to 467.8 mm 16/ for the Serer zone of Niakhar. Such a difference in rainfall has resulted in the adoption of a short cycle variety of groundnut in the Serer zone that is being progressively extended to the Wolof zone in response to reduction in the rainfall.

Despite the argument of good quality of soil presented by many peasants, findings indicate a very low natural fertility due to low organic matter content (<1%) (Sene, 1990).



From data gathered at Niakhar and Kaymor District Level.

Demographic pressures in addition resulted in the abandonment of techniques of regeneration such as fallow, and to the extension of fields to marginal soil. Continuous cultivation. but also tree slashing and destumping, and, to some extent, agricultural policies, also increase the risks of soil loss by wind erosion in the Serer zone and water erosion in the Wolof zone.

b) Policy Environment.

Several governmental agricultural policies have been implemented that have resulted in far less than the expectations of the policies. The last implemented policy termed the New Agricultural Policy (NPA) was aimed at redesigning and reducing State intervention. This policy known in Senegal as "responsabilisation du paysan" advocates more responsibilities on the part of the peasant (Waterbury, 1983). In practice, this involves cutting down subsidized agricultural inputs such as groundnut seeds and fertilizer. This policy follows a trend of State withdrawal that began with the end of the Programme Agricole in 1980 through which peasants were obtaining equipment. The New Agricultural Policy advocates progressive staff reduction of outreach agencies that used to work on the diffusion of new technologies and on providing peasants with training and

information. Because of this new policy, peasants confront very hostile conditions for agricultural production. The lack of fertilizer puts pressure on land that already has low soil fertility. Equipment that is not overhauled and spare parts for maintenance are scarce. The new policy adds to the problem of insufficiency and irregularity of rainfall is further pushing agriculture to a state of marginalization rather than contributing its improvement. In other words, as a result of this new policy, agriculture loses all those capacities which yield sufficient output for the satisfaction of peasants' needs. Reinvestment under such conditions is very unlikely.

Hostile ecological conditions reinforced by inappropriate policies that do not facilitate the acquisition of factors of production by peasants, impose serious limitations on the output of agricultural production. The effects of physical environment may vary however depending on the limitations it imposes on the available resources and technology and on the ability of the peasants as well.

V-1-2. Factors of Production Internal to Farm Families.

Internal factors to family farm performances include: 1) characteristics of farm operators: age, technical knowledge, and 2) characteristics of family farm in terms of available factors of production.

Concerning the age of respondents, the older the farm operator, the more experienced he may be not only in farming but also in managing a farm. In family organization, father tend to associate eldest sons to the managing of the farm family. Yet, age is not necessarily the factor determinant. Rather, it is the experience which comes with age that produces an efficient utilization of available resources.

This section classifies farm families head according to the level of available resources for production. The level of available resources is expressed in the form of a computed variable including variables such as the size of landholding, the level of equipment, and the labor available for family farms as described in the preceding chapter. Three levels are differentiated: low level of available resources, average level of available resources and high level of available resources.

Family farms with a low level of available resources are those without land or with insufficient land, with a low level of equipment and small labor available. Production units in this category depend almost totally upon other farm families to cultivate.

Farm families with an average level of available resources are those that have an adequate level of factors of production in terms of land, equipment, and labor. Even though they are involved in transactions of land and/or equipment (borrowing and/or exchanging), these family farms

are much less dependent upon the help they might receive from other production units as are family farms with a low level of resources.

Finally, high level of available resources includes family farms that rely on themselves for labor, equipment, and land. Land borrowing may exist not because of a land shortage as it might be the case for the two preceding categories, but for the purpose of crop rotation. Besides possessing a good level of production factors, these family farms can afford to hire labor in case of bottlenecks or for a whole farming season.

Table 5-1 indicates that only 12.0% of total farm families including 10.0% of Serer farm families and 14.0% of Wolof have a high level of resources available to them. In contrast, 49.5% of farm families and particularly 38.5% must rely on transactions with other production units to cultivate. Also differences are observed in the level of available resources among Serer and Wolof farm families.

Family farms with a high level of available resources represent 12.0% of total family farms. This includes 10.0% of Serer and 14.0% of Wolof family farms that can rely upon their own resources. In contrast, 88.0% of family farms must depend upon transactions among themselves and with family farms with enough resources to allow for access to production factors. This is particularly the case for 38.5% of family farms including, 44.0% of Serer production units

as compared to 33.0% of Wolof, having a low level of available resources and, to a lesser degree, 49.5% of family farms, 46.5% of Serer and 53.0% of Wolof , with an average level of available resources.

Table 5-1. Distribution of Family Farms by Level of Available Resources and Ethnicity.

Level of Available Resources*	Ethnicity Serer	Wolof	Total
High Level of Resources	10.0%	14.0%	12.0%
Average Level of Resources	46.0	53.0	49.5
Low Level of Resources	44.0	33.0	38.5
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

* Level of available resources is computed as the ratio (size of landholding + level of equipment + labor)/3.

Relying on others farm families for equipment has the disadvantage of delaying certain activities such as seeding and weeding that in turn, ma affect the level of production. The following explains the level of available resources: 1)

the patterns of access to farms operator status, 2) the age of respondents and, 3) the period (Year) at which the production unit was created. Given the elimination of the Programme Agricole in 1980, it is hypothesized that the later a family was created, the less likely there will be a high level of available resources. Also, the land tenure system of Serer and Wolof which gives right to land to every man in the family farms, characterized by successive fragmentations suggests that younger people in families are likely to receive less land than the older.

As indicates Table 5-2, the pattern of access to farm operator status affects the level of resources available. This table confirms that the retirement mode of access to farm operator status that creates less harm in terms of availability of production factors to family farms. Indeed, only 19.3% of Serer and Wolof family farms in this pattern are in the category of low level available resources as compared to 58.1% that have an average and 22.6% a high level of available resources. The reason is that retirement does not imply the partition of resources as it would be in case of death of the father through inheritance process. Another situation that suggests readiness of the farm operator is implied in the case of access to the status of farm operator as a result of personal request. Indeed, those who request to become head of family farms tend to be in the same category of average to high level available resources

than those who have replaced their former head of family

Table 5-2. Distribution of Family Farms by Level of Available Resources and Pattern of Access to Farm Operator Status.

Patterns of Access	Level of Available Resources. Low Level	Average Level	High Level	Total
Request	34.9%	55.6	9.5	100.0% (63)
Recommended	47.4%	39.5	13.1	100.0% (38)
Retirement	19.3%	58.1	22.6	100.0% (31)
Death	43.1%	48.3	8.6	100.0% (58)
Conflict	60.0%	30.0	10.0	100.0% (10)
Total	38.5%	49.5	12.0	100.0% (200)

farm. They represent 65.1% of Serer and Wolof family farms, 55.6% with an average level of resources and 9.5% with a high level of available resources as compared to 34.95% with a low level of available resources.

Personal request suggests a high achievement motivation therefore, farm operators who request to have their own family farms tend to be prepared for their new role as independent producer.

A similar conclusion cannot be drawn for cases of recommendation for which 47.4% have a low level of available resources. even less for cases of death and conflict. In case segmentation occurs following the death of a father, younger heads of farm family who were not associated to the managing of the farm not be ready to assume this role. Furthermore, resources owned by the father are inherited (land) or sold (equipment) with the money generated divided among heirs. Given the increasing population pressure on land and the end of the agricultural program, those who became heads of production lately are likely to have a lower level of available resources. The association year of access to farm operator status and level of available resources support such an hypothesis. The period of access to farm operator status is negatively associated with the level of available resources, r=-.338** (Table 5-7) indicating that the latter the access to farm operator status, the lower the level of resources available.

Farming conditions of Serer and Wolof family farms have became critical because of the hostile ecological environment, and because of inappropriate agricultural policies that did not succeed to create and sustain incentives for farmers to invest in farming. As reported during village discussions, many family farms survive in agriculture because of transactions in production factors with other production units. The following section examines the level of interactions among family farms and the ways in which they affect farming performances of production units.

V-2. Level of Interaction Among Family Farms as a Factor of Production.

For the purpose of this work, two sorts of interactions are differentiated: social interaction and economic interaction. Social interaction has been expressed in the preceding chapter as reciprocal visits, sharing of meals, and patterns of residency. In this section, economic interactions are examined. Economic interactions designate transactions among and between family farms as they might help in the conduct of agricultural production. A variable has been computed named the degree of economic interaction. Economic interaction expresses the frequency with which family farms benefit from outside support in terms of labor, land, and equipment.

Similar to the level of available resources, family farms are classified into three levels of interaction based on the frequency with which they are involved in transactions relative to each of the factors mentioned. The first level, weak interaction, suggests that family farms are rarely part of economic interactions with other production units in the village. The second level, moderate interaction, indicates that family farms are sometimes involved in interaction with others family farms. Finally, the third level, good interaction, describes a situation where family farms are often involved in economic interactions with other family farms. Given the low level of available resources, many production units, Serer and Wolof as well, face a great deal of difficulty if they relied only on themselves. Exchange and/or help they receive or give contribute to mitigate such difficulties.

V-2-1. Distribution of Family Farms by Degree of Interaction.

Few cases of frequent economic interaction between family farms regardless of ethnicity are reported. This concerns 6.4% of Serer family farms (Table 5-3), as compared to 9.4% of Wolof family farms (Table 5-4), that reported having a good degree of interaction with other production units. In contrast, 46.8% of Serer and 42.2% of Wolof are classified

as having a weak degree of interaction in contrast with 46.8% of Serer and 45.4.% of Wolof are fairly involved in transactions of factors of production. The importance of the number of family farms with a poor or fair degree of interaction is not surprising. One element fundamental to the frequency of interaction is the existence of an adequate level of resources for family farms. Such a situation, as indicated earlier, does not really exit.

Table 5-3. Patterns of Segmentation and Degree of Interaction Between Serer Family Farms.

Degree of Interaction*	Patterns of Segmentation			
	Request	Recommendation	Conflict	Total
Good Interaction	5.9%	10.0%	0.0%	6.4%
Moderate Interaction	44.1	40.0	100.0	46.8
Weak Interaction	50.0	50.0	0.0	46.8
Total	100.0%	100.0%	100.0%	100.0%
(N)	(34)	(10)	(3)	(47)

* Degree of interaction is computed as the ratio (support with labor + support with equipment + support with land)/3.

Besides, one must take into account the negative effects of the Law on National Domain on transactions on land. Also the nature of equipment considered to be too old or needing repair does

Table 5-4. Patterns of Segmentation and Degree of Interaction Between Wolof Family Farms

Degree of interaction	Patterns of Segmentation			
	Request	Recommendation	Conflict	Total
Good Interaction	10.3%	7.1%	14.3%	9.4%
Moderate Interaction	37.9	57.1	42.9	45.4
Weak Interaction	51.7	35.7	42.9	42.2
Total	100.0%	100.0%	100.0%	100.0%
(N)	(29)	(26)	(7)	(64)

not encourage transactions on material. This, obviously, does not mean that interactions do not exist.

It confirms, however, the argument that the difficult conditions of production have contributed to weaken transactions of factors or production through which low level available resources family farms were obtaining part

of what they needed for production.

Beyond the impact of limited factors on the economic interactions between family farms, it is hypothesized that different patterns of segmentation can affect in different ways the level of interaction between a newly created family farm and the family farm of origin.

V-2-2. Impact of Patterns of Segmentation on the Degree of Interaction Between Family Farms.

Table 5-3 and Table 5-4 respectively describe the distribution of Serer and Wolof respondents according to the degree of economic interaction with other family farms in villages. The situation among Serer respondents (Table 5-3) shows no association between the degree of interaction and pattern of segmentation. Table 5-4 suggests that among Wolof family farms, recommendation seems to favor economic interaction. Yet, we think that the degree of interaction depends more upon the level of available resources rather than upon any specific pattern of segmentation. Even in the case of conflict, brothers continue to provide help to the separated new head of family farm, if not during the days they must work in fields managed by the head of family farm, at least during the time granted to them for working their own fields. Economic interactions are not limited to family farms of the same origin. Farm operators also turn to

neighbors for help and they may themselves be approached for help.

V-3. Hypotheses Testing.

Given the rapid increase in population and the limited resources of land, given the Senegalese agricultural policy stating a reduction in state intervention with more responsibilities of peasants particularly in the acquisition of agricultural inputs and, finally, given the ecological degradation as a result of rainfall shortage and also pressure of population, several hypotheses are made:

1) The later a family farm is created, the smaller the size of land allotted from the family holding;

2) The more interaction a farm family can develop, the more likely it can cope with the low level of available resources properly owned;

3) The patterns of segmentation may affect the degree of interaction and therefore, the level of performances of family farms;

4) Members of family farms with small holding are more likely to be found in off-farm activities. Chapter three has focused on farm operators' characteristics and also attributes of family farms have been classified for comparison using cross tabulation, frequencies and measure of relationships such as Yules coefficient and Pearson

correlation.

Table 5-5. Matrix of Correlation Coefficients of Determinants of Farming Performances.

	1	2	3	4	5	6
(1) Year	1000	-.112	-.338**	-.102	.202	-.086
(2) Pattern		1000	-.043	.007	.129	-.084
(3) Level of Resources			1000	.086	.263**	.078
(4) Degree of Interaction				1000	.303**	.025
(5) Farming Performances					1000	-.019
(6) Migration of Men						1000

1 Tailed significance: * .01 **. 001

Concerning the first hypothesis, the section on the determinants of the size of landholding indicated the existence of a moderate negative association r=-.296** (Table 4-18) between size of holding and year of access to farm operator status. Such a correlation supports the postulated hypothesis that family farms lately created are more likely to have smaller size of holding. Similarly, the data show a positive relationship between the degree of

interaction and farming performances r=.303** (Table 4-12).

Hypothesis (3) postulating an indirect effect of the pattern of access to farm operator on farming performances through interaction hardly holds, r=.007, indicating a negligible direct effect of the pattern of segmentation on the degree of interaction.

The purpose of this section is to examine which of the variables used in the formulation of hypotheses postulated are important predictors of family farm performances. In that respect, a causal structure has been set up which describes potential relationships between variables concerned, namely: The year of access to farm operator status; The pattern of access to farm operator status; The level of available resources; The degree of interaction among family farms; and, the farming performances of family farms. Following a causal ordering among variables, a regression of variables year of access and pattern of access to farm operator status, level of available resources, and degree of interaction is run on the variable farming performances. The objective was to test the null hypothesis negating any causality of these variables on the performances of family farms. The result gives a coefficient of determination R of.17608 indicating that variables considered positively contribute towards determining farming performances of family farms. Generally speaking, this result supports previous conclusions. First, it confirms the

idea that other factors particularly factors external to farm operators' characteristics and to production units characteristics such as rainfall, quality of soil and agricultural policy, are playing an important role in determining the farming performances. Second, the percentage explained but also, the value and level of significance of F (F=10.418 and signf=0000) suggest that the null hypothesis that would negate any association of variables considered with farming performances must rejected. Yet, the observation of direct effects shows independent variables with a weak direct effect on farming performances.

A step by step elimination of variables based on their direct effect on farming performances and using the procedure of stepwise selection drops variable pattern of access to farm operator status at a first stage. At a second stage, the variable year of access to farm operator status as a determinant of the family performances is eliminated from the model. The elimination of the variables year of access and patterns of access does not significantly affect the value of the coefficient of determination. This supports the argument that the level of available resources principally determines the degree of interaction and the farming performances.

V-4. Performances of Serer and Wolof Family Farms.

A pertinent analysis of performance necessitates a standard to which results obtained can be compared. In that respect, the frequency that farm operators reach food self-sufficiency appears to be an appropriate norm. Food self-sufficiency describes a situation when a farm family can live from its agricultural production and supplementary economic activities (livestock, off-farm activities) from one crop season to the next.

This section examines the degree to which Serer and Wolof family farms surveyed perceive themselves to be food self-sufficient. In addition, it presents the estimated levels of production for two main cultural crops, millet (cereal) and groundnut during 1986/1987 and 1987/1988. Finally, this section examines the strategies developed by farm families for alleviating food shortages or the use of food crop surpluses.

V-4-1. Food Self-sufficiency of Family Farms.

In the context of our study, we consider food self-sufficiency not in terms of quantity of calories but in terms of the availability of food and or resources to purchase food all year long.

Three levels of food self-sufficiency are differentiated. The first level includes secure farms family, those that have always been food self-sufficient. The second level includes marginal farm families those that occasionally reach food self-sufficiency. The third level includes farm families in a critical food situation, that is farm families that are rarely or have never been food self-sufficient, (Table 5-6).

Near half of Serer and Wolof farm families, 45.5% compose the category of farm families in critical food situation. This includes 49.0% of Serer farm families as compared to 42.0% of Wolof. In contrast, only 17.0% of total farm families (15.0% of Serer and 19.0% of Wolof) are secure. That is, they are always reaching food self-sufficiency. Farm families with a marginal food self-sufficiency situation represent 37.0% of total farm families. This includes 35.5% of Serer farm families and 39.0% of Wolof. With the conditions of production deteriorating, this category of farm families may geared toward the level of critical food situation.

Food-sufficiency follows a cyclical evolution characterized by a period when there is enough food for family farms to sustain themselves

Table 5-6. Distribution of Family Farms by Frequency of Food Self-Sufficiency and Ethnicity.

Food Self-Sufficiency	Ethnicity		
	Serer	Wolof	Total
Secured	15.0%	19.0%	17.0%
Marginal	35.0	39.0	37.0
Critical	49.0	42.0	45.5
No Response	1.0	0.0	0.5
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

and a period when family farms have no choice but to rely on other family farms or get involved in off- farm activities in order to survive. The period of food self-sufficiency would last from the harvest of millet in October to the month of April/May depending upon the amount harvested and the family food demand which in turn, depends upon the size of the family farm. The period of food shortage called "soudure" takes place during the pre-harvest when many families have used up their food stores. As reported during village discussions, food shortage in some cases is a

serious problem. Some people must work off the family farm or send their dependents off family farm to work for money to buy food. Such a practice is known as "saad".

Can family farms that rarely reach food self-sufficiency or those that have never reached food self-sufficiency maintain farming as their main source for subsistence and under what circumstances? An answer to this question will be provided in the recommendations from this work.

V-4-2. Food Self-Sufficiency and Patterns of Segmentation.

Generally speaking, their is no significant difference in the relationship between patterns of segmentation and food self-sufficiency except for segmentation resulting from conflict. In such a case, 80.0% of respondents are in critical food situation (Table 5-7). In contrast, those who replace their father as head of a farm family after death or retirement of this latter dominate the category of secured food, respectively, 23.0% and 23.7%. They also all other patterns of access to farm operator status, family farms that reported reaching occasional food self-sufficiency dominate. They represent 37.0% of family farms compared to 28.5% that have never been food self-sufficient and 17.0% that always reach food self-sufficiency and 17.0% that rarely reach food self-sufficiency. Finally, heads of family

farms after retirement of their former ndiatigue, and those after death are less subject to food shortage. Table 5-7 shows 64.5% of cases of retirement including 41.9% which sometimes are reaching food self-sufficiency and 22.6% which are always self-sufficient.

Table 5-7. Distribution of Family Farms by Frequency of Food Self-Sufficiency and Patterns of Access to Farm Operator Status

	Patterns of Access				
Food Self-Sufficiency	Request	Recom-mendation	Retirement	Death	Conflict
Secured	13.9%	14.4%	23.7%	23.0%	10.0%
Marginal	43.7	39.3	47.9	45.1	10.0
Critical	42.4	46.3	28.4	30.4	80.0
No Response	0.0	0.0	0.0	2.7	0.0
Total	100.0%	100.0%	100.0%	100.0%	100.0%
(N)	(63)	(38)	(31)	(58)	(10)

It also shows 62.1% of cases after death of which 39.7% are sometimes reaching food self-sufficiency and 22.4% which are

always food self-sufficient.

One explanation is the fact that death, when it is not followed by the fragmentation of the production unit, and retirement are the only patterns of access to farm operator status that do not lead to the division of available resources for production particularly labor and equipment. The section on the determinants of family farm farming efficiency will examine such an association.

Beyond farm operators' perception of food self-sufficiency an attempt was made to determine the level of total income generated from crop yields by family farms over the last two years preceding the survey 12/. This total income has been calculated using official prices for cereals and groundnut at which farmers would sell their production 13/ . The low levels of annual income per person for both Serer and Wolof but particularly for Serer family farms, (Tables 5-8 and Table 5-9) support the idea that most of family farms do not reach food self-sufficiency particularly, did not during the campaign 1987/88. During both campaigns, the annual income generated from agricultural activity by most of Serer farms families was less than 20,000 (Fcfa, $=300 Fcfa) per person (Table 5-8). This included for the first campaign, 75.0% of families among which 39.0% had generated less than 10,000 (Fcfa) as compared to 90.0% during the second campaign.

Table 5-8. Distribution of Serer Family Farms by Total Income Fcfa per Person During Campaigns 1986/87, and 1987/88.

Income, Fcfa Per Person	Agricultural Campaigns 1986/87	1987/88
Less than 10,000	39.0%	90.0%
10,000 - 20,000	36.0	9.0
20,000 - 30,000	18.0	0.0
30,000 - 40,000	4.0	1.0
more than 40,000	3.0	0.0
Total	100.0%	100.0%
(N)	(100)	(100)

The average income per person in Serer family farms dropped from 13,812 Fcfa for 1986/1987 to 3,447 Fcfa in 1987/88. In comparison, Table 5-9 shows 66.0% of Wolof family farms including 37.0% with less than 10,000 Fcfa and 29.0% between 10,000 Fcfa and 20,000 Fcfa for the first campaign as compared to 80.0% with less than 20,000 Fcfa composed of 53.0% with less than 10,000 and 24.0% between 10,000 and 20,000 Fcfa. As in the case of Serer family farms, the

average income generated by Wolof has dropped from 17,414 Fcfa during the campaign 1986/1987 to 11.558 Fcfa during the campaign 1987/88.

A person who heavily depends upon agriculture for a living can hardly survive conditions of low income and, even less, reinvest in farming. Indeed, investing in farming is too high a risk. The implementation of the 1984 agricultural policy calling for the reduction of State involvement in farming activity by ending subsidization of factors of production makes this situation more difficult. Continued falling prices for groundnut also contribute to difficulty in reaching food self-sufficiency, and make their investment appear not worthy. In other words, the groundnut prices are not providing enough return to compensate for the reduction of cereal production and the investment in seeds of quality and fertilizer. Cereals are the base for alimentation in rural Serer and Wolof.

The lack of small industry or non farm employment in rural area in Senegal does not create opportunities for part-time work to supplement low income generated from agriculture.

The results shown in these tables as well as the perception respondents have of the food situation they face raise the question of how family farms survive these conditions of low income from their principal activity of production? Such a question leads to investigating survival strategies developed by farm operators and, by other members

in family farms as well, that is to say, activities that provide family farms with supplementary income. It also leads to examining potential determinants of farming efficiency.

Table 5-9. Distribution of Wolof Family Farms by Total Income per Person (Fcfa) During Campaigns 1986/87 and 1987/88.

Income Fcfa per Person	Agricultural Campaigns 1986/87	1987/88
Less than 10,000	37.0	56.0
10,000 - 20,000	29.0	24.0
20,000 - 30,000	19.0	15.0
30,000 - 40,000	8.0	2.0
more than 40,000	7.0	3.0
Total	100.0%	100.0%
(N)	(100)	(100)

V-5. Food Self-Sufficiency and Farm Operators Strategies.

The purpose of this section is to determine the strategies developed by family farms in case their production of cereal exceeded their needs for food. It also investigates the strategies more commonly used by farm operators in situation of food shortage.

V-5-1. Strategies in Case of Surplus of Production of Cereal.

From responses to the question relative to the use of surplus of production, it appears that farm operators adopt three main interdependent strategies, namely stockpiling, sale, and help to relatives (Table 5-10). All three, it must be noted, are not exclusive from one another. only the size of the surplus determines the action of the farm operator. A significant difference exists in the strategies adopted in case of estimated surplus of production among ethnic groups. In contrast to 25.0% of Wolof farm families, 60.0% of Serer farm families stockpile at home their estimated surplus of production. As compared, 30.0% of Serer farm families and 50.5% of Wolof, reported selling their estimated surplus production. Finally, 10.0% of Serer and 20.0% of Wolof, used that surplus to provide assistance to relatives. The rest

2.1% did not respond.

Table 5-10. Strategies in Case of Cereal Surplus Production by Ethnicity.

Strategies Adopted	Ethnicity		
	Serer	Wolof	Total
Stockpiling	60.0%	25.0%	42.5%
Sale	30.0	50.0	40.0
Helping Relatives	10.0	20.0	15.0
No Response	0.0	5.0	2.5
Total	100.0%	100.0%	100.0%
(N)	(15)	(19)	(34)

When the estimated surplus is sold, (Table 5-11) the income generated is principally used for buying livestock particularly small ruminants (goats and sheep). This concerns 48.3% of total respondents, including 51.0% of Serer respondents and 45.5% of Wolof. When the size of the income allows, people buy draught animals, donkeys, horses and, in the best, oxen.

Table 5-11. Ethnicity and Use of Income Generated from Sale of Surplus Production

Use of Income from Sale	Ethnicity Serer	Wolof	Total
Reinvesting in Farming	33.0%	36.5%	34.7%
Buying Livestock	51.0	45.5	48.3
Miscellaneous	16.0	18.0	17.0
Total	100.0%	100.0%	100.0%
(N)	(6)	(8)	(14)

Peasants may use the income generated in repairing equipment or buying spare parts in weekly markets. Such a use of income from surplus production is considered as reinvestment in farming. It involves 33.0% of Serer and 36.5% of Wolof. Finally, income from sale of surplus production is used for diverse purposes particularly during social circumstances naming, marriages, death ceremonies, etc by respectively 16.0% of Serer and 18.1% of Wolof.

V-5-2. Strategies in Case of Food Shortage.

Family farms which are never, rarely, or sometimes food self-sufficient, have recourse to different strategies (Table 5-12). They represent 83.0% of total family farms including 81.% of Serer as compared to 85.0% Wolof family farms. 11.0% of farm operators, 8.6% of Serer and 13.4% of Wolof, reported no specific strategy. For these respondents, all opportunities to buy food are explored. Sale of animals is the most frequent strategy in both ethnic groups, 42.9%. This includes 49.4% of Serer and 36.5% of Wolof family units of production. For these farms operators, the outcome of the sale is used for buying food and also groundnut seeds.

Off-farm activities are practiced, particularly during the dry season that last from February to June, by 22.2% of Serer in comparison with 17.8% of Wolof. Transportation, small trade in weekly markets, and any other work outside agricultural activity used to generate income for food buying is included. There are 4.9% and 13.4% of Saad respectively for Serer and Wolof respondents. Saad, as defined earlier, designates paid work during the rainy season for the purpose of alleviating food shortages. Other strategies reported consist in borrowing money and/or cereal, 3.7% of Serer and 4.7% of Wolof whereas 6.3% and 5.9% respectively Serer and Wolof respondents reported asking for help.

Table 5-12. Food Shortage Strategies by Ethnicity.

Food Shortage Strategies	Ethnicity. Serer	Wolof	Total
Sale of Animals	49.4%	36.5%	42.9%
Off-Farm Activities	22.2	17.8	20.0
Asked for Help	6.3	5.9	6.1
Practice of Saad	4.9	13.4	9.2
Borrow Money or Cereals	4.9	8.3	6.6
Pawn and or Sale of Equipment	3.7	4.7	4.7
Other	8.6	13.4	11.0
Total	100.0%	100.0%	100.0%
(N)	(85)	(81)	(166)

V-5-3. Livestock raising as a Strategy for Food shortage.

Livestock, particularly cattle, have played a very important role in maintaining the farming system of Serer. It remains that the prestige and the wealth implied by the expression "O side yal naak" suggests another role for animals beside maintaining the fertility of soil, 14/. Animals, particularly goats and sheep but also poultry, are kept for insurance in case of a bad crop yields. They can be considered as an emergency food reserve in the sense that peasants in villages rely on these animals in case of food shortage. Because of the uncertainties tied to rainfall, because of the lack of banking institutions in rural areas, and the difficulties of access to banking institutions in urban cities, Serer and Wolof invest part of their surplus production in buying animals. Since the decision of the government to stop providing farmers with seeds, animals are also sold to buy groundnut seeds (Niang, 1984).

Beyond this economic role, animals are used for social cultural and religious purposes. As to the social cultural aspects, animals are used to honor guests, during family ceremonies: naming, marriages, and deaths. Sheep, in particular, but also goats, serve religious purposes for the Muslim Feast of Tabaski 15/.

a) Importance of Cattle.

As far as agriculture is concerned, Serer farming system differentiated itself from the Wolof system by its integration of animals and trees. Analysis of the Serer agricultural activity describes a farming system in which livestock has played a fundamental role of reconstitution of soil fertility by the manuring of plots (Lericollais, 1970; Pelissier, 1965). The system has been deeply affected by hostile climatic conditions but also by the competition resulting from: 1) the rapid increase of population, 2) the demand for more land to cultivate to feed the population, and 3) the necessity to keep a system that has proved to be efficient by maintaining animals particularly cattle in the farm. In other words, is animal raising still an element of differentiation between Serer and Wolof? The distribution of family farms according to the number of cattle owned indicates differences between Serer and Wolof (Table 5-13). Of Wolof family farms, 82.0% do not have cattle as compared to 55.0% of Serer. The mean analysis gives an average number of cattle of 5.2 to Serer in comparison to 2.8 heads of cattle per Wolof family farm. The standard deviation among Serer owning of cattle is 8.6 and 9.7 among Wolof.
Ownership of cattle is positively associated with the total size of holding r=.266** (Table 3-36).

Table 5-13. Distribution of Family Farms by Cattle Owned and Ethnicity.

Number of Cattle Owned	Ethnicity Serer	Wolof	Total
no cattle owned	55.0%	82.0%	68.5%
1 - 5	17.0	7.0	12.0
6 - 10	11.0	4.0	7.5
11 - 15	6.0	0.0	3.0
16 - 20	5.0	0.0	2.5
more than 20	6.0	7.0	6.5
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

This positive correlation is not significant for Serer, r=.117, in contrast with Wolof r=.454**. It suggests that Wolof family farms that own cattle tend to be those with larger landholding. Table 5-14 suggests a positive association between being Serer respondent and cattle ownership. The association expressed in Yules' Q is moderately significant Q=.58.

Table 5-14. Association of Cattle owning with Ethnicity

		Ownership of Cattle		
		Yes	No	Total
Ethnicity	Wolof	18	82	100
	Serer	45	55	100

Yules' Q= .58.

The disappearance of fallow land where animals were grazing during the rainy season has contributed to a change in the patterns of cattle raising. Animals can only stay a few months in the area during the dry season because of lack of dry grass. The risks to damaging fields compel animals owners to move them away from cultivated areas. Animals are sent to localities where forests still exist. This phenomenon of animal transhumance significantly affects the role animals use to play in the reconstitution of soil fertility resulting in losses in agricultural production. With the increasing demand for farm land, new forms of cattle raising may be adapted. Large herds of cattle can no longer be maintained in the Serer area. This adds to the changing mode of ownership of cattle from a lineage type of

ownership to a more individualized ownership of animals. This negatively affects the size of herds. Ownership of limited number of cattle rather than a herd seems to be the response. More importantly, it facilitates the fattening of animals practice that is developing in the Serer zone.

b) Importance of Small Ruminants.

In the introduction of this section we have indicated the importance of animals for rural Serer and Wolof. Small ruminants also present an advantage by being less competitive for space and are less affected by the lack of dry grass beside being more affordable than cattle. This explains the high percentage of family farms that own small ruminants (table 5-15). Only 15.0% of total family farms including 16.0% of Serer and 14.0% of Wolof do not own small ruminants. Also, most of family farms have between 1 and 5 animals (39.0% of Serer as compared to 50.0% of Wolof family farms. In comparison to cattle, there is no significant difference in the average number of small ruminants by family farms. Serer families have an average number of small ruminants of 6.5 as compared to 5.3 for Wolof families. Ownership of small ruminants as opposed to ownership of cattle is not significantly associated with the size of holding r=-.013 (Table 4-30).

Table 5-15. Distribution of Family Farms by Ethnicity and Number of Small Ruminants.

Number of Small Ruminants	Ethnicity		
	Serer	Wolof	Total
No Small Ruminant	16.0%	14.0%	15.0%
1 - 5	39.0	50.0	44.5
6 - 10	24.0	19.0	21.5
11 - 15	14.0	12.0	13.0
16 - 20	3.0	2.0	2.0
More than 20	4.0	3.0	4.0
Total	100.0%	100.0%	100.0%
(N)	(100)	(100)	(200)

As for cattle, small ruminants within family farms are considered as an important resource for the family food shortages. Sometimes, they are the only recourse for many families. In these situations, animals are sold in the weekly market and the revenue from the sale is used to buy food.

To conclude this chapter, the situation of food self-sufficiency as reported has become a very serious problem

for rural Serer and Wolof families. While there is a rapid increase in population, unfavorable ecological conditions, inadequate agricultural policies are bringing the level of resources available for family farms to a marginal stage, a stage at which production insuring food self-sufficiency for family farms cannot be or is hardly reached. In such a situation, it is very unlikely that farm operators will find the means to invest in farming and, if they do, will be willing to reinvest. This without any doubt will increase the deterioration of agricultural conditions and as result will contribute to reinforcing the desire to look outside the family for more opportunities. Indeed, the existence of economic interaction particularly, transaction of equipment that is indispensable to many farm families will became progressively limited as the equipment gets used and is not replaced or renewed.

It is then necessary to find ways through which access to factors of production will be made available to farmers, ways in which opportunities would be created to reduce the heavy dependence on an insecure agriculture. This will not eliminate the separation of families in segments representing independent units of production, at least it will help those that plan to stay in farming to be able to operate.

CHAPTER VI. SUMMARY AND CONCLUSIONS.

Although differences may occur in the patterns of segmentation, Serer and Wolof develop a similar family organization. Also joint or extended families still are the dominant structure. The occupation and residential arrangements and the patterns of access to farm operator status are practically the same. These families are not static either in their composition. organization or their structure. Development cycles of changes in the family are observed as children grow up and establish new family farms. In that process. death of a family household head leads to changes in the organization of the group without necessary leading to its segmentation. Also, marriage of children does not cause the division of the family production unit. Reorganization of the group but sometimes, establishment of new family farm, may result as well in a change in residence. When a new family production unit is established, there is the disassociation of the work team, and the fragmentation of family landholding. Under the condition of an agricultural subsistence economy, the establishment of new production units raises questions concerning the availability of resources available for production for the new production unit, and for the farm family of origin. In turn, Serer and Wolof respond to the deterioration of agricultural condition by changes in the ways new units of

production were created. Indeed the number of cases of personal request and recommendation have significantly increased. In comparison, the increase of cases of conflict as cause of family segmentation is not significant for both Serer and Wolof. What this suggests is that the desir of economic independence whih, in most of cases, leads to family segmentation does not vanish people attachment for the family as a social group.

VI-1. Characteristics and Food Self-Sufficiency of Family Farms

The analysis of data indicates succession as the more frequent way through which Serer respondents became heads of family farm. In comparison, most of Wolof respondents became head of family farms from personal request and recommendation. Cases of conflict as a pattern of segmentation are more frequent among Wolof respondents. These observations show Wolof as more inclined to favor or, at least, to tolerate segmentation. Data indicate an increase in the number of cases of segmentation from personal request and from conflict as well. Even cases of recommendation have became more frequent. The increase of cases of personal request especially is the manifestation of more marked differences between heads of family farms and dependent producers about goals and means to achieve these

goals. It is the manifestation of an individualistic attitude reinforced by the inability of the family to continue providing its members with economic security. The evolution of cases of segmentation from personal request between brothers relates to the resentment of claimants to work towards the accumulation of wealth they will not fully benefit from because of the inheritance system favoring sons. Its development then can be considered as a response to increasing scarcity of resources for agricultural production.

Resources for agricultural production, the main occupation through which Serer and Wolof draw their subsistence include: land, labor, equipment management and capital investments in livestock. One characteristic of farm families is that labor is provided primary by family members, men, women and children. Therefore, the larger the family, the more likely it will have labor available. The analysis of means indicates an average family size of 12.3 members for Wolof respondents in comparison to 10.9 members for Serer farm families. In both ethnic groups, the study shows a positive association between the size of landholding and the size of the farm family. In other words, farm families with a larger size tend to those that have larger landholding.

Four categories of landholding can be identified. About half of the Serer and the Wolof family farms have very small

(0-1.00 hectares) or small landholdings (1.00- 5.00 hectares). 37.0% of Serer farm families have medium size holdings (5.00 to 10.00 hectares) compared to 33.0% for Wolof farm families. Farm families with holdings larger than 10.00 hectares are found among the Wolof (25.0%) and the Serer, (12.0%).

Individually, Serer tend to have slightly more land per person (.750 ha) than Wolof family members (.650 ha). Such small size holdings per person reflects the combined effect of high level of population pressure on the land and the system of cultivation that has led to reduced soil fertility. The size of total landholding for both Serer and Wolof is positively associated with family size suggesting that the larger the holdings, the larger the family. In addition, the age of respondent is associated positively with the size of the family. This indicates that, despite the assumed right of equal distribution, land redistribution is biased by age and younger males are likely t have smaller size holdings. Since segmentation in most of cases follows seniority, there is close relationship between the period of segmentation and size of holdings. The data support the hypothesis that more recently created farm families have smaller size holdings.

The data show a limited number of well equipped Serer (18.0%) and Wolof (22.0%) farm families. Also, Wolof dominate the category of farm families with average level of

equipment.

Respondents who personally requested to become farm operators and those after recommendation, tend to have a higher level of equipment. Production units created before and during the Programme Agricole have a relatively higher level of equipment in comparison to those created after the end of the Programme Agricole in 1980. Yet, difficulties of obtaining spare parts and of maintaining the existing equipment limit the extent of the difference in levels of equipment. In conclusion, most of Serer and Wolof family production units are characterized by a low level of available equipment for production. Smaller farm families as well as those with little of equipment, borrow from others to meet their needs. Yet, the conditions of the equipment (used equipment, difficulties of renewing and repairing) more and more limit these transactions.

Transactions on land and equipment, support with labor are designated as economic interactions between family farms as opposed to social interactions represented by patterns of residency, reciprocal visit, sharing of meals.

Social interactions are not affected by the pattern of segmentation that is, segmentation does not vanish the joint family as a social group. Even in cases of conflict for instance, social relations are maintained if not between members in disagreement at least between actors of the conflict and other members of the family.

Economic interactions, are developed between the family farm of origin and the newly created production unit. This means that segmentation of a family farm should not be viewed as a complete break-up of social jointness, a dissolution of the family. Therefore, it is not the pattern of segmentation which determines the level of economic interactions but the level of resources for production.

Beyond affecting the level of economic interactions, limited resources add to uncertain and unfavorable environmental conditions to lower the level of production of farm families. Moreover, agricultural policies not fitting peasants circumstances, deeply affect the level of production. Almost half of all family farms have never reached food self-sufficiency or are rarely reaching food self-sufficiency. This includes half of Serer family farms and over forty percent of Wolof family farms. More than third of total family farms are occasionally reaching food self-sufficiency and only one out of five family farms are always food self-sufficient.

The average annual incomes generated from the cultivation of millet and groundnut for the last two campaigns preceding the survey, show the extent to which the situation of Serer and Wolof family farms has become critical. Serer family farms have an average income of 13,558 (Fcfa) 16/ in 1987 and 3,447 (Fcfa) for the 1988 campaign, while Wolof respectively have generated in average 17,414 (Fcfa) and

11.558 (Fcfa). This obviously implies very low farming performances that represent the inability of family farms to reach food self-sufficiency and or to reinvest in agriculture is far from being attained for many production units. Family farms with food shortages will care less about investing in farming.

Off-farms employment for to Serer and Wolof families are also very limited, if not non-existent. Confronted by such a situation, the purpose of farming has shifted from maximizing economic growth by increasing the output of agriculture per unit of resources used, to reducing poverty and meeting basic needs. In response, Serer and Wolof family farms develop survival strategies, that are based on investment in livestock.

Livestock alone cannot solve the crucial problem of food shortage. Because of the heavy dependency on agriculture, all solutions to food shortage, among other things, require creating better conditions of agricultural production but also the creation of opportunities to rural people. Is such a goal feasible in the context of the new agricultural policy? Is such a goal important enough to bring changes in state intervention?

V-2. Significance of Findings.

Findings of the study of Serer and Wolof family units of production are important in the context of development in Senegal. They also contribute to social research on the family and its evolution.

V-2-1. Importance For Development in Senegal.

There are fundamental economic and political reasons that justify any state effort to help rural people attain food self-sufficiency particularly when most of the population, more than 60% in Senegal, reside in rural areas.
Economically, actual conditions and level of production of Serer and Wolof family farms significantly affect the contribution of agriculture to the Gross National Product. It is very likely that peasant's effort will be limited to producing for their own consumption rather than for the market. It is also widely agreed that declining rural conditions which characterize Serer and Wolof family farms, lead to growth of the urban population through migration. As a response to reduced income from agriculture, peasants are attracted by opportunities, real or not, that cities are believed to provide. This not only contributes to augmenting the size of unemployment but generates social problems, i.e., housing, health.

Politically, internal political stability when basic needs are not met by the majority of the population may not be easy to reach. Furthermore, the dependence of a country to outside will be reinforced when the country must rely on foreign aid for food. For all these reasons, it is the duty of the state to take part in actions aimed at improving the conditions of populations.

As to the possibility of reaching food self-sufficiency, there may not be an easy way. Yet, substantial results can be obtained with a combined effort accompanied by a strong will to succeed by both producers and government. Since independence, there has been an option to increase agricultural productivity. Several programs and organizations with the objective of intensifying agriculture through the provision of credit, seeds, fertilizers were introduced. Efforts to intensify agriculture through the introduction of cultivation practices were undertaken. Yet, policy expectations were not fulfilled and have made only small contribution to economic growth compared to their implementation costs. Such results gave rise to the New Agricultural Policy characterized by "less state intervention" and "more responsabilisation" of peasants particularly for the acquisition of factors of production.

Such a policy seems to be in contradiction with the goal of helping rural people reach food self-sufficiency. There is a need to raise the level of output from agriculture, the

main activity if not the sole activity of production for most of Serer and Wolof family has became more of a priority. The level of available resources described in this work can only have a limited impact in increasing agricultural output. It is then important for Serer and Wolof peasants to have access to factors of production, to be trained to efficiently use available resources. This obviously may not even be sufficient to insure food security given unfavorable environmental conditions, periodic drought irregular rainfall and, lack or limited off-farm opportunities, that agriculture in Senegal is facing. Therefore, creating opportunities for both men and women, that will generate income without interfering with agricultural activity will play an important role in securing food self-sufficiency.

Increasing agricultural output will not be possible without State intervention aimed at facilitating the access to factors of production. Peasants who cannot secure food for their family do not have surplus to invest in farming. In turn, access to factors of production, creation of new opportunities will not be enough for increasing agricultural production. Increasing agricultural production will require a real participation of peasants as the New Agricultural policy puts it.

For this to be possible we recommend the establishment of a new relationship on the part of the state and the peasants

that makes possible a real contribution of each sector. This relationship must based on mutual respect, good will and combined effort to improve. There is a need for a new philosophy of state intervention and of the role peasants must play. The assigned goal of the New Agricultural Policy:"less but best of state involvement" "Responsabilisation des paysans" will have a meaning only if state agents influence reinforced by a top down planning and resources flow pattern that characterized previous state intervention changed. Such an approach has, indeed, created dependency among peasants by enhancing the perception of "State providence", that is to say, the belief that government can do every thing from organizing farm inputs, subsidizing them transporting them, sending agents for advise and. finally, can offer loans and take the risk of failure. In other words, the New Agricultural Policy will contribute to increasing output if it is based on a redefinition of the state intervention from a paternalistic attitude assuming all risks involved to a shared responsibility role with peasants. Only after peasants rebuild confidence in themselves and in the state through its agents (researchers and extension agents), and are included in the decision-making process, only then can efforts to create better conditions for increasing agricultural output be fruitful. Rebuilding confidence of peasants, real integration and real participation of

peasants requires people awareness or consciousness 17/ about their situation and problems. They must be aware of their potentialities and overcome the state of fatalism. helplessness. It can be reached if peasants are given opportunities to learn, and to express themselves. In that respect, functional education can play an important role. Functional education, indeed, will create, develop, and facilitate the consciousness of peasants on what they do. should do, and are willing to do. Such an attitude is necessary and important in actions aimed at protecting available resources as it must be the case in the Wolof zone where water erosion is rapidly extending. In other words, the chances of participation of peasants in actions aimed at limiting the effects of soil erosion that is menacing fields and villages are likely to be greater: 1) if there is a realization of the losses by villages themselves; 2) if a willingness to participate in efforts to resolve or at least to limit its extension exists and, 3) if awareness and conscientization lead to an effective organization that will support and undertake actions decided by peasants themselves. Functional education will not only raise awareness and conscientization, it will also contribute to creating assets that may generate additional income for family farms and therefore, offer some security in case of misfortune of agriculture.

The same major issues that cooperatives had to confront in

the 1980's apply to the New Agricultural Policy of responsabilisation. These are the extent to which the reforms:

- restore peasant confidence and promote greater rural participation;
- put more political and economic power in the hands of the peasantry by giving them greater control over cooperatives institutions (Waterbury, 1987).

The traditional system of land holding allocation results in fragmentation of family holding suggesting that over time. many production units will not have adequate farming land. It is important to provide peasants with more education in order to create for youth opportunities to compete for non agricultural employment, raising the possibility of them becoming more self-reliant. Training should also be directed toward developing the conditions of productivity, increasing technologies. It is indeed our belief that the greater a peasant's knowledge the greater his/her ability to make wise choices of assets and product combinations.

Food self-sufficiency will not be secured as long as Serer and Wolof family farms only take up agriculture. There is a need for creating off-farm activities that will generate income. The time of occupation of peasants must be increased by providing the opportunity of dry season activities to people. This however may not be possible unless peasants are helped to develop such alternatives, trained, or provided with adequate information.

The existence of economic and social interactions not only

imply reciprocal obligations but suggests the existence of some sense of community. It is possible then to find in these interactions a basis for effective village organization for collective liability what was missing and has led to the failure of cooperatives. organization that could conduct common actions. It is important then to determine and to take into consideration factors that make possible and facilitate interactions between individuals and between families in villages. In that respect, enhancing locale organization can be very important. Also, identifying family production units and larger social entities to which they belong by a process of lineage reconstruction through genealogies will play an important role. The study of segmentation of families in a village makes possible such lineage reconstitution.

Research as well as developmental projects when dealing with long term orientation need to consider the evolution family production units are taking, to consider changes that are likely to occur that will affect the structure of these units of production. Therefore, understanding the processus of formation and segmentation of family production units can help define ways for future development. That is to say, any attempt to introduce improvements in social and economic conditions of Serer and Wolof family farms and to engage the participation of family members in community projects should take into consideration the stages of family life cycle.

V-2-2. Importance of Findings for Social Sciences.

Understanding processes and causes of family segmentation fits the preoccupation of social scientists about family and the direction of its evolution. Findings of this study are different from the idea of a definite direction of change from the extended family to the nuclear or conjugal family where marriage occurs as a breaking point. Time and again, extended families dissociate to form separate family production units which, in their term, became bigger joint families before splitting again. In other words, the nuclear family, if it exists, must be considered as either a "joint family in becoming" or the remnants of a "joint family that was" to borrow Desai's (1964) definition.

There is no uniformity, even within ethnic group, of a direction of change of the structure of the family.

As a response to economic conditions where the family can no more insure security, segmentation does prevent families for socially interacting but also from providing supprot to esch other whenever the resources available allows such a support. In other words, it is important to note that separation of family production units does not mean complete break up of jointness as indicated by the persistence of social and economic interactions. Despite segmentation, parts of the social family retain functional relations with each other, relations considered indispensable in the

context of limited resources that characterize Serer and Wolof family production units.

Finally, segmentation, in the view of this work, is a social event in the course of evolution of families. A social event on which economic conditions have a great impact in accelerating the process. Such an acceleration takes on two forms. First, people tend to become economically independent at an early age. Second, personal request and recommendation are becoming the most important patterns through which segmentation occurs.

Segmentation of farm families should not be viewed as an obstacle to farming performances rather it is the reflect of achievement motivation indispensable for development.

NOTES.

1/ Among these programs are, the Groundnut - Millet Productivity Program, the "Terres Neuves" Resettlement Pilot Project (Nelson et al, 1974) and, the "Unites Experimentales" Project.

- The Groundnut-Millet Productivity Program or Agricultural Program (PA) was initiated in the early 1960's and, by 1972, had involved more than 80% of the country's farmers through the comprehensive Government cooperative and marketing system. By distributing improved inputs, it hoped to increase average yield but it was also designed to increase the acreage under cultivation for both groundnut and food grains. Besides supplying fertilizer, seed and equipment on credit, it provided extension services and instructions in their use.

- The "Terres Neuves" Resettlement Pilot Project was initiated as a program to develop methods and experience for more large scale resettlement in the future. Over a period of three years beginning in 1972, it was to resettle some 300 families from the overpopulated area of the groundnut basin in the project area of Senegal Oriental region. It would also provide extension and credit services to families already in the area. It involved construction of feeder roads, storage facilities and wells, and would establish a central equipment pool for use by project farmers.

- The "Unites Experimentales" Project was initiated in 1969 by the French Institute for Tropical Agricultural Research (IRAT) taken over by the Senegalese Institute for Agricultural Research (ISRA). Two Unites Experimentales were implemented: The Unite Experimental of Koumbidia in the North-East of the actual region of Kaolack and the Unite Experimentale of Thysse Kaymor/Sonkorong in the South-East of the same region where is located a large majority of Wolof respondents. The Project aimed an increase of the level of production through the intensification of agriculture. In that respect, a technological package tested in station was proposed for implementation. It included techniques such as ploughing, deep phosphate dressing, destumping, animal traction, new patterns of crop rotations, crop diversification. The Project also introduced peasants to farm management techniques known as "Conseil de Gestion".

2/ The mean age of Serer respondents has been affected by 4 cases of young men under age seventeen who became heads of production unit after the death of their father.

3/ Among methods used to determine the size of active population of family farms, one can differentiate the norms established by ISRA from the National Norms. Both present advantages and also disadvantages. The method used in ISRA

has the advantage of taking into account the participation of young people from 8 to 15 years old to whom is given a coefficient of (.25) for a girl and (.50) for a boy. The disadvantage is that the participation of women is in the view of this work underestimated. Indeed, women from fifteen years are given a coefficient of (.50) when men of the same category are given a coefficient of (1).
National norms attach a man labor coefficient of (1) active to both men and women between 15 and 60 years old. As opposed to norms used by ISRA, there is no man labor coefficient for people from 8 to 15.

4/It is important to note that family holdings are not measured. Rather, farmers estimations of the size of land they operate is relied upon for the Serer zone (by means of the number of seeders, they were taught to estimate their land). For Wolof respondents, most of them have had their land measured during the grouping of land realized by the Unites Experimentales Project. Despite redistributions that occurred in the meantime, farm operators still have a good sense of the size of their holding.

5/ In June 1964, a Law on National Domain was enacted that gave the Government the right to use land previously controlled by peasants. As stated, rights to land would henceforth legally derive from the State through rural councils. These rural councils could expropriate land that is no longer being exploited by the possessor or that remains idle for a given time. The Law aimed at reforming some inequalities caused by the traditional system. Its second purpose was to permit resettlement and development projects.

6/ Plan de Developpement de la Communaute Rurale de Ngayokheme, 1988.

7/ Plan de Developpement de la Communaute Rurale de Kaymor, 1988.

8/ Norms of equipment are established (Kleene,1974) in terms of the nature of the equipment, the size of holding and the type of draught animal. Thus, a seeder or a weeder attached to a horse gives an estimated sowing capacity of 3.5 hectares and a weeding capacity between three and four hectares. It is important to note that animals used by family farms do not have the same strength than those from the station that were used to establish these norms. Also, it is common practice to use an incoherent cultivation team, that is to say, attaching a light weeder to a pair of oxen as they do not have the proper equipment.

9/ After sowing, dependent members of production are given days to work their own fields. The remaining time they work in the n'diatigue's fields.

10/ Plan de Developpement de la Communaute Rurale de Kaymor (1988).

11/ Plan de Developpement de la Communaute Rurale de Niakhar (1988).

12/ Only production from collective fields under the supervision of the heads of family farms are considered as there is no rule compelling dependent producers to use the production from their own fields for family food purpose. Indeed if some dependents, particularly married dependents, do contribute to family subsistence by giving part of their production, it is under heads' of family farm responsibility to insure food for the production unit.

13/ For the period considered, the price of millet (suna) as well as that of groundnut did not change. They were respectively 70 Fcfa/kg for millet and 90 Fcfa/kg for groundnut.

14/ Side in Serer language is the title given to the manager of a matrilineage owned herd of cattle. This role was given to the oldest man of the lineage. There is social prestige and influence tied to Side status besides the fact that the herd is viewed as a sign of wealth.

15/ This is a Muslim feast during which there is a ritual sheep slaughtering in commemoration of Abraham's sacrifice of his son.

16/ $ 1 corresponds to about 300 Fcfa.

17/ Paulo Freire (1970).

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APPENDIXES

Appendix # 1.

Guide for Discussion

Open discussions about the different patterns of access to farm operator status and, particularly, about segmentation were held, one in a Wolof village, Thysse, and, one in a Serer village, Sob.
The objective of these discussions was to have opinions expressed and debated by those who already experienced segmentation and by young men still dependent producers.
Heads of family farms were invited to describe the process of family segmentation, its purposes, its patterns, its impacts in the overall agricultural production and finally, to describe the evolution it has taken and provide reasons for such an evolution.
The following questions served as basis for discussion:
- Under what circumstances was segmentation occurring?
- Do you observe any change in:
  a) the circumstances causing segmentation;
  b) the patterns of segmentation;
  c) the age at which people separate from the family farm of their father.
- Since when are such changes being observed and how would you explain them?
- What are the advantages and/or disadvantages of family segmentation?

Discussions with dependent producers were centered on questions such as:
- Why would somebody separate from the family production unit of his father or from his brother's production unit?
- What advantages do you foresee that encourage someone to have a production unit of his own?
- Are there circumstances that may discourage or delay segmentation of the family farm?

Appendix # 2.

QUESTIONNAIRE

Unit of Residency Identification Card.

1 - Date of interview _____

2 - First/last name of interviewer _____

3 - Region _____

4 - District _____

5 - Village _____

6 - ID Number of the unit of residency in the village ____

7 - first/last name of the head of the unit of residency

_____

8 - Ethnic group _____

9 - Number of dependent households _____

10 - Number of units of production in the residency _____

ID	Name HPU	degree of relation to the head of unit of residency

HPU, head of unit of production.

Unit of Production Card.

1 - Date of interview _____

2 - First/last name interviewer _____

3 - ID unit of residency in the village _____

4 - ID family farm in the unit of residency _____

5 - Name head of the family farm _____

6 - Age head of the family farm _____

7 - Number of dependent households _____

8 - When did you become head of family farm? (year) _____

9 - How did you become head of a family farm?

10 - Why did you decide to create your own unit of production when you did?

_____

_____

_____

Characteristics of the Unit of Production:

11 -Population Size

First/Last name	Age	Sex	Status in the UP	Relation to the Head of the Unit of Production

Land Holding:

12 - Size of land allotted (ha)
before segmentation ☐

after segmentation ☐

total available ☐

13 - Do you or someone else in your family farm receive land temporary
- from the head of the residency? yes ☐ no ☐

- from somebody else? yes ☐ no ☐

if yes, specify the relation to this person ?

---

14 -How would you characterize the type of land allotted to you?

dior	deck - dior	deck	hur

if other, specify

---

15 - What do you think of the quality of land allotted?

very	good	good	moderate	marginal	very marginal

Equipment:

16 - Do you personally own any equipment for cultivation?

yes ☐ no ☐

if yes, give specifications:

Nature	Year	Modalities of Acquisition			Working Condition		
		bought	borrowed	pawn-ed	works	needs repair	broken

If borrowed, specify from whom and your relation to that person:

_____

_____

If you got it from a pawn not paid, specify from whom and your relation to that person:

_____

_____

If no, how do you manage for cultivation?

borrow	cooperative work	cultivate manually

If you borrow material, specify your relation to the person you usually borrow from:

_____

_____

Pulling Animals:

17 - Do you personally own pulling animals for cultivation ?

yes ☐ no ☐

if yes. give specifications.

Nature	Year of Acquisition	Modalities of Acquisition		
		Bought	Borrowed	Pawned

If no, do you borrow, and from whom (relation to the person you borrow from most often)

_____

_____

Cattle:

18 - do you or someone in your family farm own cattle?

yes ☐ no ☐

If yes, give specifations:

Nature	Number	Status of Owner in the Unit of Production	Mode of Acquisition

Off-farm Activities:

19 - Have you or someone of your family farm been involved in off farm work these two last years ?

yes ☐ no ☐

If yes, indicate:

nature activity	status person	Period	locality	
			in the farm	outside farm

20 - Have you or someone of your unit of production migration from the village these two last years ?

yes ☐ no ☐

If yes, indicate:

ID migrant	destination	status in the family farm	duration	activity

Interactions with Other units of production:

A) With the unit of production of Origin:

21 - Did you and your family continue living in the residency of origin after you became head of a family f a r m ?

Left Immediately	Stayed a Limited Period	Still in the Residency

22 - Why did you decide to immediately create your own residency ?

_____

_____

_____

23 - If you stayed a limited period, were you and members of your family farm eating from the same hearth than members of the family farm of origin?

never	rarely	sometimes	often	very often

24 - Why ?

_____

_____

_____

_____

25 - If you shared meals for only a limited period why ?

_____

_____

_____

26 - How often do you and your family visit with the family of the origin?

never	rarely	sometimes	often	very often

27 - After you became head of a unit of production, have you received any kind of support from the unit of production of origin ?

	Never	Rarely	Sometimes	Often	Very Often
Food					
Equipment					
Labor					
Seed					
Financial					
Fertilizer					
Animals					

28 - If other, specify _____

29 - If none, give the reason (s).

_____

_____

_____

30 - After you created your family farm, did the head of the unit of production you depended upon advise you or make suggestions in production matters ?

never	rarely	sometimes	often	very often

B: Interactions with Other Units of Production:

31 - Since you became head of a unit of production, have you received support of any kind from a unit of production other than the one yours originated from?

Yes ☐ No ☐

32 - If yes, nature of the support received:

	Never	Rarely	Sometimes	often	Very Often
Advices-					
Equipment					
Food					
Financial					
Labor					
Other					

33 - If other, specify

_____

_____

_____

34 - In case you received support from a unit of production not originating from the same unit of residency, what are your relation to that unit of production?

_____

_____

Knowledge Skills:

35 - How and where did you and members of your family farm learn to farm?

a	from personal experience within the family;
b	through training sessions;
c	through both personal experience and training sessions;
d	other, (specify)

_____

_____

- If (a), go to question # 40.
- If (b), or (c), continue with question # 35.

36 - Could you specify: the nature of the training, the Institution which provided it, the period (year) and the status of the person in the family farm who benefitted:

Status	Nature Training	Institution	Period

NB_ask questions 36 and 37 for each training listed.

37 - What method of training was used?

a	inside discussions;
b	demonstrations in the field;
c	both (a) and (b);
d	other,(specify) _____

38 - At what level of organization was the training done?

a	at an individual basis;
b	at the level of the family farm;
c	at the level of farmers group of produce s;
d	open to everyone in the village;
e	other (specify) _____

39 - When was the last time you and/or someone of your family farm benefitted from training (year)?

[ ]

40 - How significant would you say the training received has been in the performance of your family far ?

not significant	slightly significant	moderately significant	very significant

Justify your answer? _____

_____

_____

41 - In case you have personally never participated to a training session, have you received advices from someone who participated?

yes ☐ no ☐

42 - Would you say that with training, you would be more successful in farming activities?

yes ☐ no ☐

If yes, what do think you would learn?

_____

_____

_____

Performances:

43 - Were you able to satisfy your family needs of food the two first years after you became head of unit of production?

a	never produced enough food for the family;
b	produced enough for food only the first ye r;
c	produced enough for food only the second y ar;
d	produced enough for food the two first yea s;
e	have always produced enough for food for t e family:

If(e) go to question # 45.

If(a), (b), (c), give the reason(s):

_____

_____

_____

44 - Have you produced enough for food and other expenses of the family the two last years?

a	produced enough only in 1987;
b	produced enough only in 1988;
c	produced enough for the last years;

if (c), go to question # 45.

45 - In case you did not produce enough to satisfy your family needs, what alternatives did you use to get through?

a	asked for food and/or financial support
b	borrowed money and/or food from:
c	worked for pay in another family farm;
d	performed off - farm activities;
e	pawn material for money;
f	other(specify)

If (a) specify to whom?

If (b) specify from whom and the relation to this person.

_____

46 - Would say that you produced more than what you needed for family food and other expenses during the last two years?

yes ☐ no ☐

If yes, what did you do with the surplus ?

Kept it at home	Sold it	Lend it	Support to a relative	Other

If other, (specify) _____

_____

_____

If you sold it, did you use the revenue obtained to reinvest in your farm?

yes ☐ no ☐

If yes, when was the last time you invested and what kind of investment did you do ?

Nature of Investment	Period
Seeds	
Fertilizer	
Bought new equipment	
Paid for equipmemt repair	
Bought pulling animal (s)	
Rented land	
Other (specify)	

If not, what did you do with the revenue?

47 - Generally speaking. what do you think about segmentation:

do you or not support the idea that segmentation is a good thing?

strongly oppose
moderately oppose
slightly oppose
indifferent
slightly support
moderately support
strongly support

Why do you say so?