A PRELIMINARY ANALYSIS OF THE PARAGUAYAN

COTTON PRODUCTION-DISTRIBUTION SYSTEM:

A DEVELOPMENT POLICY PERSPECTIVE

By

Ariel C. Cegla

A PLAN B PAPER

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Agricultural Economics

Summer 1986

ABSTRACT

A PRELIMINARY ANALYSIS OF THE PARAGUAYAN
COTTON PRODUCTION-DISTRIBUTION SYSTEM:
A DEVELOPMENT POLICY PERSPECTIVE

By

Ariel Cegla

This study provides a preliminary description and diagnosis of the Paraguayan cotton production-distribution system. The general objective of the study is to identify opportunities which will allow the cotton production-distribution system to continue being a productive force contributing to the welfare of the small farmer and to national economic development.

A conceptual framework is developed that relates the working of the cotton economy and its market participants to government institutions and macroeconomic forces that have a significant bearing upon its organization and performance. Selected aspects of cotton performance are evaluated in terms of their contribution to agriculture and national development goals.

Main recommendations for future research are formulated in the areas of technical assistance to farmers, assemblers and ginners; market information programs; cotton lint processing and; programs to give small farmers more access to economic opportunities.

To my parents.

ACKNOWLEDGMENTS

I wish to express my gratitude to Dr. Harold Riley, my major professor, for his continued support throughout all my graduate program and for his guidance and supervision of this work. Appreciation is due to Dr. Michael Weber and to Dr. Stan Thompson for their participation in my examination committee.

I am specially indebted to my wife, Perla, for her understanding and encouragement and to my children, Abi and Brenda for making my life so enjoyable during my stay at Michigan State University.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

The Paraguayan Economy

Paraguay is a middle-income developing country [1] with a per capita income of $1,285 in 1984 [2]. As such, it shares many of the characteristics and problems of other developing countries together with a specific set of opportunities, challenges and constraints given by the particular realities it faces. From the domain "characteristics of developing countries", the ones that seem more accurately to depict the country are: agrarian economy; rapidly growing population; generally low levels of per capita income, literacy and labor productivity; poor infrastructure; deficiencies in private saving and in government revenues; inequality in the distribution of income and wealth; and imperfect markets for factor inputs, particularly capital markets and underemployment of labor [3]. Other factors mentioned in the literature, have acquired relevance for the country in the last years, namely: rapid inflation and currency overvaluation [4].

From a historical perspective, looking back at the sixties and coming from there to the present, the evidence

1

is overwhelming: the country achieved impressive rates of growth compared to historical standards [5]. Four different periods are readily identified: a) prior to the 1960s Paraguay's principal economic activity was the livestock sub-sector. Smallholders produced crops mainly for home consumption in _minifundia_ zones around Asuncion, the capital city. The economy was described as a stagnant, low income system; b) the 60s saw the beginning of three fundamental developments: construction of roads, massive relocation of small farmers through intense settlement programs in areas previously unexploited and development of export crops like cotton, tobacco and soybeans; c) the 70's plus the years 1980 and 1981 in which the developments of the sixties together with new rural development projects and favorable international prices and demand yielded a boom for the export crops cotton and soybeans. From the mid 1970s, this growth was reinforced by the expansion of demand, employment and income associated with the construction, in a joint venture with Brazil, of the giant Itaipu hydroelectric scheme on the Parana river. The per capita GNP of the country rose in real terms from an annual average of 4.2 percent in the sixties and 6.6 percent during 1970-1975 to 11.4 percent during 1976-1981. The standards of living and the expectations rose accordingly and; d) from 1982 to the present, in which the country is striving to keep the levels of growth previously obtained under the constant pressure of declining foreign revenues due to the ending of Itaipu's construction; distortions in input:output prices due to

foreign exchange rate goverment policies; and due to structural and international pricing problems in the cotton economy [6].

The above background illustrates three important issues: a) agriculture has been instrumental in the development of the country; b) goverment actions can have a considerable effect on the economy in general and on agriculture in particular and; c) the future path of development of the country will most likely be heavily influenced by goverment's macroeconomic policies and by the way it sees the potential contributions of agriculture to the development process.

The Agricultural Sector

Agriculture is the most important sector of the economy. In 1984, the sector contributed almost 30 percent of the GNP, over 95 percent of the export earnings and employed 45 percent of the labor force. Total population of the country is over 3.5 million of which 57 percent belongs to the rural sector [7]. In addition to food, employment, income and foreign exchange, it provides the raw materials for the agroindustries. Its dynamic growth since the beginnings of the 70s has expanded considerably the economic frontiers of the country, allowing a more balanced regional distribution of the population. The sector also had a considerable multiplier effect upon the rest of the economy. From a policy perspective, the most pressing current issues in agriculture are: a) how to ensure adequate food supplies

3

for the growing population of the country while increasing, as much as possible, the exportable surplus of food and raw materials; b) how to ensure that the agricultural growth of the country benefits the comparatively disadvantaged small farmer; c) how to cope with the increasing depletion of natural resources stemming from inappropriate soil conservation and forest clearing techniques and; d) how to increase yields that have remained static in recent years [8].

Small Farm Agriculture

Agriculture in Paraguay is characterized by side-by-side sub-groups using two significantly different types of agricultural technologies: a traditional, numerous group of small farms with low level of utilization of modern agricultural inputs and a modern group of relatively few large farms that use modern inputs and practice mechanized agriculture. This is described in the literature as "dualism". It has been observed that the larger, mechanized farmers are more readily able to absorb the benefits of government programs and marketing opportunities, constraining the choices open to the small farmers, given the limited availability of government resources. Small farmers' choices are also limited when, individually, they must negotiate the terms of exchange of inputs and outputs with middlemen with greater economic power. The real meaning of small farmer is perceived in its full extent when defined as: "The small farmer is not to be understood as the

"normal" farmer, but one who is handicapped by lack of economic resources and therefore by a reduced ability to take risks, compounded by a sense of social inferiority and by limited education and access to technical and economic information" [9]. T. W. Schultz has observed that, "the transformation of traditional agriculture into an increasingly more productive state, a process that is commonly referred to as "modernization", entails all manner of adjustments in farming as new and better opportunities become available. The value of the ability to deal with disequilibria is high in a dynamic economy" [10]. Economic disequilibria are inevitable and those who are more educated are the ones who will benefit the most from them. It goes without saying that the small farmer is the least likely to benefit from a change, given his/her limited education.

Given that small farmers constitute the majority of the productive force of the Paraguayan agriculture; that they have a comparative disadvantage in terms of economic opportunities and that "they are the ones who require much broader institutional support regarding credit, technical assistance, infrastructure and organized marketing channels" [11]; the policy question is how to raise their economic opportunities with a cost-effective approach.

The Agricultural Marketing System

The agriculture in the country is a market oriented agriculture. Almost all the farms produce a marketable surplus. The large-farm, commercial-agriculture aside; the

typical farmer in Paraguay (small or medium farm) allocates part of the land to subsistence crops and some livestock and the remaining to cash crops. The situation that emerges is a market oriented agriculture composed of many small, scattered farms, with very limited storage and transportation means. These farms have small volumes of production and considerable variability in quantity and quality across harvest periods. Serving this population of producers, there is a network of middlemen that move the product through the vertical channels up to the final consumer. The prices that are discovered in the market guide the production and consumption decisions and determine the rewards to the participants. The agricultural marketing system is a vital part of the process of rural development and of the economic growth of the industrial urban centers.

There has been traditionally in the country a bias on the part of the goverment towards on-farm production issues, neglecting, to a considerable extent, the tremendous importance that marketing can have and should be given in the process of economic development. Usually, it has been naively assumed that once the product is produced it will be able to find its own demand. It must be the other way around: identify the demand first and then satisfy it by delivering the mix of time, place, form and ownership that the consumer requires in the product and/or service.

Lately, however, the decision-makers of the Ministry of Agriculture have shown an increasing awareness with respect

to the marketing aspects of the agricultural production-distribution system. The decision has been made and awaits implementation to develop a national marketing plan in which the government policies, strategies and priorities with respect to the subject-matter of marketing and its contributions to the development of the sector will be defined and actions will be taken.

The Need For A Systems Assessment Approach

This study is concerned with gaining a better understanding of the agricultural production-distribution system. The basic idea of a system being a set of interdependent activities organized towards a common goal. P. N. Khandwalla says that "to a large extent a system is what one chooses to perceive as a system; it is a gestalt, a perceived configuration that somehow seems to make sense as a whole, as a unit. In this universe, everything can be shown to be related to everything else" [12]. This raises the issue of the boundaries of the system, that is: where do you draw the line?. The answer is conditional upon the purposes of the research, the audience to which it is intended and the resources available. Why a systems orientation?. Following H. Riley et. al. paper , it is believed that small increases in productivity in one part of the system may greatly improve the potential of the whole system. Similarly, failure at any level may cause stagnation in the entire system. The focus of the research is on all market participants acting as a coordinated group [13].

Keeping within manageable and meaningful boundaries the systems approach can be a valuable contribution for understanding real-world observed phenomena. It seems suitable as a method to describe a given situation, diagnose its weaknesses and identify opportunities for improvements. The concept of adopting a systems orientation, with a comprehensive unit under study seems analogous to the dynamic process of development as conceptualized by Hayami and Ruttan. They say that in the dynamic process of development, the emergence of imbalance or disequilibrium among the several elements in the system creates bottlenecks that focus the attention of scientists, inventors, entrepreneurs, and public administrators on the solution of problems for attaining more efficient resource allocation. A solution to the problems that result from one bottleneck generally creates another bottleneck [14].

The above implies the generation of a systematic, cumulative body of knowledge, that is the essence of the advancement of science. If the conceptualization and operationalization of the systems approach is good enough, it should contribute to the cumulative body of knowledge, provided that it can pass the tests of consistency, clarity and workability [15].

The production-distribution system includes producers, middlemen, consumers, input suppliers, government institutions, the macroeconomic environment and, development goals. A system of physical flows of inputs, outputs and consumer goods is coordinated by a system of

information, prices and other institutional mechanisms.

Cotton

This study is commodity-specific. It has a commodity orientation as opposed to a broader agricultural or food system orientation in order to be more meaningful and manageable. Meaningful in the sense of being able to produce concrete results in the form of conclusions and recommendations for future research. Manageable in the sense of being tractable given the time, database and analytical capabilities.

The reasons for having chosen cotton are the following: a) it is the most important agricultural commodity in the country from the point of view of employment and foreign exchange earnings. In 1981 there were 138,214 cotton farms out of a total of 248,930 farms in the country [16]. In 1985 $142 million of cotton fiber were exported out of a total value of $303 million for the country's exports [17]; b) It is produced mainly by the small farmer and it is his principal cash-crop. That adds an equity dimension to the subsector; c) It is a raw material for the agroindustry and, as such,it generates employment, investment and income in other sectors of the economy; d) throughout the years it has received considerable support from the government and as such, there is more data in the country about cotton than about any other crop; f) since it is almost exclusively an export crop, it is affected by the supply and demand in the international markets plus the government management

of the exchange rate. It is particularly important to study a commodity that is traded in the international markets because the economic orientation of the government is to foster, as much as possible, the production of export crops to increase the economic opportunities of the country [18] and; g) the cotton economy is facing recent problems: structural constraints and declining international prices, that deserve special attention, since they are likely to accentuate in the near future.

Specific Problem

Cotton has an extremely important place in an economy that is growing increasingly dependent upon its production. Even though it is the most important crop in the country; a lot of valuable information about the cotton production-distribution system is not being collected. Knowledge is missing with respect to some specific constraints present in the system and how to overcome them. Institutional coordination at the public level is rather poor as the result of not having clearly defined cotton production-distribution system objectives and risk is pervasive throughout the system.

The following problems have been cited in the cotton production-distribution system: a) cotton area expansion is experiencing structural constraints due to scarce labor at harvest time and the unavailability of public lands in the Eastern Region of the country; b) there has not been increases in yields in the last decade; c) the

price of cotton is declining in the international markets ;
d) exchange rate policies have introduced distortions in the
input:output prices that act as a disincentive for
production and/or for using modern inputs (fertilizers and
pesticides); e) virtually nothing is known about the income,
savings and investment schemes of the small farmers who
produce cotton; f) Even though one of the specific
objectives of the 1977-1981 National Plan of Social and
Economic Development was to foster agroindustry and export
value-added agroindustrial products and develop an import-
substitution agroindustrial base, the country is exporting
cotton fiber exclusively while importing cotton textile
products [19].

In addition to the above problems, the following research
questions remain, for the most part, unanswered: a) what
will be the consequences of expanded cotton production upon
the ability of the country to produce the food required by
its growing population?; b) what are the real costs of
operation for the different middlemen in the channels and
the extent of product spoilage?; c) what are the realistic
alternatives to improve the bargaining power of the small
farmers?; d) what specific actions should the government
undertake in the system to improve coordination and overall
performance ?; e) are the small farmers price responsive?,
what are their goals and thought processes?; f) what are
the standard operating procedures working in specific
channels?; g) are the risks and returns equitably

11

distributed throughout the system? and; h) how has the subsector evolved over time and what are the consequences for future performance of the subsector?.

Objectives

The general objective of this study is to identify opportunities which will allow the cotton production-distribution system to continue being a productive force contributing to the welfare of the small farmer and to national economic development.

The specific and operational objectives are to:

1. Develop a conceptual framework which could be used to explain subsector production-distribution performance in the context of national development.

2. Describe and analyze the structural and operational characteristics of the subsector in order to identify its problems and opportunities.

3. Evaluate, preliminarily, selected aspects of the performance of the system relative to what seems realistically attainable.

4. Identify the specific areas within the subsector that require the collection of missing information for future problem-solving research.

5. Develop simple, operational procedures for analyzing the subsector, so that it may be applied to other settings.

6. Recommend programs for improving the performance of the cotton subsector and the cumulation of research findings.

Data Sources

This study uses secondary information only. It is mostly based on official statistics as published in public documents. It also uses the findings of previous studies conducted by researchers in the public and private sector as well as by international organizations like the World Bank. A large amount of information comes from the Gabinete Tecnico of the Ministry of Agriculture and Livestock. The Gabinete Tecnico is mostly engaged in economic research on the agricultural sector. Most of the data are highly aggregated in nature: e.g. a national price for cotton or a unique technology of production across the country.

Orientation of this Study

This study is expected to be exploratory and preliminary in nature. In many instances, due to data and time limitations it will be more like a research proposal than a comprehensive and complete study. It can also be viewed as a methodological exercise on a systems approach to commodity production-distribution systems in a development context. The goal is to apply a methodology that seems to have a great potential for problem-solving research in a developing country. The systems approach appears to be flexible enough to accomodate a wide spectrum of perceived problems.

The present study will go more in breadth than in depth in the treatment of the issues and will leave a number of unanswered questions. As J. E. Austin puts it in his

systems analysis of agroindustrial projects: "it is better to know what questions have gone unanswered than never to have asked -- risks can be better judged this way" [20].

This research will provide information which is intended to be useful in some of the decisions of. the researchers and administrators working in the cotton production-distribution system.

Organization of the Paper

This paper is organized in the following way:

Chapter II develops the conceptual framework of the paper based on a literature review. A systems approach is adopted to study the cotton production-distribution system. Modified, expanded and adapted industrial organization structure-conduct-performance frameworks are examined.

Chapter III is a descriptive and diagnostic analysis of the cotton production-distribution system. It explores the structure, organization and performance of the system. It identifies problems and opportunities. The description and the analysis of the system include: market participants, government actions, the macroeconomic environment and, performance measures in a development context.

Chapter IV offers the main conclusions of the study and some recommendations for future research.

CHAPTER I

FOOTNOTES

[1]   FAO. The State of Food and Agriculture 1984.
Rome, 1985, p. 59.

[2]   Banco Central Del Paraguay. Cuentas Nacionales.
Reporte No.   21,   Departamento de Estudios Economicos,
Asuncion, 1985.

[3]   I. M. D. Little and J. A. Mirrlees. Project
Appraisal for Developing Countries. Basic Books, New York,
1974.

[4]   World   Bank.   Paraguay: Economic   Memorandum.
Washington, D.C., February, 1983.

[5]   Banco Central Del Paraguay.   Cuentas   Nacionales.
Reporte No.   19,   Departamento de Estudios Economicos,
Asuncion, 1983.

[6]   World   Bank.   Paraguay.   Economic   Memorandum.
Washington, D.C., February, 1983.

[7]   Banco Central Del Paraguay.   Cuentas   Nacionales.
Reporte No.   21,   Departamento de Estudios Economicos,
Asuncion, 1985.

[8]   Ministerio de Agricultura y Ganaderia.   Paraguay:
Estudio   del Sector   Agropecuario.   Asuncion,   Gabinete
Tecnico, 1984.

[9]   John Abbott.   "Agricultural Marketing Mechanisms
and Institutions: Their Performance and Limitations". AGREP
Division Working Paper No. 94, The World Bank, March, 1985,
p. 30.

[10]   Theodore W. Schultz. "On Economics and Politics of
Agriculture." In Distortions of Agricultural Incentives, p.
5. Edited by Theodore W. Schultz. Indiana University Press,
1978.

[11]   World   Bank.   Regional Development in Eastern
Paraguay. Washington, D.C., 1978, p. 12.

[12] Pradip   N.   Khandwalla.   The   Design   of
Organizations. Harcourt Brace Jovanovich, Inc., 1977, p.
224.

[13]   Harold   Riley   and   John   Staatz.   "Food   System Organization Problems in Developing Countries". Seminar report for The Agricultural Development Council.   East Lansing, 1981.

[14]   Yujiro Hayami and Vernon W.   Ruttan.   Agricultural Development: An International Perspective. The Johns Hopkins University Press, 1985.

[15]   Glenn   L.   Johnson and Lewis K. Zerby.   What Economists Do About Values. East Lansing, Michigan State University,   Center   for Rural Manpower and Public   Affairs, 1973.

[16]   Ministerio   de   Agricultura   y   Ganaderia.   Censo Nacional Agropecuario 1981.   Asuncion, Direccion de Censos y Estadisticas Agropecuarias, 1982.

[17]   Banco   Central Del Paraguay.   Boletin Estadistico. Reporte   No.   329,   Departamento de   Estudios   Economicos, Asuncion, December, 1985.

[18]   Secretaria Tecnica de Planificacion. Plan Nacional de Desarrollo Economico y Social 1977-1981.   Asuncion, Secretaria Tecnica, 1977.

[19]   Ministerio de Agricultura y   Ganaderia.   Paraguay: Estudio del Sector Agropecuario. Asuncion, Gabinete Tecnico, 1984.

[20]   James E. Austin.   Agroindustrial Project Analysis. The Johns Hopkins University Press, 1981, p. 25.

CHAPTER II

A CONCEPTUAL FRAMEWORK - REVIEW OF LITERATURE

The purpose of this chapter is to provide a conceptual framework within which the organization and performance of the cotton production-distribution system and its contributions to national and agricultural sector development can be better understood. To do this, it is important to outline the main concepts that have a bearing on the cotton production-distribution system.

Marketing in Perspective

The terms "marketing" and "marketing system" are used interchangeably in the present study.

The term "marketing" carries different meanings to different authors.

Kohls and Uhl define marketing as "the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production until they are in the hands of consumers"[1]. This has been the most common definition of agricultural marketing-- what happens from farm gate to the consumer.

H. L. Breimyer says that the "what happens" definition of marketing "falls short when tested in the crucible of marketing as an instigating and coordinating force over

17

economic processes" [2].

Schmid and Shaffer define marketing system as "the complex pattern of institutions and physical facilities which relate human beings and things in the transfer of goods and services" [3]. This wide definition of marketing indicates that this is the system coordinating the economic activities of production, distribution and consumption of economic goods. The marketing system is composed of the exchange system expressed in the transfer of property rights of goods and services; and the physical distribution system. The marketing system thus includes both intangible social relationships and tangible physical relationships. The exchange system is an instituted process. Its operation is effected through institutions within the limits set by the social system. The outcome always reflects custom, political power, and the the personality of the members of society.

K. Harrison et. al., define marketing system as "a primary mechanism for coordinating production, distribution and consumption activities. When viewed in this manner, marketing would include the exchange activities associated with the transfer of property rights to commodities, the physical handling of products and the institutional arrangements for facilitating these activities" [4]. The operational application of this definition was to include in diagnostic studies of agricultural production-distribution systems external elements that they felt most directly affected the performance of the traditional market

18

participants. That is, credit policies and institutions, legal and policy elements, and supply of technical farm inputs were added to the study of consumers, retailers, wholesalers, assemblers, processors, truckers and producers.

J. D. Shaffer, tells us that the central economic problem of any society is the organization and use of knowledge to direct economic activity given the dispersed nature of the essential information. He goes on saying that the market provides a mechanism for collecting and summarizing an enormous quantity of idiosyncratic information about production possibilities and preferences in the easily understood form of prices, which at the same time carry incentives to produce and conserve. The "invisible hand" is working and this is "the miracle of the market system". Then he adds:

> But this is only part of the story. The market may fail to provide effective coordination with economic growth for many reasons -- limited perception of opportunity sets, high transaction costs, opportunistic behavior, externalities, etc. Public sector and other forms of group action are needed to deal with market failure.
> Those who argue that "free" markets are the solution ignore the fact that markets always reflect political preferences and prior distribution decisions. That is, demand is determined by the distribution of wealth, and institutions establish the rules of the market. In this respect, the market is always an instrument of the political system. Performance is always a reflection of preferences and power expressed through a combination of market and political processes. Policy is concerned with the mix of these processes [5].

J. Abbott, observes that an efficient marketing sector does not merely link sellers and buyers and react to the current situation of supply and demand. It has a dynamic

19

role in stimulating output and consumption, the essentials of economic development. On the one hand, an efficient market system creates and activates new demand by improving and transforming farm products and by seeking and stimulating new customers and new needs. On the other hand, it guides farmers to the production opportunities and encourages innovation and improvement in response to demand and prices. Its dynamic functions are thus of primary importance in promoting economic activity [6].

All of the above illustrates that marketing systems are: a) complex, dynamic and continually evolving; b) a reflection of the political economy; c) a tremendous force for development; d) a coordinating element of the economic activities of the society; e) modifiable by policy; and f) performing functions that no bureaucrat or central planner can equate.

Development

Development is a multidimensional concept. W. A. Ward illustrates its multidimensionality when describing approaches to project appraisal. He says:

> So long as the national goals were unidimensional --
> that is, capable of being included under or
> translated into the national income goal-- there was
> no problem. However, as evidence began to mount that
> such national goals as equity (subsumed under the
> employment and income distribution objectives),
> efficiency (i.e., the national income objective) and
> growth (i.e., capital accumulation) might well be
> competitive rather than complementary approaches to
> project appraisal which would allow the inclusion of
> competing objectives began to be sought [7]

Different paths to increase development has been proposed in the literature. Among them: neoclassical economic theory

20

emphasizes increasing resource availabilities, particularly capital, as a basis for growth; others propose advancing technology; still others emphasize expanding markets: classical theories of free trade and Keynesian theories of aggregate demand both use this approach. Still others rely on institution building (like financial institutions, manpower training, etc; and some authors use a combination of the above [8].

Over time, as economic development takes place, output per person increases and the material well being of the population is raised to higher levels. Increased specialization of productive effort, industrialization and urbanization are important elements in the growth and development process. These forces contribute to a growing demand for marketing services. In agriculture there is a transformation as relatively small scale, predominantly self-sufficient family farming units become larger, more specialized and increasingly dependent on marketing arrangements for the sale of their agriculture products and for purchased inputs. In most developing countries migration of people from the rural areas to urban centers takes place. With the build-up of urban population and rising levels of consumer income, marketing services become a larger portion of the consumer food [9]. The agricultural marketing system is seen as a coordinating element in the economic activities related to the food sector which promotes efficiency and a reduction of costs when satisfacing the

urban demand for food. In the long run, it results a lower price for food. This expands the effective demand for food. This, in turn, increases income in the agricultural sector which can then demand a larger quantity of modern production inputs and consumption goods of industrial-urban origin. This expands the urban economic activity and allows an increase in the income and demand for food. This cycle of increases in income, production, and consumption becomes dynamic due to the continual coordination and adjustments of the rural and urban markets, thus permitting a constant improvement in the key variables of economic development [10].

The last two sources above show the growing importance of marketing in the economy as structural changes take place as a result of the economic development.

Hayami and Ruttan offer the induced innovation model to explain agricultural development. In their model, interrelationships between changes in resource endowments, cultural endowments, technology and institutions are explored. The model treats technical change as endogenous -- as induced primarily by changes in relative resource endowments and the growth of demand. Similarly, institutional change is also treated as an economic response to changes in resource endowments and technical change. Valuable insights can be gained from the model since they analyze the demand for and supply of institutional innovation. That could be critical in understanding decision-making of the public institutions in developing

22

countries. For example, they hypothesize that institutional innovations will be supplied if the expected return from the innovation that accrues to the political entrepreneurs exceeds the marginal cost of mobilizing the resources necessary to introduce the innovation [11].

The Industrial Organization Paradigm

Industrial organization is a field within economics that provides an analytical framework for the study of industries and markets. The industrial organization model is based on the concept that a set of basic conditions on the supply (raw materials, technology, etc.) and on the demand (price elasticity, substitutes, rates of growth, etc.) sides of the economy interact with market structure influencing market conduct, which in turn determines market performance. Dimensions of market structure are the number of sellers and buyers, barriers to entry, product differentiation, cost structures, vertical integration and conglomerateness. Market conduct includes pricing behavior, product strategy and advertising, research and innovation, plant investment, legal tactics and actions by competitors to coordinate market behavior [12]. The market performance dimensions most often cited are: allocative and technical efficiency, progressiveness, and equity. There are, however, other market performance dimensions [13]. Performance is a multidimensional attribute and there are often trade-offs between different performance goals. The industrial organization paradigm seeks theories that permit the

prediction of ultimate market performance from the observation of structure, basic conditions and conduct. Hence, the primary concern is with the causal flow from market structure and/or basic conditions to conduct and performance. However, not all influences flow from basic conditions or market structure toward performance. There are also feedback effects that add complexity to the system.

Systems Approaches

The word system is commonly used in a general sense and usually the meaning inferred is of a complex set of related components with a common purpose. The basic idea behind the concept is that because the complex interrelationships between components are so important, the whole system is more complex, more comprehensive, than the sum of the individual components [14]. The systems approach is based on a comprehensive view; it is centered on the interaction between components; and its results are validated by comparing a model with reality. The abstract model is developed by decomposition of an observed aggregate phenomenon. The observation point at the outset is the complex behavior of phenomenon and system structure [15].

The appeal of the systems approach is that it permits the investigator to view problems as they exist rather than as some predefined analytical structure admits. Implicit in this observation is the idea that flexibility is the major attribute of the systems approach [16].

Johnson and Rausser, in their Survey of Systems Analysis

24

Applications in Agricultural and Resource Economics say that market or industry models typically involve the study of structures governing the movement of commodities from producers to consumers. Research objectives are associated with improved understanding of the behavior of market systems and their evolution over time or with improving the decision processes of the components comprising the system. Attempts are often made to improve the understanding of interaction and feedback relationships among various components. Decision models are frequently concerned with the evaluation of alternative marketing policies [17].

Development models, are typically eclectic and highly specialized to the country under examination. The specialization is based not only on the particular traits of the the agricultural sector and related institutions but also on the diverse political structures and restrictions with regard to potential policy variables and objectives. The models are exploratory in nature. The exploratory aspects of development models arise from their strong policy orientation and from an absence of fundamental types of behavioral and technical relationships and data which may be employed to identify them.

Systems-oriented research doesn't have to be constrained by or limited to particular methodologies. It is eclectic by design. A specific technique used to model a specific process or behavioral characteristic is chosen because it is seen as being most appropriate for the job.

B. C. French provides a good example of the variety of methodologies that can be employed when the research focuses on total systems. He says that "the research method must be selected in accordance with the demands of the problem (or expected set of problems), the time available, the prior information and data available, and the special interests and talents of the researchers". It could be added that the selection of the method depends also on budgetary constraints and the social and political realities in which the research takes place [18].

A brief description of some conceptual frameworks and research approaches that have been useful in guiding the conceptualization and operationalization of this study follows.

An extended industrial organization framework has been developed by the Project NC 117 team. This extended structure-conduct-performance framework looks at the influence of goverment programs and regulations on market structure, conduct, and performance. It emphasizes the vertical coordination processes within subsectors [19]. The studies cut across or include several industries. Vertical integration, differences in pricing mechanisms, and other coordinating mechanisms are also explored in detail [20].

A modified industrial organization paradigm has been proposed by J. D. Shaffer. It is the environment-behavior-performance paradigm. It says that at a point in time participants in a political economy exist in an environmental situation which is their opportunity set. Each

26

participant responds to his environmental situation and the aggregate consequence is a change in environment. Changes in participants' perceptions of the environment and appropriate behavior follow from the change in the environment. The sequence continues and the system evolves. The total flow of consequences which follow from the organization of the political economy is called performance. The evolving system is driven by this basic three-term sequence of environment, behavioral responses, and performance. The environment can be thought of conceptually as overlapping opportunity sets. There exists a physical environment and a political-economic system. The behavior is characterized by bounded rationality, satisficing behavior, opportunistic actions, contingent reinforcement, collective action and standard operating procedures (SOP). Actions through both the political system and the market alter the aggregate and individual opportunity sets. That is, the available factors, products, and incentives are influenced. The opportunity set of each individual is coercive. It rewards and punishes and thus channels behavior. Uncertainty is pervasive in the system. There exists problems of market failure, externalities, free riders and public goods. Then, there exists a rationale for government intervention. Among those performance indicators that are considered important are: production, product mix, employment, inflation, and distribution of benefits. As Shaffer says:

> we have to recognize the very limited capacity we have for understanding and predicting the behavior

of such a complex system. Nevertheless, a conceptual framework that includes behavioral variables generates hypotheses which can be tested at least partially by observable action of the participants [21].

A modified market structure-conduct-performance framework of analysis has been developed by a group of Michigan State University researchers in order to conduct diagnostic studies of food marketing systems in developing countries.

This food system approach is based on the concept that market coordination is a dynamic and important element in development. Their approach is:

Primarily directed toward development specialists faced with the practical and difficult problems of identifying opportunities for improving existing agricultural production-distribution systems in developing countries, designing general strategies and coordinating sets of specific programs and projects consistent with national development goals [22].

They adopted a systems approach. They were concerned both with the micro (firm level) behavior of participants in agricultural production-distribution systems and the macro consequences that occur over time and affect the well-being of the market participants. Their approach emphasizes interdependence of related activities and is concerned with the coordination of economic activities as a system. It is believed that a substantial complementarity exists within the economy -- poor performance in one subsystem of the economy limits the potential performance of another. Failure at any functional level may cause stagnation in the entire system. Integrated or closely coordinated channels can obtain a synergistic effect from their relationship. It is

28

believed that goverments can effectively stimulate improvements in marketing performance.

J. E. Austin follows a systems approach and develops a methodology for analyzing agroindustrial projects. His book on the subject is written primarily for public sector analysts in developing countries. He identifies an institutional difficulty in the current organization of governments when saying:

> Agroindustrial projects are often evaluated as either agricultural or manufacturing projects, a division that reflects the fragmented structure of the analyzing institutions themselves: ministries are split into agriculture and industry; development banks are specialized as agricultural or industrial; and analysts are categorized as agricultural economists or industrial engineers. But agroindustrial projects are by nature intersectoral, and a framework for the sectoral analysis of agroindustrial projects is inappropriate [23].

His framework for project analysis treats agroindustries as a component in a larger, seed-to-consumer system of related parts, in which the system linkages create an interdependence between the actions and actors in the system. The method necessarily examines the project implications of interdependent stages of the system. There are operators, supporters, and coordinators in the system. The operators are the farmers, transporters, warehousers, processors, and distributors who handle the physical commodity as it flows from the farm to the marketplace. The supporters are the farm suppliers, financial entities, and research centers that contribute to the system's operators. The coordinators are goverments, contractors, futures markets, and industrial associations that integrate the

various stages of the food-and-fiber system. Marketing is an integral part of the system. The linkages between single projects and the macroeconomy are provided, since "single projects cannot be divorced from the larger context of development policy". Hence, international trade, regional development, national planning, research, monetary policy, incomes policies and quality control are considered. The systems method implies an interactive process whereby the effect of one decision can be traced through the whole system to reveal consequences that, at times, necessitate modifying the original project design.

C. P. Timmer et. al. develop in their book Food Policy Analysis a set of tools and analytical frameworks to deal with food policy issues. Their systems approach contains three building blocks: the microbehavior of food consumers and producer households; a trade perspective on the role of markets, both domestic and international; and the macroeconomic environment. The markets link the microsector and and its household issues to the macro sector and its policy issues. Their analysis shows that food problems are immersed in the broader problems of economic development. They analyze the macroenvironment in the knowledge that "in the long run, macroeconomic forces are too pervasive and too powerful for micro sectoral strategies to overcome". They call to our attention that many important food policy decisions are made not in agriculture or food ministries but in ministries of finance or planning or in the central bank.

These agencies dictate the environment in which decisionmakers in the food system operate [24].

G. E. Rossmiller et. al. make an exposition of a general system simulation approach for agricultural sector planning. They show the eclecticism of the method with respect to modelling techniques and types and sources of data. They stress the importance of establishing the credibility of the approach with decision makers. It is the only way for the administrative side of the government to validate the approach, cooperate with the investigative side and coordinate the transfer of resources that the research demands. A decision support system is presented. It includes the decision maker, the database and the model-base. Effective planning requires good quality data, workable models and an interacting decision-maker that contributes his/her input to the process. They conclude that:

> Constraints to informal and enlightened decision making such as organizational structure, institutional gaps and inadequacies, level of human capacities, skills and training, and the level of commitment to improve the planning and decision-making process differ markedly among countries and affect greatly the potential for transfer of the approach [25].

On the Concept of Subsector

For the purposes of this study, the cotton production-distribution system is viewed as a commodity subsector.

A subsector has been defined as "a meaningful grouping of economic activities related vertically and horizontally by market relationships" [26]. It represents a meaningful and manageable division of the economy for comprehensive

31

investigation. A subsector cuts across or includes several industries. Implied in the idea of subsector analyses is the consideration of both vertical coordination and competitive relationships. Research on economic organization has emphasized the firm and the industry and has tended to neglect the critical issues involved in vertical coordination. Shaffer goes on saying: "closely tied to my perception of subsector studies is what I would call a systems orientation" [27].

B. W. Marion views a commodity subsector as:

> An interdependent array of organizations, resources, laws, and institutions involved in producing, processing, and distributing an agricultural commodity. The essential characteristic of subsector analysis is focusing in on the total vertical complex as a system. In a real sense, subsectors are small economic systems. Viewed as a system, a subsector is analogous to an assembly line in which functions are performed and value added at several succeeding stages. This raises the issue on control of critical parts of the subsector, and on the coordination needed to synchronize and integrate efficiently the whole process [28].

The subsector as the unit of observation is a dynamic setting that compels the researcher to examine the processes of productive transformation, exchange, risk-taking and sharing, and information dissemination.

Vertical coordination; coordination mechanisms; pricing methods; information and control

"Vertical Coordination is the general term that includes all the ways of harmonizing the vertical stages of

production and marketing. The market-price system, vertical integration, contracting and cooperation singly or in combination are some of the alternative means of coordination" [29]. An economic stage in production is any operating process capable of producing a salable product or service under appropriate circumstances. It includes any value adding process whether it be a change in location, time or form of the commodity. It is any step which takes the commodity closer to final consumption.

The adoption of a commodity subsector as the unit of observation and the emphasis on understanding, within the subsector framework, the processes of vertical coordination are the two sides of the same coin. By definition, the subsector is designed to yield valuable insights of the vertical relationships in the system (i.e. the subsector) under study. These vertical relationships are in essence the vertical coordination processes. To be sure, the study of subsectors is more than the study of vertical coordination processes. It also includes the study of the competitive relationships at the industry level, of the decisions that are internal to the firm, and of the legal environment within which the exchange of goods and services take place.

To be clear, an industry is defined as consisting of a group of firms producing a recognizable group of products which are close substitutes to buyers, are available to a common group of buyers, and are relatively distant substitutes for all products not included in the industry.

33

An industry, for purposes of analysis, is practically defined by census classifications which involve a grouping of firms or divisions of firms which either produce similar products or employ similar processes. Conceptually, an industry sells or competes in a common market and the production units are related horizontally [30].

Nevertheless, when studying commodity subsectors, particular attention has been focused on vertical coordination. Understanding vertical coordination is probably the most difficult and critical part of subsector analysis [31].

Why bother with vertical coordination?. In an economy characterized by specialization or division of labor, exchange of products and resources among individual economic agents is necessary. Coordination and exchange assure people that commodities are available, with a certain degree of reliability, in amounts and qualities when and where they are needed. In the ideal world of a perfect and competitive economy, exchange and coordination are integrated. Market prices reflect all the information needed by economic agents (technical relationships included) to plan and adjust their activities. Coordination is given, it is assured by the "invisible hand". Hence, we need not bother with vertical coordination problems or interventions.

But the real world differs from the ideal world. The ideal world is a "place" where items of the traded commodity are fungible (interchangeable), divisible and homogeneous;

34

buyers and sellers act in an economically rational fashion; economic agents are small and numerous enough that their decisions have no impact on prices; all participants have equal access to activities of the market on the same terms; and everyone has complete knowledge of forces likely to influence supply and demand. In contrast, in varying degrees, the real world operates with risk; uncertainty; small numbers; product differentiation; unequal bargaining power; transaction costs; and barriers to entry. Private costs and benefits differ from social costs and benefits; externalities are present; and not all exchange takes place within the market. At any given time, the market is the result of market forces and political processes.

All of the above indicates that: a) A coordination process is required if exchange is going to take place in the economy; b) Market prices, although vitally important in market economies, are not the only means of coordination open to society and; c) Price discovery is neither perfect nor without error.

The term price discovery is used to describe the process by which buyers and sellers,in open marketing systems, arrive at specific prices and other terms of trade. Tomek and Robinson also say:

> Not all agricultural commodity prices are 'discovered' through the process of higgling between buyers and sellers or on the basis of bidding at auctions or on organized markets. Some prices are negotiated by producer organizations, calculated using some type of formula, or established by a public agency [32].

They use the terms "pricing arrangements" or "pricing

mechanisms" to denote the complex set of institutions and methods used to discover farm prices.

W. G. Tomek observes that there are two general hypotheses implicit in the research on pricing mechanisms in agriculture. One is that a causal relationship exists between pricing mechanisms and performance as measured by certain criteria. A second hypothesis is that pricing mechanisms are themselves determined by market structure, government policy, and other variables and hence are subject to change. That is, price discovery mechanisms are endogenous variables in the marketing system; and if the performance of a pricing mechanism is somehow unsatisfactory, private or public decision makers may be able to influence development of appropriate mechanisms. Thus, the general justification for research on the topic is to develop information as a basis for such decision making. Tomek concludes by saying that "in practice, however, it is often difficult to establish a relationship between a pricing mechanism and performance (holding other things constant)" [33].

B. W. Marion provides a comprehensive classification of pricing methods and coordination mechanisms. The "institutions and methods" that make the definition of "pricing arrangements" or "pricing mechanisms" given by Tomek and Robinson are in Marion's work coordination mechanisms and pricing methods respectively. Marion shows the different relationships between pricing methods and

coordinating mechanisms and their likely outcome in terms of selected performance criteria. The focus is on "the performance of the mixture of systems which one finds in existing commodity systems and on the trade-offs involved in the selection of coordination and pricing systems".

Marion's coordinating mechanisms are: terminal markets; direct marketing; electronic markets; contract coordination; cooperative bargaining; cooperative integration; integration; forward contracts; futures markets and; government control.

The pricing methods are: auction; private treaty; administered and; formula pricing.

The performance criteria are: technical efficiency; operational efficiency; equity; transaction cost; access and; stability [34].

Information and Control , in the context of this study, are two interdependent concepts through which most of the vertical coordination process can be understood.

Market information, while not a coordinating mechanism in itself, is a central element in vertical coordination. Cost and availability of information are key determinants of performance. Public information may reduce the advantage of large firms and may reduce the incentive to integrate. Coordination can be facilitated by information services such as price reporting, production estimates, inventory data, and intentions of market participants. Information possesses many public good attributes like indivisibility and non-appropriability. It can be used by those who pay for it but

37

also by free-riders. Attributes of information are composition, completeness, accuracy, and timeliness. Ideally, information should be easily understandable. It should include all the relevant components to facilitate coordination. It should be accurate: inaccuracy can arise from ignorance or design. Designed inaccuracy is often called strategic misrepresentation. Information should be transmitted at the proper time in order for the recipients to make the best use of it [35].

Given the public good nature of information and its key role in vertical coordination, governments, especially in developing countries, should strive to collect and disseminate it. The idea is to mantain open, competitive, efficient, transparent markets. The idea is also to have data needed to plan, formulate policies and administer programs.

M. Bulmer, notes that in many developing countries official statistics are collected as a byproduct of administration. Traditional administrators do not really believe in the value of social science data in formulating and implementing public policy. The demand for quality data is then low. In some instances there is an alarming lack of data; in other instances the situation is more a case of poor quality data than of no data. In still another situation, many administrators do not know what to do with quality data. Finally, objective information produced by social science research, is by no means the prime ingredient

in making or in assessing government policies. Politics is more often the order of the day than statistics [36].

The concept of control in the coordination of vertical systems follows next. Control has many definitions. A useful one defines control as the ability to direct the flow of decisions. Control can be active or passive. Active control is the power to command that resources be allocated in some given manner while passive control is the ability not to accept a given decision or function. It is important then to know who has the control over strategic decisions in the subsector. Control (specially active control) gives discretionary power. Who controls can set the rules of the game [37].

As discussed above, information and control are two basic dimensions of vertical coordination. They are interdependent. Simply stated, those with access to information usually have control which arises because decisions are made with information. The one who shapes the distribution of information shapes the decision process.

Active coordination is needed in traditional rural markets in developing countries. Active coordinators identify potential demands and, to meet the demand, offer information and incentives to potential producers. They influence farm production decisions. They understand producers' problems and help solve them. They promote the availability of critical farm inputs and assure markets, reducing market uncertainty. They actively seek markets adapted to local production conditions. They are a dynamic

element for change in the system. They should be given positive reinforcement by the government with respect to regulation and access to resources as long as the market remains competitive [38].

It is important to keep in mind that the process of vertical coordination of agricultural commodities is affected by: a) the biological lags between production decisions and actual output, b) the economics that generally motivates a producer to complete a batch production process once begun regardless of large, unexpected drops in price, c) the fact that production decisions are made with incomplete knowledge of the aggregate impact of the simultaneous decisions of other producers, d) the unpredictable and largely uncontrollable impacts of weather, disease, etc. on domestic and world output, e) the relative perishability or storability of the commodity and any derived products and, f) the relative elasticities of demand and supply for the commodity.

Finally, we recall that a market transaction of the commodity involves four important elements: a) making the deal -- specification of terms of performance by each participant; b) transfer of ownership; c) establishing a price and; d) physical delivery to the buyer.

All four of these elements may be completed simultaneously or they may be fulfilled in varying places at varying time.

On Performance

Performance has been defined as the aggregate consequences of the behavior of the participants under a given market structure [39]. Another definition provided by Shaffer is that performance is the outcome of the behavior of the sum of participants acting within the constraints of their perceived individual opportunity sets [40].

At any rate, performance is a dynamic and complex concept. Its multidimensional nature should be readily recognized. Performance dimensions that are capable of being measured, either in ordinal or cardinal terms, can be appraised by performance measures. One of the fundamental difficulties is being able to develop performance measures that accurately reflect the dimensions in question. Trade-offs are often encountered between the different dimensions of performance. We can evaluate market performance, subsector performance, sector performance (i.e. the agricultural sector), etc. in isolation from the rest of the economy or we can add comprehensiveness and evaluate them also in an economy-wide basis. In most cases evaluation of performance is both a normative and a relative issue. For example, K. Harrison et. al. suggest an evaluation of marketing system performance that is both, normative and relative. They say:

> It must be normative in the sense that market system results (outcomes) are measured against what seems to be desired based on contributions toward general development goals. The procedure must be relative in the sense that results flowing from the present system are judged against what seems realistically attainable from alternative organizational

arrangements and policies [41].

Norms are needed to evaluate performance. Performance norms are socially accepted ideals or standards with which actual performance can be compared and evaluated. Operationally, it is desirable if norms are expressed in a way that allows performance measures to be compared directly with them. The problem is that frequently an operational norm must be used as a proxy for a theoretical ideal. In addition, no single norm may exist for some measures, e.g. when are promotional expenses excessive?.

Riley and Staatz, mention that the conceptual approaches of marketing research studies done by economists have in general taken two forms: approaches that emphasize the perfectly competitive market as a norm and those that use a broader, food systems framework of analysis. In the case of the latter, the performance norms are based in part on the concept of "workable competition". A limitation of the perfect competition approach is that market performance has been defined almost solely in terms of static economic efficiency. Relatively less attention has been given to other dimensions of performance such as stability of product flows and prices, product suitability and equity. A drawback of the food systems approach is that its performance norms are much less clearly defined than are those of the perfect competition approach [42].

Workable competition has been defined by Jesse Markham as:

An industry may be judged to be workably competitve

42

when, after the structural characteristics of its market and the dynamic forces that shaped them have been thoroughly examined, there is no clearly indicated change that can be effected through public policy measures that would result in greater social gains than social losses [43].

Other performance dimensions that have often been cited by different authors are: subsector adaptability; waste and spoilage; reliability of export products; external effects; fair conduct; product safety; adequacy of consumer information [44].

Marion, comments that "performance must be judged moment by moment in light of what was know or could be known, not by looking backward to what might have been given a state of knowledge attainable only after the fact" [45].

All of the above clearly indicates that evaluation of performance is not an easy task. There is not such a thing as a weighted average index of performance as a clear numerical answer that rates how well a marketing system functions. Anyhow, if there were, it would probably be of limited usefulness [46].

CHAPTER II

FOOTNOTES

[1]   R.   L.   Kohls and J.   N. Uhl. <u>Marketing of</u> <u>Agricultural Products</u>. Fifth Edition. Macmillan, 1980, p. 8.

[2]   Harold   F. Breimyer. <u>Economics of the Product</u> <u>Markets of Agriculture</u>. Iowa State University Press,   1976, p. 7.

[3]   A.   Allan Schmid and James D.   Shaffer. "Marketing in   Social   Perspective".   In <u>Agricultural   Market</u> <u>Analysis</u>, p.16. Edited by Vernon Sorenson. Michigan State University, Bureau of Business Research, 1964.

[4]   Kelly   Harrison,   D.   Henley,   H.   Riley,   and J. Shaffer. <u>Improving Food Marketing Systems in Developing</u> <u>Countries: Experiences From Latin America</u>. Research Report No.   6,   Michigan State University,   Latin American Studies Center, 1974, p. 4.

[5]   James D.   Shaffer et.   al. "Influencing the Design of Marketing Systems to Promote Development in Third World Countries". Paper presented at the International Workshop on Agricultural Markets in the Semi-Arid Tropics, Hyderabad, India, October, 1983.

[6]   John   Abbott. "Agricultural Marketing Mechanisms and Institutions: Their Performance and Limitations". AGREP Division Working Paper No. 94, The World Bank, March, 1985.

[7]   William A. Ward. "Incorporating Employment into Agricultural Project Appraisal". EDI/World Bank Mimeograph, February, 1975, p. 7.

[8]   Clark Edwards. "The Bases for Regional Growth: A Review". In <u>A Survey of Agricultural Economics Literature</u>. Vol. 3. Edited by Lee R. Martin. University of Minnesota Press, 1981, pp. 159-252.

[9]   Harold M. Riley and Michael T. Weber. "Marketing in   Developing   Countries".   In <u>Future Frontiers   in</u> <u>Agricultural Marketing Research</u>. Edited by Paul L. Farris. Iowa State University Press, 1983.

[10]   Charles   Slater, Harold Riley et. al. <u>Market</u> <u>Processes in the Recife Area of Northeast Brazil</u>. East Lansing, Michigan State University, 1966.

[11]   Yujiro Hayami and Vernon W. Ruttan. _Agricultural Development: An International Perspective_. The Johns Hopkins University Press, 1985.

[12]   F. M. Scherer. _Industrial Market Structure and Economic Performance_. Second Edition. Houghton Mifflin Company, 1980, pp. 3-5.

[13]   Other market performance dimensions are given in page 43 of this chapter.

[14]   John Barry Dent et. al. _Systems Simulation in Agriculture_. Applied Science Publishers Ltd., 1979.

[15]   Joel de Rosnay. _The Macroscope, Towards a Global view_. Seuil Editions, 1975.

[16]   S. R. Johnson and Gordon C. Rausser. "Systems Analysis and Simulation: A Survey of Applications in Agricultural and Resource Economics".   In _A Survey of Agricultural Economics Literature_. Vol. 2. Edited by George G. Judge, Richard H. Day, S. R. Johnson, Gordon C. Rausser, and Lee R. Martin. University of Minnesota Press, 1978, pp. 157-279.

[17]   _Ibid_.

[18]   Ben   C. French. "The Subsector as a Conceptual Framework   for Guiding and Conducting Research". _American Journal of Agricultural Economics_, vol. 56, No. 5, 1974, pp. 1014-1022.

[19]   The concept of "subsector" is defined on page 31 of this chapter.

[20]   Bruce W. Marion. _The Organization and Performance of the U.S. Food System_. NC-117 Project. Lexington Books, 1986.

[21]   James D. Shaffer. "Food System Organization and Performance: Toward A Conceptual Framework". _American Journal of Agricultural Economics_, may, 1980.

[22]   Kelly   Harrison, D. Henley, H. Riley, and J. Shaffer. _Improving Food Marketing Systems in Developing Countries: Experiences From Latin America_. Research Report No. 6, Michigan State University, Latin American Studies Center, 1974.

[23]   James E. Austin. _Agroindustrial Project Analysis_. The Johns Hopkins University Press, 1981, p. 14.

[24]   C. Peter Timmer, Walter P. Falcon and Scott R. Pearson. _Food Policy Analysis_. The Johns Hopkins University Press, 1983.

[25] George E. Rossmiller. Agricultural Sector Planning: A General System Simulation Approach. East Lansing, Michigan State University, Department of Agricultural Economics, Agricultural Sector Analysis and Simulation Projects, 1978.

[26] James D. Shaffer. "On The Concept of Subsector Studies". 1968. (Mimeographed).

[27] Ibid.

[28] Bruce W. Marion. The Organization and Performance of the U.S. Food System. NC-117 Project. Lexington Books, 1986, p. 52.

[29] Ibid., p. 60.

[30] James D. Shaffer. "On The Concept of Subsector Studies". 1968. (Mimeographed).

[31] Bruce W. Marion. The Organization and Performance of the U.S. Food System. NC-117 Project. Lexington Books, 1986.

[32] William G. Tomek and Kenneth L. Robinson. Agricultural Product Prices. Second Edition. Cornell University Press. 1981, p. 213.

[33] William G. Tomek. "Alternative Pricing Mechanisms in Agriculture". In Future Frontiers in Agricultural Marketing Research, pp. 137-162. Edited by Paul L. Farris. Iowa State University Press, 1983.

[34] Bruce W. Marion. The Organization and Performance of the U.S. Food System. NC-117 Project. Lexington Books, 1986.

[35] Larry Hamm. "Food Procurement Practices: Their Implications for Food System Structure and Coordination". Ph.D. Dissertation, Michigan State University, 1981, pp. 39-42.

[36] Martin Bulmer. "General Introduction". In Social Research in Developing Countries. Edited by M. Bulmer and D.P. Warwick. John Wiley & Sons, Ltd, 1983.

[37] Larry Hamm. "Food Procurement Practices: Their Implications for Food System Structure and Coordination". Ph.D. Dissertation, Michigan State University, 1981, pp. 43-45.

[38]   James D. Shaffer et. al. "Influencing the Design of Marketing Systems to Promote Development in Third World Countries". Paper presented at the International Workshop on Agricultural Markets in the Semi-Arid Tropics, Hyderabad, India, October, 1983.

[39]   F. M. Scherer. <u>Industrial Market Structure and Economic Performance</u>. Second Edition. Houghton Mifflin Company, 1980, pp. 3-5.

[40]   James D. Shaffer. "Food System Organization and Performance: Toward A Conceptual Framework". <u>American Journal of Agricultural Economics</u>, May, 1980, p. 312.

[41]   Kelly   Harrison, D. Henley, H. Riley, and J. Shaffer. <u>Improving Food Marketing Systems in Developing Countries: Experiences From Latin America</u>. Research Report No. 6, Michigan State University, Latin American Studies Center, 1974, p. 8.

[42]   Harold   Riley and John Staatz.   "Food System Organization Problems in Developing Countries". Seminar report for The Agricultural Development Council.   East Lansing, 1981.

[43]   Jesse W. Markham. "An Alternative Approach to the Concept of Workable Competition". <u>American Economic Review</u> No. 40, 1950, pp. 349-361.

[44]   Edward V. Jesse, in "Measuring Market Performance: Quantifying the Non-Quantifiable" (March 1978), provides a summary of performance dimensions developed by: Bain (1959); Sosnick (1964); Hidreth, Krause and Nelson (1973); Padberg (1975) and; Brandow (1977).

[45]   Bruce W. Marion. <u>The Organization and Performance of the U.S. Food System</u>. NC-117 Project. Lexington Books, 1986, p. 64.

[46]   E.   V. Jesse. "Measuring Market Performance: Quantifying the Non-Quantifiable". NC-117 Project, 1978.

CHAPTER III

DESCRIPTION AND DIAGNOSIS OF THE COTTON

PRODUCTION--DISTRIBUTION SYSTEM

AN INTRODUCTORY OVERVIEW OF THE COTTON

PRODUCTION-DISTRIBUTION SYSTEM

Figure 1 provides a schematic representation of the Paraguayan cotton production-distribution system. The direct market participants are: farmers, primary assemblers, wholesalers, ginners, exporters and foreign consumers. Other elements that have an important influence upon the direct market participants are: government institutions, importers of farm inputs, and suppliers of farm inputs. The main government institutions serving the cotton system are: Ministry of Agriculture (including the Marketing Service and the Department of Agricultural and Forestry Research and Extension [DIEAF]); Rural Welfare Institute (IBR); National Development Bank (BNF); Ministry of Industry and Commerce; National Cotton and Tobacco Service (OFAT) and; Cotton Research and Extension Project (PIEA). Major legal and policy elements are: foreign exchange rate management; quality standards; regulation and control of competition and; regulation and control of imports and exports.

48

FIGURE 1

PRINCIPAL COMPONENTS OF THE COTTON

PRODUCTION-DISTRIBUTION SYSTEM

FOREIGN CONSUMERS

EXPORTERS

GOVERNMENT INSTITUTIONS
Ministry of Agriculture
Ministry of Industry and
Commerce

IBR
OFAT
BNF

GINNERS

WHOLESALERS

LEGAL AND POLICY ELEMENTS
Foreign Exchange rate mgmt.
Quality Standards
Regulation and Control of
Competition
Regulation and Control of
imports/exports

PRIMARY ASSEMBLERS

FARMERS

TECHNICAL FARM INPUT DISTRIBUTORS

IMPORTERS
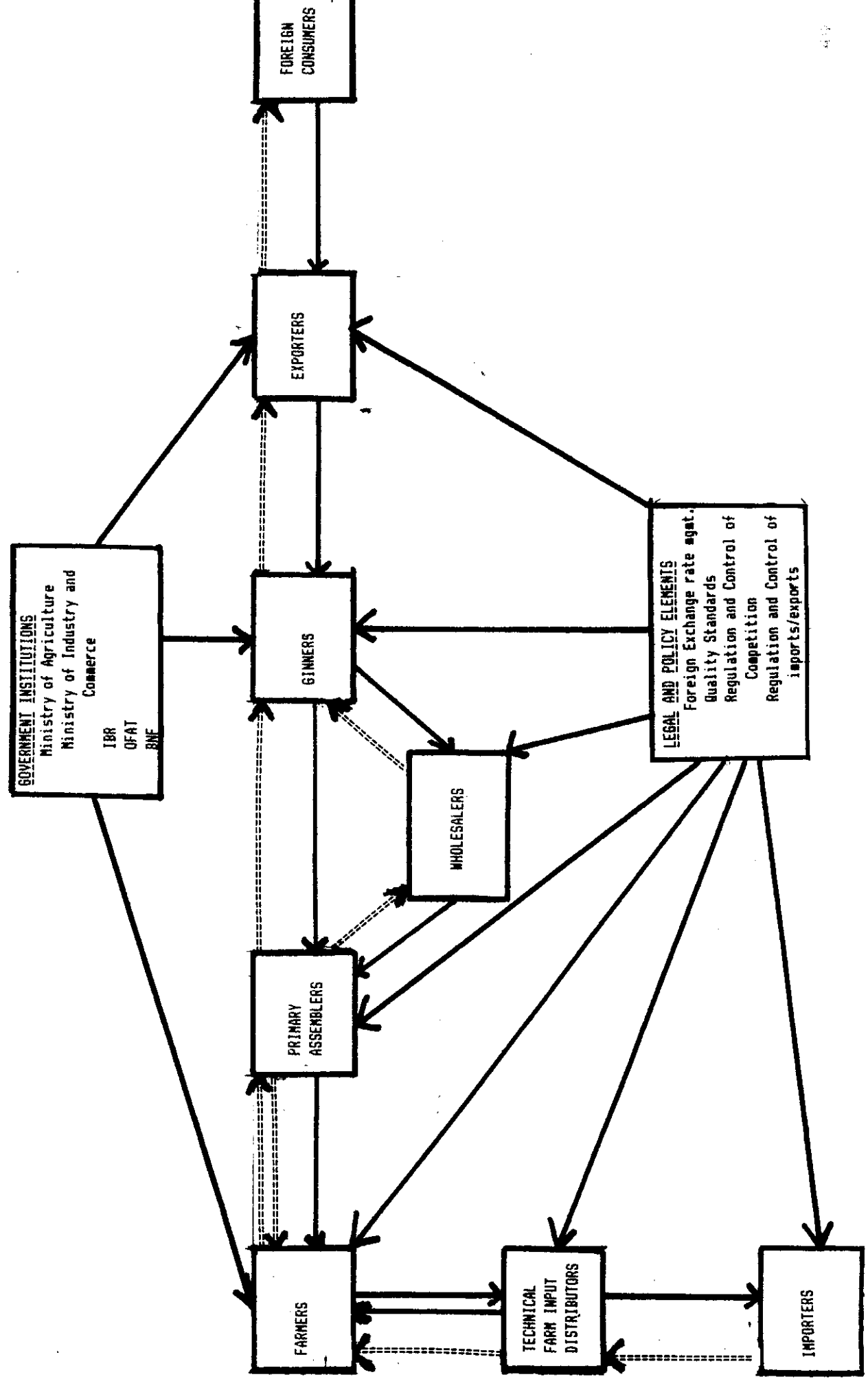
The dotted lines of Figure 1 denote input and/or product flows, and the solid lines depict flows of capital, services, information, and legal and policy elements.

The evaluation of the cotton production-distribution system will be both normative and relative. Normative in the sense of measuring system results against national development goals. Relative in the sense that the results will be judged against what seems realistically attainable given the political, social and economic realities of the country. The reference frame for the sector and national development goals of the country is expressed in its National Plan of Economic and Social Development [1]. The policy objectives for the sector are: A) Increase production, productivity and, quality of agricultural products to support domestic consumption, the provision of raw materials for processing and, the growth of exports. B) Improve the quality of human resources and consolidate the research and extension services towards improved productivity and diversification of agricultural production. C) Improve conservation and utilization of natural resources. D) Consolidate smallholder colonies on public lands. E) Improve the standard of living of the rural population.

National policy objectives are: A) Increase the level of income and employment. B) Increase production and resource productivity. C) Achieve a more equitable distribution of income and productive resources.

COTTON PRODUCTION

Paraguay's Natural Resources

Paraguay, primarily an agricultural country, has substancial natural resource endowments. It covers 407,000 square kilometers and it is divided into two distinctly different regions; the Chaco with 247,000 square kilometers to the west of the Paraguay River, and the Eastern Region with 160,000 square kilometers to the east (see Figure 2). The Chaco is characterized by low and highly variable rainfall, extreme temperatures and relatively poor soils. With less than 3 percent of the 3.6 million country's population, the area is devoted mainly to cattle ranches.

The Eastern Region is much better endowed, with generally fertile soils, regular and plentiful rainfall and subtropical temperatures. The original land cover was either forest, much of it with good timber-quality species, or natural pastures suitable for livestock grazing. In terms of soil resources and development potential, the Eastern Region may be divided into four sub-regions. Region I-- with high quality soils suitable for crops, toward the east; Region II--with lesser quality soils of moderate-to-low crop potential in the center of the Region, running from north to south; Region III--with low-lying, floodable areas suitable for livestock in the south-west of the region; and Region IV--with traditional, lower productivity cropping and livestock areas surrounding and running south from Asuncion, the capital of the country.

51

OLIMPO

BOQUERÓN

o Mayor Pablo Lagerenzo

o
Gral Eugenio A Garay

o Dr Pedro P Peña

WESTERN REGION (CHACO)

Fuerte Olimpo o

CONCEPCIÓN

Pedro Juan
Caballero o

AMAMBAY

EASTERN REGION

PRESIDENTE HAYES

Pozo Colorado
o

o Concepción

San Pedro
o

SAN PEDRO

Sub-Region II

Salto Del Guairá o

Sub-Region I

CANINDEYU

ALTO PARANA

CORDILLERA

o Coronel Oviedo

Hernandarias o

Sub-Region IV   GUAIRÁ

o Villarrica

PARAGUARI

o Caacupe

NEEMBUCU

o Pilar

San Juan Bautista
o

CAAZAPÁ

MISIONES

Sub-Region III
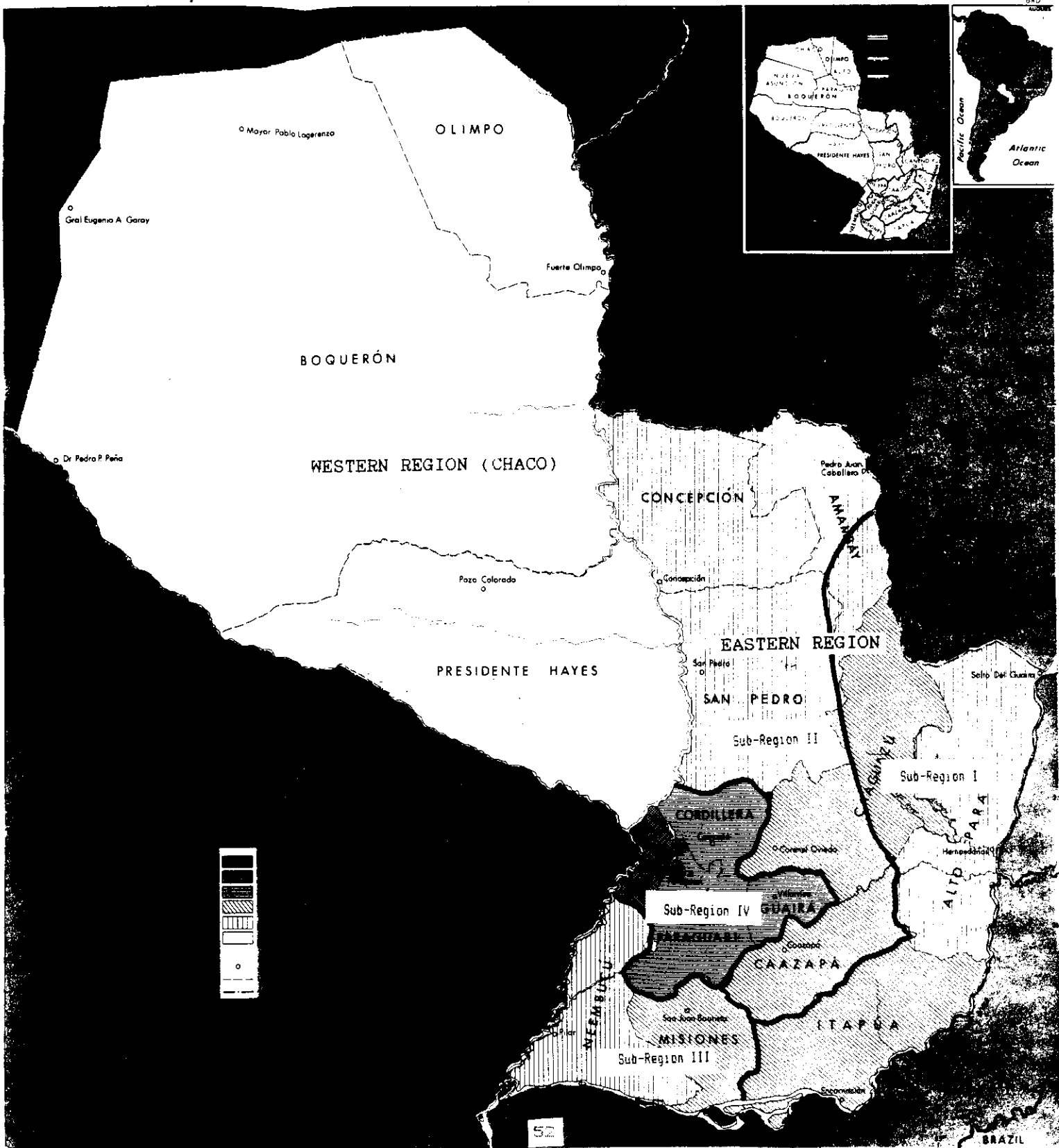
ITAPUA

Encarnación o

BRAZIL

Figure 2   Agricultural Sub-Regions, Eastern Region,   Paraguay

Source: World Bank.   Regional Development in Eastern Paraguay.

Washington, D.C., 1978.

Unfortunately, there is no broad consensus on the potential for expanding areas under crops, because of the absence of reliable resource data. Some authorities have observed that with around 6.7 million hectares suitable for crops in the Eastern Region and with only 2.8 million hectares usually under crops or fallow, there are sufficient areas suitable for expanding crop production for many years [2]. Others, notably the FAO, have concluded that the areas brought under crops have already exceeded reasonable limits, endangering the ecological balance and preservation of soil resources [3]. There is now an increasing awareness on the part of the government of the need to develop effective soil conservation and forest management practices.

Cotton Farms

The 1981 Agricultural Census identified 248,930 farms in the country. From them, 138,214 farms (or more than 55 percent of the total of farms) produce, among other crops, cotton. Cotton production takes place mostly in the sub-regions II and IV identified above. There is also production in sub-region I, but to a lesser extent, due to the fact that the lands are used primarily for soybean and wheat production. The Census indicates that, in 1981, 242,882 hectares of cotton were cultivated [4]. That makes an average of 1.76 hectares per farm. Assuming that the number of farms remained constant, the all-time-record area cultivated of 407,600 hectares in 1985, still indicates an average area of less than 3 hectares per farm.

With respect to land distribution by farm size, and considering the total number of farms in the country, the Census reveals that 55 percent of the total number of farms are smaller than 10 hectares and with an average size of 3.3 hectares. In addition, 38 percent of the total number of farms are greater than 10 hectares but smaller than 50 and with an average size of 15.8 hectares. The totality of cotton farms belong to the above 93 percent of total farms in the country. And this 93 percent of the total number of farms comprises only 10 percent of the total area of farms in the country.

The above indicates: a) the general suitability of the weather and soils in the areas in which cotton is produced; b) the varied agro-ecological zones in which its production takes place; c) the small size of the cotton farms; d) the great number of cotton-producing farms in relation to the total number of farms in the country and; e) the scattered location of the production units.

It is important to consider the evolution through time of cotton production in the country to appreciate the great transformations that have taken place, especially in the last fifteen years, and how they affect current performance of its production-distribution system.

The agricultural census of 1956 indicates for that year a total of 149,619 farms in the country. Among them, there were 54,745 farms producing cotton (36.5 percent of the total). The area cultivated under cotton was 66,101 hectares. That compares with 46,900 hectares of cotton in

54

1970; 112,000 hectares in 1974 and 407,500 hectares in 1985. The pattern is clear, a very static cotton subsector between 1956 and the beginning of the 1970s; and a dynamic system with an impressive growth since then.

This study will focus its attention primarily on the time-series data for the years 1970 to 1985, the dynamic and relevant period for the purposes of our analysis, that will lead us into the present structure, organization and performance of the cotton economy.

Traditionally, cotton production was concentrated almost exclusively in what was described as sub-region IV of the Eastern Region. This is a sub-region surrounding Asuncion, with around 15 percent of the total area of the Eastern region and more than 60 percent of the population of the country [5]. Today, less than 20 percent of the cotton is produced in this sub-region. The remaining cotton is produced in areas considerably further away from the traditional center of economic activity in the country. The implication is a much more complex marketing system due to the longer transportation distances, the lack of appropriate infrastrucuture in relatively new development areas and the scattered location--small volume type of agriculture that characterizes cotton production in the country.

To have an idea of the magnitude of the increase in agricultural production and of the dispersion of the production units in recent decades it is worth comparing the

following numbers. In 1956, there were 710,009 hectares under cultivation and/or fallow. In 1981, the number increased to 2,775,038 hectares. And since 1981 to the present, there has been further increases in land use. The annual rate of growth of land area used for agriculture use was 5.6 percent between the years 1956 and 1981. This compares with an annual rate of growth of the population of 3 percent during the same period. This indicates that the per capita use of land for agriculture has increased considerably over the last decades.

The dispersion of the production units is illustrated by two "proxies": changes in the regional distribution of the population and increases in the transportation network of the country. That is, by 1982 only 50 percent of the total population was living in the sub-region IV. And the average annual rate of growth of the population for the years 1970 to 1982 was 3 percent for the capital city and 2 percent for the areas surrounding it. That compares with annual rates of population growth around 6 percent for the sub-regions I and II. The migration flow was urban to rural and/or traditional urban to new urban in the developing areas.

With respect to the transportation network of the country, there were 1,165.9 km of roads in 1955 (95 km paved and 1,070.9 km unpaved); 6,329.3 km in 1970 (817 km paved and 5,512 km unpaved) and; 12,840.1 km in 1982 (1,667.8 km paved and 11,172.3 km unpaved) [6].

The tremendous buildup of roads aside; most of the

transportation of the agricultural commodities from the production units to the assembly centers takes place through unpaved roads that are subject to the inclemencies of the weather. That adds risk and uncertainty, costs and spoilage to the cotton production-distribution system.

Factors contributing to agricultural production increases were: a) government's massive rural settlement programs; b) increased transportation network; c) adequate real prices of agricultural commodities and; d) foreign demand able to absorb the increasing agricultural surplus of the country.

The effects of government settlement programs on the cotton subsector, will be analyzed later, together with other government actions.

Similarly, the supply responses of cotton producers to changes in the real price of the commodity will be subject of analysis later in the chapter.

On-Farm Production Issues

One of the many definitions of what constitutes a small farm in Paraguay is: "a farm with a total size of about 10-40 ha, operated by the farmer and his family, producing a mix of food crops and livestock for family consumption and cash crops, primarily cotton (also tobacco and soybean), with a limited use or no use of machinery (if used, it would be rented). Smaller farms - called minifundia - are not sufficient to fully support a family and the farmer has normally other major sources of income" [7]. The definition does not specify the typical level and range of income of a

small farm; the kinds of off-farm employment opportunities that the farmer has; the status of land tenancy of the farm; the modal size of the family and; the extent of labor-hiring to complement family labor.

At certain times of the year, particularly during harvest of cotton, the availability of labor constitutes an absolute constraint on the volume, and thus the area, of crops that may be harvested [8]. A typical farmer without oxen and implements, cultivates about 3 ha-- 2 ha of food crops (maize, cassava and beans) and 1 ha of cotton. A typical farmer who possesses oxen and implements or rents them, cultivates up to 5 ha -- 2 ha of food crops and 3 ha of cash crops (mostly cotton, but also tobacco, sunflower or soybeans).

The above describes the typical cotton producer in the country. There are a few instances however, in which the small farmers go a step further: they produce up to 5 ha of cotton. To do so, the land is contract plowed and harrowed, and then cotton is hand planted and harvested.

It takes about 100 man/days to produce a ha of cotton [9]. This amount can vary from as low as 65 to as high as 130 man/days depending upon the particular weather conditions and the price expectations during the growing period. When price expectations are high, farmers put more work in the crop and increase the hiring of additional workers. Surveys indicate that farmers generally hire from 30 to 50 percent of the labor required to produce 1 ha of

cotton. The implications of the above for rural employment opportunities are very important. For example, in 1985, there were 407,600 ha of cotton under cultivation. Assuming an average demand of 100 man/days per ha and a rate of labor-hiring of 40 percent; it follows that the total production of cotton demanded the hiring of 16,304,000 man/days; that is the equivalent of almost 109,000 workers during 6 months of the year. In addition, of course, cotton provided employment for 6 months to more than 140,000 farmers and their families.

It is important to recognize the seasonality of cotton production and associated labor requirements. Cotton is planted in October and early November and it is harvested during the months of March, April and May. It puts great pressure on labor demand during harvest time and in many instances the farmer can not get the additional labor that he needs. That, as it was already mentioned, acts as an absolute constraint on cotton expansion.

From the point of view of whole-farm planning, it is important to keep in mind that diversification into additional crops enables the period of peak labor demand to be spread as different crops mature at different times. It also helps to provide on-farm income activities during the traditionally "slack" months of June through September.

With respect to technology of production, the following questions arise: is the technology appropriate for the small farm conditions?; is the technology uniform and uniformly employed throughout the producing regions? and; can it be

improved to enhance the economic results of the farming operation?.

With respect to technology, the following have been said: "one of the several reasons for the large increases in production in the 1970s has been the availability of appropriate, low-level crop technologies, which were developed largely in the 1960s and early 70s" [10]. It is generally accepted that these technologies were well adapted because they took into account the small farmers' realities: weak cash position, risk aversion, land size and labor availability. However, there is a concern that these technologies were not diffused and explained with enough detail to ensure proper adoption by a considerable number of small farmers.

The technologies developed by the research and extension personnel of the government agencies are intended to be an uniform package to be applied all accross the country in the producing regions. This could be questionable, on the basis of the different agro-ecological regions in which cotton is produced. With respect to the level of uniformity with which the farmers apply the technology, the evidence suggests a great disparity in the use of technology and a considerable variability in yields across farmers, for the same harvest period and the same geographic area. There are also considerable yield differences between geographic areas and across time periods (See Tables 3.1 and 3.2). Differences across time periods are normally expected in a rain-fed

60

agriculture subject to the vagaries of the weather. Differences across geographic regions could be related to soil and weather conditions, but then, the uniform package of technology for the country loses its credibility in the disadvantaged areas. Differences across regions could be also due to differences in the level of education of farmers; the infraestructure of the area; the level of support by the government institutions; the tenancy status of the land; etc. It is the impression of the author that much more research is needed in this area.

Differences across farmers, in the same area, could be due to conditions internal to the farms: resource availability, managerial capacity; etc. or due to different degrees of participation in government credit and extension programs.

Some specific examples of the above follows. With respect to geographic variability, the 1981 Agricultural Census indicates an average cotton yield of 1,305 kilograms/ha for the country as a whole. Considering only the 14 departments in which the Eastern Region is administratively divided, it shows departments with over 1,400 kilogram/ha and others with under 950 kilogram/ha.

Variability of yields over time is also considerable. For the years 1970 to 1985 they have varied from a national average as low as 518 kilogram/ha in 1971 to 1128 kilogram/ha in 1985 [11]. Note that the information of source [11] is inconsistent with the national average yield of cotton provided by the 1981 Agricultural Census.

Table 3.1   Cotton: Evolution of Cultivated Hectares,
             Total Production and Yields,
             Paraguay

Years	Area (ha)	Production (Tons)	Yields (kg/ha)
1967	38,200	26,700	699
1968	37,200	30,100	809
1969	60,000	40,500	675
1970	46,900	39,600	844
1971	32,000	16,600	518
1972	50,000	40,500	810
1973	87,000	69,900	803
1974	102,000	75,000	735
1975	112,000	99,000	883
1976	117,000	105,000	897
1977	218,000	222,400	1,020
1978	315,300	284,800	903
1979	359,700	229,200	637
1980	262,500	230,600	878
1981	351,500	316,600	900
1982	302,900	253,200	835
1983	298,400	228,300	765
1984	305,600	302,400	989
1985	407,600	460,000	1,128

Source: National Cotton and Tobacco Service (OFAT).

Table 3.2   Cotton: Yields by Departments,
                  Eastern Region, Paraguay, 1981

Department	Yield (kg/ha)
Concepcion	1,057
San Pedro	1,554
Cordillera	1,028
Guaira	1,271
Caaguazu	1,471
Caazapa	1,335
Itapua	1,418
Misiones	1,360
Paraguari	1,205
Alto Parana	1,491
Central	988
Neembucu	955
Canendeyu	1,079

Source: Agricultural Census 1981

With respect to yield variability among farmers of the same region, we draw upon a previous study. A survey of cotton producers was conducted in the department of San Pedro, which has about 15 percent of the total of cotton cultivated in the country. 78 producers were surveyed, 46 of them not receiving credit and extension from a goverment agency and 32 of them receiving the services. Major findings were: A) A significant difference in yields between groups. The ones receiving the supporting services obtained on the average, 33 percent higher yields. B) Yields varying from over 2,000 kilogram/ha to under 1,000 kilogram/ha. C) Considerable differences in the way in which the same technologies were applied: between the groups and also among individuals within the groups. D) The major constraints observed in both groups were: low plant population; deficient soil preparation; inadequate disease and pest control; inadequate treatment of the harvested product and; low level of availability of implements [12]. However, the research does not provide an economic evaluation of the results obtained by the two groups. Hence, we can not conclude that the group who received the services obtained better results than the control group.

Can the technology of production be improved?. Studies indicate that small farmers could improve their yields by at least 50 percent with only limited increases in costs, by applying low-cost technologies. Among them: correct soil preparation, adequate time of planting, adequate plant

population and timely weed control [13]. Studies conducted by the Cotton Research and Extension Program (PIEA) show the results of a number of experiments, in which the physical results constitute the average of three years: 1983-85 using 1985 input and output prices. When explaining the results, they deduct 20 percent from the average yields actually obtained under experimental conditions, and obtain what they called an "adjusted yield". This adjusted yield represents the technical ceiling that the farmers should be able to reach, provided that they apply timely and properly the package of recommendations that comes from the research stations [14].

The actual gap between the adjusted yields of the experimental stations and the national averages is very considerable. Compare for example the national average for the years 1983, 1984 and 1985 against the average, adjusted yield obtained for the same years in experimental conditions. The national average was 960 kilogram/ha. The average, adjusted yield in experimental conditions was 1,848 kilogram/ha. That is, almost twice as much than what supposedly should be attained at the national level. Further information will be provided later, with respect to the number of farmers that the extension service reaches in the country, and the level of efficiency with which it is providing the technology transfer from the experimental fields to the farms.

Other interesting results obtained by the Cotton Research and Extension Program (PIEA) were: A) given the 1985

input/output price relationships, it does not pay to apply fertilizers to the cotton crop. B) The same was true with the application of pesticides; although it was made clear that in years of high parasitic pressures it might not be feasible to produce cotton without the use of pesticides.

The following points summarize the above discussion: a) There is considerable variability in yields among the farms throughout the country; b) farmers apply different technologies and/or apply supposedly the same technologies but, in a variety of different ways; c) the gap between experimental yields and national averages is considerable and there is no evidence whatsoever that the gap is being narrowed and; d) the input/output price relationships were of such a nature in the year 1985 that, under the specific weather and parasitic conditions, it was not economically justifiable to apply fertilizers and pesticides to the cotton crop.

Evolution of Yields

Yields have remained virtually static in the last years. They show considerable variation from year to year but without any discernible trend or pattern. A comparison of the average yield for the years 1972 through 1978 against the average yield for the years 1979 through 1985 confirms the above statement. The average for the first period was 864 kilogram/ha. The average for the second period was 876 kilogram/ha (see Table 3.1).

Costs of Production

It is difficult to talk about a national cost of production for cotton. The difficulties stem from the fact that there are different technologies being used in cotton production and even the same technologies are being used with widely different results due to different managerial capacities on the farms. In addition, the farmers decide on a year-by-year basis, how much labor to hire and how much of modern inputs to purchase, based on current prices of inputs and current and expected prices of outputs. They also make varying allocations of their fixed capital to alternative enterprises based on the comparative profitability of the crops. And the same is true with the family labor use [15].

A more relevant measure to understand farmers' decisions and the evolution of their terms of trade could be reached by the use of relative prices. They could show in real and in nominal terms the price relationships between cotton and the major inputs used in its production; between cotton and alternative crops and; between cotton and consumer goods that the farmer usually purchases. Information on these relative prices are, for the most part, lacking in Paraguay.

On Farm Income --Farming Systems --
Farmer savings and investments

It is clear that the cotton producer does not produce only cotton but a variety of different commodities. Very little is known about the best way in which the farms should be organized to obtain the most from their available

66

resources. Similarly, soil conservation techniques and natural resource management are not encouraged on the farms. Little is known about farm income: its level, variability, and rate of growth over time. Similarly, there is no information about rates of saving and investment by farmers. No studies are available about the way in which the small farmer should and could evolve over time and the implications of alternative paths of development on farm income, natural resource management and, employment.

On Human Capital -- Farmer Goals and Farm/Household Interactions

Information is also lacking with respect to what the farmer knows, his thought processes and how well he is utilizing the information provided by the extension services. Similarly, little is known about his/her goals and the way in which the farm production decisions interact with the household consumption decisions.

Estimating A Supply Response

A static supply schedule shows how much of a given commodity will be offered for sale per unit of time as its price varies, other factors held constant. This static supply schedule is known as change in quantity supplied to differentiate it from shifts in the supply curve or changes in supply when other factors are allowed to vary along with the price of the commodity. This "other factors" could be input prices, changes in return from competing commodities,

technology, weather, changes in the prices of joint products, institutional and policy variables, etc.

Price elasticities of supply provide an important measure of the responsiveness of quantity supplied to price changes. With respect to own-price elasticity, theory suggests a direct relationship between own-price increases and quantity supplied.

Time plays also an important role in supply theory. Evidence indicates that supply curves become more responsive as more time is allowed for adjustment. The length of time allowed for adjustment to a certain change raises the dynamic issue of the need to differentiate between short-run and long-run responses. That is, short-run and long-run elasticities of supply should be considered under particular model specifications.

Other factors that are often included in supply analysis are: a) time lags; b) yield risks; c) price risks; d) asset fixity; e) input/output relative prices; f) asymmetric supply responses; g) expectations; h) future prices and; i) government policy variables such as: price supports; supply control programs.

It must be also kept in mind that in a world of supposedly rational individuals, the whole opportunity set of the producers must be considered when analyzing supply. In practical terms this implies considering factors such as other available alternatives; off-farm employment opportunities; the work-leisure decision (with backwards supply curves possible) and where relevant, a vis-a-vis

comparison between commodities produced for subsistence and commodities produced for the market.

There are two general views when modelling supply responses. One theoretical view is that prices and quantities are determined simultaneously. Under this view, a simultaneous equation system is called for. The other theoretical view is that prices and quantities are determined sequentially. This call for a recursive equation system in which prices and quantities are viewed as being linked recursively in a causal chain in which realized production, because of the time lag, is a function of past prices and, where current prices are mainly a function of current supply.

Our understanding of the cotton production is that the supply model is better explained by a recursive equation than by a simultaneous system of equations.

Our supply equation is then the cultivated hectares equation. The actual number of cultivated hectares are seen as a function of the previous year real price of cotton, a trend variable and the cultivated ha lagged one year. Given the thought processes of the small farmers, it is believed that the lag of one year captures most of the information they use to make their planting decisions as opposed to longer lags or averages or weighted averages of past prices.

The inclusion of the lagged-one-year cultivated ha as an independent variable is included to reflect the fact that large changes in production tend to be restricted by factors

69

like resource fixity, managerial ability of farmers, and habitual production patterns. The formulation simply says that current production is influenced by the level of production in the previous period, and current production may be viewed as changing from the previous level in response to price changes.

The price of cotton has been deflated by the consumer price index to reflect the view that farmers respond to real prices rather than to nominal prices (i.e. there is no money illusion).

The trend variable has been introduced to account for factors not captured in the other two variables; mainly technology.

The observation has been made that the expansion of cotton production is being constrained in recent years due to structural problems. That is, labor constraints at harvest time and the unavailability of public lands for sale in the Eastern Region of the country are slowing down the cotton expansion in the country.

With this in mind, 3 different equations were fitted. All of them with the same formulation but varying the period of analysis. That is, one equation was fitted for the years 1968 to 1985; the second equation was fitted for the years 1968 to 1976; and the third equation was fitted for the years 1977 to 1985. Annual data was used for the three equations.

The idea behind these 3 equations is the following: the first one will show supply elasticities for the whole

70

period. The second one will show supply elasticities for the first nine years of the series. During these years, there were still no constraints imposed upon cotton expansion and hence we would expect an elastic price elasticity of supply. The third equation, will reflect the last half of the series.

The equations will show and answer an important policy question: namely: how responsive are the cotton producers to changes in the real price of cotton?. If their price elasticity of supply turns out to be elastic, it will mean that the farmers are very responsive to real price changes. Consequently, any goverment policy that attempts to expand cotton production; should provide enough real price incentives for the farms to respond.

The equations were estimated using a log-log formulation. Under this formulation, the coefficient of the price variable provides directly the value of the short-run price elasticity of supply.

The variables were defined as:

LCULTI= natural log of cultivated ha.

LPRICD(-1)= natural log of the real price of cotton lagged one year.

LCULTI(-1)= natural log of cultivated ha lagged one year.

TIME = trend variable

Equation One – 1968-1985

$$\text{LCULTI} = 0.5745109 + 0.5998815 \; \underset{(4.579)}{\text{LCULTI}(-1)} + 0.9212948$$

$$\underset{(3.784)}{}$$

$$\text{LPRICD}(-1) + 0.0617996 \; \underset{(2.478)}{\text{TIME}}$$

R–SQUARED= 0.955

All numbers in parentheses are t statistics.

The short-run price elasticity of supply was 0.92. That means that a 10 percent increase in the real price of cotton is likely to increase supply response by 9.2 percent.

The long-run price elasticity of supply was 2.3. That means that given the time neccessary for the adjustments, a 10 percent increase in the price of cotton will result in an increase in the supply response of 23 percent, other things held constant.

Equation Two – 1968-1976

$$\text{LCULTI} = 0.8918482 + 0.4524208 \; \underset{(2.151)}{\text{LCULTI}(-1)} + 1.2182510$$

$$\underset{(1.898)}{}$$

$$\text{LPRICD}(-1) + 0.0819078 \; \underset{(1.420)}{\text{TIME}}$$

R–SQUARED= 0.869

All numbers in parentheses are t statistics

The short-run price elasticity of supply was 1.218. It shows that the short-run price elasticity of supply was elastic in that period.

The long-run price elasticity of supply was 2.22.

Equation Three - 1977-1985

$$\text{LCULTI} = 6.8585967 + 0.3159136 \text{ LCULTI}(-1) + 0.3650787$$
$$(1.406) \qquad\qquad (1.305)$$

$$\text{LPRICD} (-1) + 0.0271607 \text{ TIME}$$
$$(1.038)$$

R-SQUARED= 0.53

All numbers in parentheses are t statistics.

The short-run price elasticity of supply was 0.365. It shows that the supply is inelastic in the short-run as it was previously hypothesized. An increase in prices of 10 percent will increase supply response by only 3.6 percent.

The long-run price elasticity of supply was 0.533.

The supply analysis indicates that: a) farmers are responsive to real prices. B) Cotton production is experiencing structural constraints in recent years.

Notice, however, that the results obtained should be interpreted with caution due to the model and data limitations. These limitations are:

1. The data series employed have limited reliability. The farmgate prices used in the analysis are probably higher than the prices that the farmers effectively received. This is analyzed later in the present chapter. Data of cultivated hectares is usually collected in an ad hoc manner that does not assure consistency and comparability among different sources. The deflator used to convert cotton nominal prices to real prices is the Consumer Price Index (CPI). This CPI is based on the cost of living in Asuncion, the capital city. As such, it does not reflect, for the most part, the

cost of living in rural areas.

2. The results obtained in the supply estimation are very sensitive to changes in model formulation. This study tried different formulations such as a linear function, a semi-log function and a log-log function. Different formulations yielded widely different results. The log-log function provided the better fit in terms of R-squared and it was not worse than the others for forecasting purposes. Hence, it was finally chosen in this study.

3. An historical simulation made with the model missed two turning points and had a rather poor forecasting capability. The model "predicted" 512,070 cultivated hectares in 1985, or 25 percent more than the 407,600 hectares actually cultivated.

4. The dependent variable and its lagged value used as independent variable were, as expected, highly correlated. Their correlation coefficient for 1968-1985 was 0.945.

5. The model bases supply response on past prices only. It does not take into account farmers' expectations of future prices, alternatives, etc. that are an important component of the decision-making process.

GOVERNMENT PARTICIPATION

The public sector is seen in the present study as one of the most important forces in shaping the opportunity sets of the different participants in the cotton production-distribution system and in coordinating its overall economic activity.

As a basic principle, the National Plan of Economic and Social Development, 1977-1981, confirmed that responsibility for economic activity lay with the private sector, supported by policies, institutions and infrastructure provided by the Government and by the maintenance of internal and external financial stability [16].

A clear example of the above policy statement is the mix of public and private institutions that are present in the cotton subsector, and the way in which they interact to determine the organization and performance of the cotton economy.

A quick look at the cotton subsector indicates that the means of production belong to the private sector and that the market price is primarily the force guiding the allocation of resources and the rewards to the different participants in the system.

A rapid appraisal of what the Government does in the subsector as well as what it does not do, should help to put things in perspective from the beginning.

In effect, the Government is responsible for the following activities: a) Road construction; b) Land settlement programs; c) Rural development projects; d) Provision of basic services such as water, electricity, schools and public health; e) Control of product quality and standards; f) Processing and distribution of the cotton seed; g) Regulation of competition; h) Determination of cotton's "reference price"; i) Research activities; j)

Extension services; k) Provision of market information; l) Provision of part of the financing to the system and; m) Cotton promotion in foreign markets.

In addition to all of the above, the government is obviously responsible for: a) Providing the legal framework within which the market processes take place; b) Designing and implementing monetary policies (money supply, interest rates, credit availability, etc.) and fiscal policies (tax system, government spending, etc.); c) Planning and policy decision making and budget allocation; d) Designing and implementing income policies (minimum wages, floor and ceiling prices, etc.) and; e) Setting the rules of the game for international trade.

A critical factor for the performance of the subsector that is managed by the government is the foreign exchange rate. As it was already mentioned, more than 95 percent of the cotton that is produced in the country is exported. So, special attention will be given to exchange rate management.

It is equally important to mention what the government is not doing in the subsector. That also determines the opportunity set and the scope for action of the private sector in the system.

The government does not: a) engage in the production and/or distribution of the commodity; b) buy or sell the commodity; c) produce, distribute, sell or buy modern production inputs such as: machinery, pesticides and, fertilizers; d) apply cost or margin controls in the marketing channels; e) set minimum prices for cotton; f)

76

subsidize interest rates; g) perform marketing functions such as: transportation, storage, planning production, etc.; h) manage marketing boards or other types of parastatals engaged in exporting the commodity; i) set minimum rural wages; j) develop income or price stabilization programs and; k) set prices of agricultural inputs.

The above indicates the following: a) There is plenty of room in the cotton subsector for public and private actions; b) The public actions in the sector are complementary rather than a substitute for private action in the sector; c) The economy is basically a "free market economy" with limited government interventions and; d) It is clear that many macroeconomic policies not directly related to the cotton subsector can still have a considerable effect upon its organization and performance.

We review next, some selected areas of Government intervention in the economy and how they affect or have affected the subsector.

Road Construction

It has already been shown the tremendous buildup of the transportation network in the country in recent years. The roads have been directly associated with the expansion of the economic frontier of the country. But other implications concerning cotton producers are: a) scattered location of the production units; b) poor transportation conditions in unpaved roads that increases costs ; c) relatively large distances to the rural markets; d) reduced numbers of buyers

for the farmer's products; e) very limited enforceable capabilities of the Government to control and promote fair competition in rather remote areas; f) poor market information and; g) limited contact with extension agents and credit institutions.

Land Settlement Programs and Land Reform

In 1963, the Government established the Rural Welfare Institute (IBR) and promulgated the Agrarian Statute. The IBR's broad mandate, according to the law, was to transform the country's agrarian structure by redressing the dualistic pattern of land ownership and increasing the participation of smallholder farmers in economic and social development. More specific objectives were: to relieve the concentration of population in smallholder (minifundia) areas near Asuncion by establishing colonies (settlements) in hitherto unexploited areas further away; to legalize the tenancy of persons occupying (illegally) areas of Government and private lands through colonization programs on these lands; and to provide technical, credit, infrastructural and other support to the settlers within the colonies.

The effect of the roads plus settlement programs upon the regional distribution of the population have already been analyzed. We add here that through 1982, 835 colonies had been established on State and private lands, covering more than 8 million ha and with almost 160,000 individual lots. Among them, the 633 colonies covering more than 6.4 million ha and with more than 93,000 individual lots that

78

were established between 1963 and 1982 [17]. In addition to that, a comparison between the Agricultural Census of 1956 and 1981 reveals that there were around 75,000 farms in 1956 with definitive or provisional titles and around 141,000 farms with definitive or provisional titles in 1981. However, in 1981, still only 57 percent of the farms had definitive or provisional titles; while 13 percent were rented and 30 percent were illegally occupied. Considering that there were around 150,000 farms in the country in 1956 and over 248,000 in 1981, the above numbers indicate that regardless of the great progress in Land Reform programs, there were still, in 1981, at least as many illegally occupied lots as there were in 1956. And farmers without at least a provisional title are not eligible for credit by the National Development Bank (BNF), the principal Government credit institution in the country for the agricultural sector.

IBR's colonization programs were designed to "settle the largest number of families at the lowest possible cost, basing development on the self-reliance of the family" [18]. The issue is that many colonies, specially the older ones, that were established with almost no planning, have been experiencing severe problems due to the lack of infrastructure and competitive conditions. That compounds the problematic situation described on the "road construction" section.

Still another problem is the size of the lots for crop

production. The IBR gives to the small farmer a lot of 20 ha. But many authors think, that 20 ha is too big a size for the lot to be efficiently used by the small farmer with traditional technology and, on the other hand, too small a size to be used for mechanized agriculture [19].

Government Credit

It has been observed that:

> BNF (National Development Bank), which supplies 68% of the institutional credit to the crop sector in the country, serves less than 15% of the farmers and finances (partially) only 30% of the area under cash crops. Small farmers can be reached on a significant scale only in the areas where the availability of roads and support services is sufficient, i.e., primarily in the frame of integrated projects. Awaiting for the country to be covered entirely by such improved services, there are many areas where agricultural services are weak and credit not sufficiently available, particularly for medium/long-term investment financing [20].

BNF financed 13,991 ha in 1975 or 12.5 percent of the total cotton cultivated ha. It financed around 70 percent of the estimated costs of production per ha in that year. With respect to the year 1985, the BNF financed 46,881 ha or 11.7 percent of the total cotton. And it financed only, around 25 percent of the estimated costs of production [21].

This figures show the limited scope of the Government agricultural credit in the country. The figures also indicate that credit is not a variable that could explain the massive increase of cotton area under production in the 1970's and part of the 80's.

Additionally, the following issues are observed: a) Farmers without title are not elegible for credit; b) Many

farmers with title will not borrow from the BNF because of the mortgage that it requires and they don't want even to think of the possibility of losing their properties and; c) many farmers often don't know about the procedures to secure a loan or they consider them too complicated and time consuming.

Research

The greatest contribution made by the Research Division of the Ministry of Agriculture to agricultural development has undoubtedly been the identification, multiplication, and distribution of the cotton variety REBA 50 in the early seventies and its replacement in the late seventies by the REBA P 279 -- a variety derived from the REBA 50.

Another major contribution to cotton production is the identification of pests and diseases and the evaluation and recommendation of means for their control. Here the Research Division is assisted by the major agricultural chemical companies, whose agents promote their products in the growing areas.

However, little, if any work, has been carried out on longer-term considerations, such as maintenance of soil fertility, crop rotation or farming systems. Research is needed to know how production can be sustained economically on small farms without cutting more forest. It is also essential to know how a small farmer, using animal traction, may progress to economically viable, mechanized agriculture. Similarly, little work have been done with respect to fertilizer responses, and, so far, only a few economic

reviews of research recommendations have been carried out related to on-farm profitability.

Extension Services

The Ministry of Agriculture has the main responsability for crops extension, through its Agricultural Extension Service (SEAG). Several other institutions undertake extension also, although the focus of their extension is normally to support their specific credit or colonization activities. In addition, several departments within the Ministry undertake specialized extension or research activities, either in cooperation with, or independently of the SEAG. One of such departments is the Cotton Research and Extension Program (PIEA).

The SEAG usually operates in the country under severe financial constraints. In any given year, they reach, at the most, 15 to 20 percent of the smallholder population, and often these are the same smallholders each year. It would appear, therefore, that SEAG's impact on the large increases in cotton production in the 70s has been limited.

It has been observed, that there is insufficient coordination in the advice being provided to farmers by the various agencies. Not infrequently, the advice is conflicting with that recommended by the SEAG, tending to reduce farmer confidence in the service [22].

Marketing Policies

The Marketing Service

Marketing policy coordination rests primarily with the Department of Marketing and Agricultural Economics (Marketing Service) of the Ministry of Agriculture. The Marketing service is responsible for: a) assembling and distributing marketing information, via radio, newspapers, its weekly Market Information bulletin and a semi-annual publication on past prices; b) managing 10 grain silos (55,000 tons total capacity); c) establishing minimum prices for wheat and sugarcane, and reference prices for soybeans and cotton; and d) establishing product norms and standards. In practice, the Marketing Service spends most of its time managing its silos and maintaining its product price information activities. The department makes very little contribution for policy decision making in the crucial area of marketing.

Very few descriptive studies have been made of how the marketing system works in the country. Diagnostic studies are definitively lacking. For the above reasons, it is extremely difficult to gather enough reliable secondary information needed as a starting point for more analytical studies. The present knowledge base is based on an ad hoc perception of reality rather than on the cumulative process of building scientific knowledge.

All of the above could gradually change. Recently, the Ministry of Agriculture initiated the elaboration of a

National Marketing Plan that is expected to be implemented in the near future. As a part of the plan the priorities of the Marketing Service will be revised and the unit is expected to be strenghtened both financially and professionally.

Government actions concerning foreign exchange rate management and international trade regulations, as they relate to cotton, will be described and analyzed in following sections of this chapter.

The Reference Price

The Reference Price is a price established by the government that indicates the minimum price that should be paid for raw cotton at the ginnery gate. In reality, the price is not enforceable and the prices paid to farmers are usually lower than the Reference Price. The Reference Price is determined long after the planting decisions were made. Hence, it does not have value for planting decisions. It could however, have some impact upon the hectares that the farmers are going to harvest. A high reference price could stimulate a careful job by the farmer at harvest time.

Quality Standards and Seed Distribution

The REBA P 279 is the only variety of cotton seed that is planted in the country. The government has the monopoly of its processing and distribution. The National Cotton and Tobacco Service (OFAT) is the government unit that collects the seed from the ginneries after each harvest

period, treats it with the appropriate chemicals for pest and disease control and sells it for the next planting period. These tasks are efficiently done since the ginneries have the responsibility to make available to the OFAT an agreed percent of seeds at no cost for the government. Generally speaking, the system works smoothly and the OFAT have, on time, enough cotton seed to cover the timely requirements of the next planting period.

The OFAT is also in charge of the quality control of the cotton fiber that is directed to the foreign markets. The government is well aware of the need to mantain the prestige that the Paraguayan cotton fiber has reached in its traditional foreign market.

The cotton producers usually do not know the norms and standards that are decreed by the government to regulate the buying/selling operations of cotton seed. The result is that they do not properly treat the harvested product and/or they do not know the quality of product that they have in their hands and hence the real value of it. Hence, they do not know if they can claim a "premium" price or if a "discount" price is appropriately applied to their product. It is also usually the case, that if the farmer has cotton fiber of different qualities and does not sort them, he receives a single price for the whole lot that reflects the lowest quality fiber.

OFAT officials should grade the lots of cotton seed that are sold. However, due to OFAT's limited resources, the extent of their grading and supervision is very limited.

THE COTTON MARKETING SYSTEM

This section explores the structure, organization and some selected performance indicators of the cotton marketing system. The following aspects are considered: a) physical flow of products and inputs; b) institutions and; c) pricing methods and coordination mechanisms. Generally speaking, our goal is to gain an understanding of how the system usually works; that is, to identify and analyze "standard operating procedures".

System Overview

Cotton is the main cash crop for small farmers and the main foreign exchange earner for the country. In 1981 there were over 138,000 cotton producers. In 1985, 407,600 ha of cotton were cultivated. After processing, a total production of 165,504 ton of cotton lint was obtained. Of this total, 95.6 percent was exported and 4.4 percent was utilized for domestic consumption. The cotton lint exported gave the country a f.o.b. value of $141.8 million. This amount constituted 46.6 percent of the total value of exports of the country for the year 1985.

Compare the above with the 1970 figures. that is: 46,900 cultivated ha; $4.04 million in f.o.b. value and; 6.3 percent of the total value of exports. The evolution of production, exports and export share is impressive. This indicates: a) an evident willingness to produce; b) an ability to produce it profitably (at least on the average)

and; c) a near total dependency on foreign demand. It should be added that there are almost no carry-over stocks in the country. Virtually all the annually produced cotton seed is processed to cotton lint and exported in the same year. It is also clear, that the country is exporting a raw material as opposed to manufactured products with higher value-added.

It is important to note that the present study does not address the processing and distribution of cotton seed by-products such as oil, pellets, etc. These cotton by-products are not included here because of the unavailability of data. What is known is that they are mostly directed to domestic consumption.

Recalling Figure 1 of page 49, chapter III, this study lacks the data to determine the extent to which the ginners are also exporters. That is, it is not know the numbers of: a) ginners only; b) ginners/exporters and; c) exporters only.

The description of the components and functioning of the cotton marketing system is based on a number of reports and studies that were elaborated mainly by researchers of the Ministry of Agriculture [23]. These studies are basically location-specific case studies. However, when reporting the results, the authors of all the studies, invariably, assumed homogeneous conditions across the country and generalized the results as applicable for the whole country. This study will proceed along the same lines, based on this

author's limited knowledge of the working of the cotton production-distribution system. However, more studies are needed to determine similarities and differences in market organization and performance among the different producing regions of the country.

Description and Analysis
The Ginneries

There are 23 companies operating in Paraguay with cotton-ginning. Many of them have a number of ginneries under operation in different locations. All the companies are private-owned. The ginneries are located mainly within the production regions, although an important number of them are located near Asuncion. They vary widely in processing capacity. The biggest can process up to 460 ton of cotton seed per day. The smallest processes a maximum of 15 ton/day. The average size is around 110 ton/day. The four biggest companies combined had a market share around 50 percent 1984/1985. The two biggest ones combined had a market share of 40 percent during the same year.

What goes on inside the ginneries is a black-box. No studies have been made on the economics of size, number and, location of the ginneries. Similarly, their cost structures, that is the height of their fixed costs, their variable costs and the break-even levels of processing, are not publicly known. Without knowing their real costs of production we can not evaluate their performance. Similarly, we do not know the appropriateness of the

technology being used in the ginneries and how progressive they have been over time.

In 1985, the installed capacity for processing cotton seed for all the ginneries taken together was 4,731 ton/day [24]. Assuming an intensity of use of 80 percent during six days a week, the maximum amount of cotton seed that can be processed in five months is 488,240 ton. In 1985, a total harvest of 460,000 tons was reported. This indicates that the ginneries, in the aggregate, were virtually working at full capacity. Further expansions of cotton production in the near future might exceed the present installed capacity of the ginneries.

One question that could be asked about the ginners is why they do not integrate backwards to ensure the supply of raw material to their processing plants. We hypothesize that they do not seek vertical integration towards the supply sources because they do not find it profitable to do so. They are already controlling the subsector through their financial power, the network of assemblers that work for them and their international contacts. It should be added that the loose enforcement of regulations and the very limited control of competition on the part of the government also work to the ginners' advantage. They have considerable discretionary power in taking their decisions.

Thus, it seems as an unnecessary risk for them to engage in production or to resort to formal procurement arrangements and production contracts. Under the present conditions, they seem to minimize their risk. They post the

price at the industrial plant and the raw material comes to them. And they modify that price as supply and demand conditions change.

Another issue that merits attention is the extent to which ginners compete with one each other. Is there any evidence of collusive behavior?. It has been observed that, for the most part, they do not compete with one each other [25]. They have very well defined networks of assemblers and geographic areas of operation; and they seem to follow the policy of "live and let live".

However, in years of unplanned short supplies due to weather conditions or unusually high parasitic pressure, the price of cotton seed has invariably gone up. That seems to indicate that: a) there is increased competition as opposed to collusive behavior and; b) the higher prices of the short supply years are always within the reference framework of the international prices and are still low enough to be profitable, since all the cotton still leaves the country.

The Working of the System

The cotton marketing system is almost entirely in the hands of the private sector. The strategic group in the system are the ginneries. Each ginnery maintains a network of assemblers and in many cases of sub-assemblers (i. e. wholesalers working in coordination with local assemblers), who deal directly with the farmers. Ginners receive advances from overseas buyers for commitments to supply agreed

quantities of lint after harvesting and processing. These advances are made either in cash or as letters of credit opened in the name of the exporter. The price is generally linked to the futures market. In return, the ginners advance through their assemblers to their growers, seed, agrochemicals and cash for cultivation expenses, and later cash to help cover the cost of harvesting. Funds provided locally are subject to interest charges of at least 30 percent per annum, that the ginners charge to the assemblers. These charges are passed on to the growers, together with other charges. While no firm data are available, small farmers appear to be charged an annual interest rate of at least 40 percent by assemblers for their production and household credit

The Paraguay Cotton Company (CAPSA), the second biggest ginnery of the country, with a market share of 18 percent during 1984/1985, provides an example of how the system works [26].

CAPSA is a private-owned company. It is owned 75 percent by Continental Grain, the international export/import firm, and 25 percent by a Dutch farmers' cooperative interested in securing a regular supply of cotton seed pellets for livestock feed. CAPSA buys cotton through 80 primary assemblers who use around 650 local assemblers as their links to small farmers. Each local assembler serves an average of 35 to 45 small farmers. At the average price for cotton seed paid at the plant for the 1983 crop of G 85/kg, [27], CAPSA estimates that farmers should have

received G 63/kg after allowances to assemblers of G 3-4/kg, plus transport and other charges. The researchers who conducted the study estimate that actual prices were probably around G 59/kg, however, because of the risk carried by the assembler on his advances to small farmers who offer no guarantees. CAPSA also receives no guarantees from assemblers for the advances it makes to them. However, if assemblers are to qualify for advances for the next year's crop, they must deliver sufficient quantities of cotton to cover the value of the advances and interest costs.

The general evidence indicates that the above is very much the way in which the cotton is channeled from the farms to the ginneries. There are no formal contracts but the system is relatively stable. Year after year, the ginneries tend to work with the same assemblers, and they, in turn, operate with the same producers. The ginners are the ones who, generally speaking, control the flow of information. They follow closely the variations in prices in the international markets and the developments of government policies with respect to exports, imports and foreign exchange rates. They are the ones who have contacts with the sources of external demand and the ones who watch closely, through their assemblers and government estimates, the evolution of supply. Following Bressler and King terminology, the ginneries are the points at which maximum concentration, equalization and, dispersion of the product

take place [28]. That is, the ginneries are the place that concentrate the product that flows from the farms; adjust the commodity flows in response to changing supply and demand conditions and; disperse the processed product to the foreign markets.

The ginneries make their costs (risk included), returns and profits calculations and determine the maximum amount that they can pay for the product at the industrial plant location. They provide their prices to the assemblers, for them to make, in turn, their own costs and returns calculations. Since the government's reference price is not enforceable; ginners pay little attention to it, unless it is convenient to do so.

The above description of the system does not imply that the system is stable. Although the relationships between participants is rather stable; there are considerable fluctuations in the system due to: a) large unplanned supply variations; b) unexpected developments in international markets; c) unexpected developments in Brazil and Argentina, two important trading partners that have frontiers with Paraguay and; d) unexpected developments in government's regulation of exports and management of the foreign exchange rate.

The system could be best described as dynamically stable but, subject to random shocks. Its dynamic stability comes from the fact that changed economic conditions are rather quickly transmitted throughout the system. The random shocks come from the presence of the unpredictable and

93

rather uncontrollable events mentioned above.

It should be stressed however, that the flow of information is mostly controlled by the ginners. For this reason, it is expected that the timeliness and accuracy of information will depend upon the extent to which the interests of the ginners coincide with the changed economic conditions.

The important point, from the small farmer point of view, is that he/she is a price taker, with very limited bargaining power and, considerable price and yield risks. This will be made clearer in the following paragraphs.

It has been observed that in the smallholder production areas, where cotton is the main cash crop, competition is less intense and marketing margins higher than in the areas where medium to large farmers predominate [29]. Roads in bad conditions limit access to smallholder production areas. Additionally, the medium and large crop farms are located mostly toward the eastern part of the Eastern Region which has the most fertile soils of the country. This region is in the frontier with Brazil, where local assemblers face heavy competition from Brazilian buyers.

In smallholder areas, product prices received by farmers are reduced by high transport costs; the quasi-monopsonistic situation that often develops because of a limited number of buyers; poor access to price, markets and quality standards information and; the farmer's need to sell soon after the crops are harvested to avoid losses due to lack of storage

94

facilities. Similarly, the cost of inputs and other necessities are increased since the assembler is almost always the supplier of inputs and the source of financing. Even when access to institutional credit is possible, the small settler often does not know about the procedures required to secure a loan; and/or cannot provide adequate guarantees, since it is likely that he does not possess a land title or is not willing to risk his land title by putting it up as a collateral for the loan.

The scattered location of the farms, the small volume produced on them and, the discouraging conditions and limited coverage of the rural roads contribute to high transport costs. Assemblers may charge as much as G 3/kg per 5 km for transporting seed cotton on certain feeder roads, compared to G 3-4/kg for 250-350 km on main roads to Asuncion.

An intrinsic handicap to cotton marketing in Paraguay is the dispersion and relative isolation of most farmers, with their homes located on their land rather than in villages. There are no well developed rural markets in which the producer could bargain for the sale of products and the acquisition of inputs and consumer goods.

It is often the case that the local assemblers live in the production areas. They have storage facilities for inputs or for limited quantities of purchased farm outputs, and often operate a store where they and their families retail a variety of household items. They have one or more trucks for collecting outputs from farmers and transporting

inputs.

It is conceivable that local assemblers could behave in an opportunistic way. Following O. Williamson paradigm, [30], the general conditions could easily be present. That is, bounded rationality, uncertaintity/complexity and small numbers are present. And there is ample room for information impactedness given the control of information and economic power that the assembler has relative to the farmer. The assembler could be obtaining higher profits than the competitive model would predict. He provides the financing, buys the products from and sells the inputs and consumer goods to the farmer. He/she stores and transports the products and inputs. In each of these functions: buying, selling, financing, storing and transporting he could be having some monopoly profits. However, this study lacks concrete evidence with respect to assemblers' profits.

But the fact is that the local assemblers are very useful economic agents who coordinate the working of the system at this stage in the vertical channel and who perform necessary economic functions that somebody must perform in the system. The saying is that you can suppress a participant but you can not suppress a function in the marketing system. In addition to the above functions, they also assume considerable risks. The questions are if they function efficiently; if they could perform more efficiently under different circumstances and; if somebody else (i.e. a producers' cooperative or a government parastatal) could

perform the same functions that assemblers do in a more effective way.

Beyond the information that was provided above, this research does not have the means to break assemblers' margins into costs and profits in order to determine the real size of the assemblers' profits. Additionally, it is very difficult to put a monetary value to two fundamental functions that the assemblers perform. Namely, assuming the risks and connecting the producers to the market. This study lacks the information to compare real costs of storage and transportation with the margins that the assemblers charge for their services. Some factors that could contribute to relatively high real costs in the system are: pervasiveness of risk due to poor roads and, yield and price fluctuations; diseconomies of scale in production, storage and transportation; spoilage of product and; inadequate technical and economic knowledge by the participants.

Additionally, even if there were excess profits in the farmer/primary assembler interface accruing to the assembler; this would not guarantee that the assembler is getting a high income. This is due to the small volume of operation of most of the primary assemblers. And without reasonable levels of income, there is hardly any saving, let alone any reinvestment in the system that could benefit everybody. This is analogous to the situation described by Collins and Holton [31], in which, even under high percentage mark up; the economic units are so very small and their capital and experience so limited, that they preclude

97

innovations requiring large scale investment and management.

With respect to the question, "could the system operate more efficiently at this stage"; the answer is, definitively, yes. However, we are not able to say by how much the situation could be improved. For this reason, the next chapter will provide only general, and rather tentative conclusions and recommendations.

With respect to the possibility of an alternative institutional arrangement at this stage; we believe that a producers' cooperative or another type of producers' collective bargaining organization might have some potential for improving small farmers' welfare.

On the other hand, we believe that a parastatal organization would have great difficulties in replacing the working of assemblers. There is no tradition in the country for this type of organization. Additionally, they would require the use of a lot of scarce financial and human capital that could be more efficiently employed in other areas of the economy. One such area should be: regulating and supplementing the functions of the assemblers.

If any policy action is going to be taken in the producer/primary assembler interface, it is important to first understand how the small farmer perceives his/her relationship with the primary assembler. Generally speaking, primary assemblers are respectable citizens in their communities. They are the ones who provide the cash, inputs and consumer goods. They are the ones who assure farmers

that their products have markets. Then, a first step, in any change, should be to teach the farmers to look more critically at the role of the assemblers in their communities. This step should come together with measures to help increase the cost effectiveness of the assemblers. Some possible measures include teaching assemblers inventory management techniques and the economics of storage and transportation.

It is important to notice that the cotton producer is almost never debt-free. He purchases inputs and goods from the assembler in return for a commitment to sell the future harvest. The assembler is the one who weights the products, keeps the accounts, charges the interest rates for cash advancements and sets the value for the cotton at harvest time. He even provides "technical" recommendations for the inputs of production that he carries on stock. Bad recommendations could be very harmful for the producers. While cotton growers normally forego the use of fertilizers; failure to undertake timely insecticide treatments carries a high risk of crop losses. The assembler also "grades" the cotton at the rural market transaction points.

Overall, cotton producers seem to be the group with the less access to information in the system; and as such, the ones with comparative disadvantage.

For most farmers the radio is the only practicable channel for conveying regular current information. A price bulletin for farmers is broadcast on the national radio at 7:00 a.m. daily. Broadcasts in the afternoon or in the

evening when the farmers are not working would be more convenient. This, unfortunately, clashes with the radio stations' interests in selling prime time to commercial advertisers.

ON INTERNATIONAL TRADE

Government economic policy in Paraguay has officially been expressed as one relying on the private sector and the market mechanism for the allocation of resources. Traditionally, there have not been official manipulation of input or output prices for agriculture. Also, Paraguayan agriculture is significantly affected by pricing and exchange rate policies in Argentina and Brazil. A profitable export market in one of these countries can vanish overnight with a devaluation. It should be mentioned that Paraguay's extensive borders with its neighboring countries have long been relatively open to unregistered (contraband) export and import trade.

The absence of manipulation of input and output prices, together with the implication of the border situation, has meant that resources, for the most part, have been channeled over the long term to production lines for which the country has a comparative advantage. Possibilities for the Government to establish local prices above or below derived import border parity prices are small. Otherwise illicit imports from or exports to the neighboring countries would be encouraged.

An analysis made in 1983, using domestic resource cost

100

coefficients (DRC), indicated that cotton is the crop in which Paraguay enjoys the greatest comparative advantage. A DRC coefficient of 0.44 was obtained [32]. The analysis was made using the same exchange rate for both the imported inputs and the exported output. It has been observed that the margin shown by the absolute value of the coefficient for cotton may help explain the continued expansion of production even after international prices began to fall from the peaks reached during the mid-seventies first and later from the peaks of 1979 and 1980.

Since the last quarter of 1981 the spread between the official exchange rate and the free fluctuating rate began to widen. This had the simultaneous effect of reducing foreign exchange earnings from exports available to the Central Bank and of increasing demands for foreign exchange at the official exchange rate. In an attempt to avoid excessive losses of reserves and in the absence of a general exchange rate realignment, the Central Bank adjusted the exchange rate for foreign exchange delivery on a product-by-product basis. The adjustments, however, fell short of a realistic exchange rate and introduced uncertainty for cotton producers and processors, and for importers of agricultural inputs.

Since then, input/output prices in the cotton economy have become severely distorted. The government has resorted to a series of essentially ad hoc partial devaluations and to adjustments to the minimum f.o.b. dollar price ("aforo")

for which export receipts must be surrendered to the Central Bank. The resultant effective exchange rates from these measures have fallen consistently short of the parallel rate. The effective rates, the increasing unavailability of foreign exchange for imports, and the great number of steps through which official exports and imports must pass, have led to price distortions and to a substantial increase in unregistered trade. Contingency planning for unforeseen foreign exchange developments has become a new and considerable cost in the cotton marketing system.

In 1981 the official exchange rate was $U.S.1=G126. The parallel market was hovering about $U.S.1=G135. All export and import operations were taking place at the above rates. (imports at the official rate and exports using both rates).

As of 1986, import operations use only the parallel rate that oscillates around $1=G800. On the other hand, cotton exports, when done through the legal channels, receive a mix of $750 per ton of cotton lint at the rate of $1=G320 plus the difference between the f.o.b. price and the "aforo" value ($750) at the parallel market rate of $1=G800 [33].

At a 1986 Liverpool price for the Paraguayan cotton of $1,212/ton and with an estimated cost of $230.70 for freight, insurance and other costs; the f.o.b. price for the cotton exporter is $981.30. The exporter's effective exchange rate is then $1=G433. No wonder that the prices of agrochemicals are so costly now for the cotton producer, relative to the price of the cotton. In addition to that, the high rates of inflation in the country in the last years have depressed

the real prices of cotton and have increased considerably the nominal costs of using domestic resources.

An example of the problems that the cotton sector is experiencing with the distorted input/output prices is now provided. The "reference price" for cotton was raised by the government in early February 1984 from G65 to G115/kg. The exchange rate and aforo levels were also changed, providing exporters with an effective exchange rate of around $1=G280, compared to the then parallel rate of $1=G320. The change was precipitated by pronouncements by Brazilian cotton purchasers that they would pay Paraguayan farmers around G130/kg for cotton seed. That indicates that cotton was valued in the country, at farmgate prices, below its real opportunity cost in the international markets. It also indicates that the adjustments were made with considerable lags and have normally fallen short of developments in the parallel market.

An added dimension to the problem is that Paraguay is a landlocked country. As such, it must incur additional costs to transport the product and, it must use port facilities of other countries. Export of cotton lint in bales of 200 Kg proceed via road to the Atlantic port of Paranagua, Brazil, and then by ship to Europe; or by road to Asuncion, then by river transport to Buenos Aires and from there by sea.

The main markets for Paraguayan cotton are Germany, Portugal, Italy, Belgium and Japan.

Price projections by the World Bank to 1995 indicates

that cotton lint will continue its secular declining trend in real prices [34]. In constant dollars of 1983 the projections indicate an average c.i.f. price at European ports for the `A` index (average of the cheapest five types of SM 1-1/16") for 1986 to 1990 of $1,730/ton. And an average price of $1,750/ton for 1991 to 1995. That compares with a real price of $1,830/ton in 1983 and with an average real price of $2,040 for the years 1960 to 1970.

Another consideration is that the deflator that is used by the World Bank in its real price projections is the Manufactured Unit Value (MUV) index, which is the c.i.f. index of US dollar prices of manufactured exports of industrial countries to developing countries. The rate of growth of this index is much smaller than the rate of growth of the price level in Paraguay. From a base value of 1.00 in 1980, the Consumer Price Index (CPI) rose in Paraguay to 2.08 in 1985. That compares with a value of 1.02 for the MUV index and for the same year. And this differential growth is more than likely to continue in the future. The implications are clear: for cotton to be attractive to Paraguayan producers in the future, the government will have to resort to periodic devaluations of the currency. And that step has been very difficult to take in Paraguay in recent years.

There are a number of secular trends in the world's cotton economy too important to be ignored. They can have a significative bearing upon cotton's future production in Paraguay. The most relevant for the country are: a) Declining real prices as it was already mentioned; b) An

104

increasing rate of growth in cotton seed production; c) Declining consumption of cotton in the traditional Paraguayan markets (Europe and Japan); d) declining rates of growth on world imports and exports; e) An increasing share of cotton consumption in the developing countries of the world (and, of course, a decreasing share in consumption of the developed countries) and; f) An increasing flow of cotton from the industrial countries which produce it to the developing countries where it is processed. Thus, developing countries can capture the value-added and the employment benefits of processing.

It seems that in the medium to long term Paraguay should consider at least three different alternatives (or a combination of alternatives): a) diminish the excessive dependency of the country on cotton (diversifying exports for example); b) Process the lint taking advantage of the country's being a cotton producer and a low labor cost economy and; c) Look for non-traditional markets for its cotton lint (i.e. countries like Hong Kong, Korea, Singapore, etc.)

Also, the country must follow very closely new developments of ever-present-issues. These are: a) The behavior of international trade: random shocks, cycles, very wide fluctuations in prices and secular decline in real prices of primary commodities. B) Inter-fibre competition: the enormous power of the chemical and petrochemical corporations that will continue making heavy inroads in the

105

cotton share of fibre consumption in the world, almost regardless of the prices of polyester, rayon, acetate, etc. relative to cotton [35].

ON PERFORMANCE OF THE COTTON SUBSECTOR

The cotton subsector is definitively contributing to sector and national development goals. It is providing employment and income to the needier strata of its population: the small farmer. And it is generating foreign exchange for the economy.

The growth of the subsector in the last fifteen years has been impressive. And this growth has come with an equity dimension also, since it came from within the small farmer agriculture. The expansion in cotton production contributed also to expand the economic frontier of the country and to relocate the population across the Oriental Region in a more balanced way. The expansion did not come at the price of reducing per capita production of food.

Cotton production has been showed to posess a comparative advantage in the country. And only a small part of the real costs of production require foreign inputs such as insecticides.

The country, basically a free economy, has showed its willingness and ability to produce cotton and its ability to place it in the international markets with almost no carry-over stocks in the country.

This study lacks important information. We do not know the real income of the small farmers; the real costs and

106

profits of the assemblers and the real costs and profits of the ginners/exporters.

However, the analysis has pointed out several issues that at least suggest the direction, but not the magnitude, of certain phenomena. The ginners seem to be the group with the most information and control in the system. The farmers seem to be the ones with less information and control. Hence, the distribution of risks and returns does not appear to be symmetrical.

The scattered location/small volume/low technology production and distribution are increasing considerably the real costs in the system. Yields could probably be higher than they are with only moderate increases in the costs of production, by the appropriate use of existing technologies.

The government is lagging behind the development of the subsector. Main limitations are in the areas of control and regulation of competition; credit; extension and the collection and diffusion of information. Recent foreign exchange rate developments are deficiently managed, adding risks and diminishing income opportunities to all the direct market participants of the system (from farmers to exporters).

Cotton lint is not being processed in the country. The country is loosing employment and foreign exchange opportunities.

Transaction costs in the system (including contingency planning for new foreign exchange rate developments) seem higher than they could be otherwise.

107

No definitive statements can be made with respect to the management of the natural resources. It is known, however, that the farmers use much less land than they have available and are not seriously concerned with the preservation of its fertility or with the prevention of its erosion.

Cotton Versus Food

Many times a valid argument has been made that in a number of countries the expansion in the production of agricultural raw materials for the local industry and/or for the world market was achieved at the cost of reducing the per capita production of food in the country. This reduction in per capita food production increases the need of the countries to import food and increases the level of prices of food in the country. And since food is the most important single expenditure of the poor; an increase in food prices have a strong negative effect on their real income. Even the nutritional value of their diet could be highly compromised.

With respect to Paraguay, the evidence indicates that cotton (and other export crops) has not replaced domestic crops for food in the production process. The last data available indicates that with a per capita food production index of 1.0 for the years 1974-1976; the indices for 1982, 1983 and 1984 are, respectively, 1.15, 1.12 and 1.09. Similarly, the levels of protein and calories in the country, on the aggregate, are above the daily requirements [36].

Concluding Comments

The main strength of the system is that it works and that it is consistently producing more and exporting more with a minimum of government intervention and public budget support. However, many of the costs of this evolution are not yet clear (farmers' income and capital formation; depletion of natural resources; etc.) and as such the performance of the cotton production-distribution system can not be fully assessed.

CHAPTER III

FOOTNOTES

[1]   Secretaria Tecnica de Planificacion. Plan Nacional de Desarrollo Economico y Social 1977-1981. Asuncion, Secretaria Tecnica, 1977.

[2]   Secretaria Tecnica de Planificacion. Estudio de la Disponibilidad de Suelos para Agricultura. Asuncion, Division de Planeamiento Regional, 1979.

[3]   This section was taken from: Ministerio de Agricultura y Ganaderia. Paraguay: Estudio del Sector Agropecuario. Asuncion, Gabinete Tecnico, 1984.

[4]   Ministerio de Agricultura y Ganaderia. Censo Nacional Agropecuario 1981. Asuncion, Direccion de Censos y Estadisticas Agropecuarias, 1982.

[5]   Ministerio de Agricultura y Ganaderia. Distribucion Regional de la Poblacion en el periodo 1970-1982. Asuncion, Gabinete Tecnico, 1983.

[6]   Ministerio de Hacienda. Anuario Estadistico del Paraguay 1982. Asuncion, Direccion General de Estadistica y Censos, December, 1983.

[7]   FAO – World Bank. Paraguay: Agricultural Credit Project. Report No. 39/82, Rome, October, 1982, p. 19.

[8]   Ministerio de Agricultura y Ganaderia. Paraguay: Estudio del Sector Agropecuario. Asuncion, Gabinete Tecnico, 1984.

[9]   Ministerio de Agricultura y Ganaderia. Proyecto de Investigacion y Experimentacion Algodonera. Informe Anual 1984/1985. Asuncion, 1986.

[10]   Ministerio de Agricultura y Ganaderia. Paraguay: Estudio del Sector Agropecuario. Asuncion, Gabinete Tecnico, 1984.

[11]   Ministerio de Agricultura y Ganaderia. Oficina Fiscalizadora de Algodon y Tabaco (OFAT). Reporte Anual 1985. Asuncion, 1986.

[12]   R. Ferrari, M. Weinberger and M. Nuñez. Perfil Tecnologico del Productor de Algodon y Tabaco del Distrito de Chore. Eje Norte de Colonizacion. Asuncion, Ministerio de Agricultura y Ganaderia, 1984.

[13]   Ministerio de Agricultura y Ganaderia. <u>Paraguay:</u> <u>Estudio</u> <u>del</u> <u>Sector</u> <u>Agropecuario</u>. Asuncion, Gabinete Tecnico, 1984.

[14]   Ministerio de Agricultura y Ganaderia. Proyecto de Investigacion y Experimentacion Algodonera. <u>Informe</u> <u>Anual</u> <u>1984/1985</u>. Asuncion, 1986.

[15]   <u>Ibid</u>.

[16]   Secretaria Tecnica de Planificacion. <u>Plan</u> <u>Nacional</u> <u>de</u> <u>Desarrollo</u> <u>Economico</u> <u>y</u> <u>Social</u> <u>1977-1981</u>.   Asuncion, Secretaria Tecnica, 1977.

[17]   Instituto de Bienestar Rural. <u>Estudio</u> <u>de</u> <u>la</u> <u>Demanda</u> <u>Potencial</u> <u>por</u> <u>Tierras</u> <u>1983-1987</u>. Asuncion, 1983.

[18]   World Bank. <u>Regional</u> <u>Development</u> <u>in</u> <u>Eastern</u> <u>Paraguay</u>. Washington, D.C., 1978, p. 8.

[19]   Basilio Nikiphoroff.   "Restricciones, Estrategia y Politicas Del Desarrollo Del Sector Agropecuario y Forestal". pp. 101-107. In <u>Economia</u> <u>Paraguaya</u> <u>1985</u>. Edited by Centro Paraguayo de Estudios Sociologicos. Asuncion, 1986.

[20]   FAO - World Bank. <u>Paraguay:</u> <u>Agricultural</u> <u>Credit</u> <u>Project</u>. Report No. 39/82, Rome, October, 1982, p. 19.

[21]   Banco Nacional de Fomento. <u>Memorias</u> <u>1985</u>. Departamento Agropecuario, Asuncion, 1986.

[22]   Ministerio de Agricultura y Ganaderia. <u>Paraguay:</u> <u>Estudio</u> <u>del</u> <u>Sector</u> <u>Agropecuario</u>. Asuncion, Gabinete Tecnico, 1984.

[23]   Most of this studies were conducted by researchers of the "Gabinete Tecnico" and the Marketing Service of the Ministry of Agriculture and Livestock. See, for example: <u>Estudio</u> <u>de</u> <u>Mercado</u> <u>de</u> <u>Algodon</u>. Asuncion, Gabinete Tecnico, 1982.

[24]   Ministerio de Agricultura y Ganaderia. Oficina Fiscalizadora de Algodon y Tabaco (OFAT). <u>Reporte</u> <u>Anual</u> <u>1985</u>. Asuncion, 1986.

[25]   Ministerio de Agricultura y Ganaderia. <u>Paraguay:</u> <u>Estudio</u> <u>del</u> <u>Sector</u> <u>Agropecuario</u>. Asuncion, Gabinete Tecnico,1984.

[26]   <u>Ibid</u>. There is no information about the biggest ginnery. Hence, we use the study case of CAPSA, the second biggest ginnery.

[27]   G stands for Guarani; the Paraguayan currency.

[28]   Raymond G. Bressler,   Jr.   and Richard A. King. Markets, Prices, And Interregional Trade. John Wiley & Sons, Inc., 1970, p. 74.

[29]   Ministerio de Agricultura y Ganaderia. Paraguay: Estudio del Sector Agropecuario. Asuncion, Gabinete Tecnico, 1984.

[30]   Oliver Williamson.   Markets and   Hierarchies: Analysis And Antitrust Implications. The Free Press (A Division of Macmillan Publishing Co.), 1975.

[31]   N. R. Collins and R. H. Holton. "Programming Changes   in Marketing in Planned Economic Development". In Agriculture and Economic Development. Edited by C.   Eicher and L. W. Witt. McGraw-Hill, 1964.

[32]   Ministerio de Agricultura y Ganaderia. Paraguay: Estudio del Sector Agropecuario. Asuncion, Gabinete Tecnico, 1984.

[33]   The definition of the term "aforo" is: the minimum FOB   dollar price for which export receipts must   be surrendered to the Central Bank.

[34]   World Bank. The Outlook For Primary Commodities, 1984 to 1995. World Bank Staff Commodity Working Paper No. 11, Washington, D.C., December, 1984.

[35]   United Nations Conference on Trade And Development (UNCTAD).   Fibres & Textiles: Dimensions of Corporate Marketing Structure. Geneva, UNCTAD Secretariat, 1981.

[36]   FAO. The State of Food and Agriculture 1984. Rome, 1985, pp. 47-52.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

The main objective of this study was to identify opportunities which would allow the cotton production-distribution system to continue being a productive force contributing to the welfare of the small farmer and to national economic development.

It has been shown that cotton is the most important agricultural commodity in the country. Its importance stems from the fact that it is the major source of income and employment for the small farmers; it is an important raw material for the ginning industry and; it is the main earner of foreign currency for the country.

The study was designed to identify some of the constraints that are present in the cotton production-distribution system and others that could likely develop in the future if no corrective actions are taken. Furthermore, this has been an attempt to identify policy actions that could remove present constraints, avoid future problems and exploit opportunities for improvement that are within the domain of what seems realistically attainable.

Conclusions

1. The production of cotton in the Eastern Region of the country is characterized by a large number of small production units, scattered throughout the region.

2. The agro-ecological conditions throughout the region are varied. Differences in soils and weather are partially responsible for a considerable variability in yields and technology within the region. The general agro-ecological conditions are, however, appropriate for cotton production.

3. The cotton producers, small farmers by definition, are usually located in areas without appropriate transportation networks. Roads can be closed for substantial periods of time due to weather conditions.

4. The typical farm possesses 20 or less hectares of land. On the average, less than 3 hectares are allocated to cotton production and less than 8 hectares are under crop production at any given time. The farmers also raise some livestock and subsistence crops such as beans, maize and, cassava. The farmers and their families live on and operate their farms. They can own the land or they can be occupying it illegally. Farmers without land titles are not elegible for government credit. Cotton is the main source of income of the farm.

5. Cotton production is very labor-intensive. The farms hire labor during harvest time to supplement family labor. Cotton is picked by hand. A low-level technology

114

characterizes the production process. The farms are not mechanized. The seed is bought for each planting period. All the farms use the same variety of seed. It is a variety adapted locally by government research. The government has the monopoly of seed multiplication, processing and distribution. Almost no farms use fertilizers. Insecticides are a must for cotton production; if not used the production has a high chance of failure.

6. National average yields are considerably lower than what seems attainable. Quality standards are rather poorly understood. Post-harvest management of the product is often inappropriate.

7. For the most part, farmers lack storage facilities and transportation means to store and transport their products.

8. Government credit and extension services to the cotton producers are limited. In 1985, the BNF, the main source of government credit to agriculture, financed less than 12 percent of the cultivated hectares of cotton and covered only, around 25 percent of the estimated costs of production. Extension services don't reach more than 20 percent of the producers in any given year; and often, these are the same smallholders each year. So far, the contribution of government credit and extension services to the development of cotton producers has been rather limited.

9. Producers have limited access to information. The radio seems to be the best source to reach them in great numbers. The Marketing service of the Ministry of Agriculture provides price information through a national

broadcast at 7:00 a.m. daily. Broadcasts in the evening when the farmers are not working would be more convenient. This, unfortunately, clashes with the radio stations' interests in selling prime time to commercial advertisers.

9. The primmary assemblers generally live in the same community with the farmers. They have storage facilities and transportation means. They provide credit, production inputs and consumer goods to the farmers and purchase their production. They are, generally speaking, seen by the farmers as a very necessary and useful institution.

10. There are usually only a few primary assemblers for each locality. They are the only alternatives for the producers to market their products.

11. The primary assemblers operate on a relatively small scale. They are, for the most part, connected to bigger assemblers which can be called wholesalers. The wholesalers serve many primary assemblers and are generally located outside the production regions. They deliver the product to the ginneries for processing.

12. The ginners are considered the strategic group within the system. They have the information and control. They are the active coordinators of the channel. They gather and disseminate information concerning external demand and supply prospects. They finance the wholesalers, who in turn finance the primmary assemblers. They set the rules of the game with their posted prices at industrial plants. They are the group with the most discretionary power in the system.

Evidence indicates that ginners do not compete with each other, except in the years of unplanned, very short crops. In this circumnstance, the prices of the cotton seed can go up considerably because ginners will compete for a short supply to fulfill their international contracts.

13. This research does not have the necessary information to analyze the operations and performance of ginner/exporters and, exporters. For this reason all the ginners are treated as if they were also exporters.

14. The economics of distribution and processing remains largely unknown. We do not know the real costs, prices and profits of the primary assemblers, wholesalers and ginners. This is so, because there do not exist in the country historical series on transport costs, processing costs and, the prices at the different stages of the marketing channel. The available information on farmgate prices for cotton seed and f.o.b. prices for cotton lint have been questioned as to their validity and accuracy.

However, the organization of the subsector indicates that the real costs must be rather high in the areas of transportation and product spoilage due to the small volume/scattered location/low technology/poor roads nature of the distribution system. Additionally, the presence of risks due to yield and price variability and the uncertainty of new developments in government's management of the foreign exchange, may add considerable cost to the system.

15. The control and regulation of competition by the government is minimal. That arises from the non-

interventionist policy of the government in some cases; and in other cases it is due to the government's lack of means to enforce its laws.

16. The cotton-production distribution system is a demand-driven system. Since more than 95 percent of the production is exported, the foreign consumers drive the system. The impressive increases in production of the last fifteen years have almost always been cleared before the next harvest season starts. The willingness and ability to produce cotton in the country have been matched by the ability to place the product in the international markets. Since there is no government intervention in the pricing of inputs and outputs; the f.o.b. prices follow the international prices. The farmgate prices seem to be in line with the f.o.b. prices (see table I.1 of the appendix).

17. Generally speaking, the relationships between the participants, from the farmers to the ginners, could be considered as a very stable one. The ginners work with a known, specific number of wholesalers and/or primary assemblers; and the primary assemblers have a rather fixed portfolio of farmers. There are no formal contracts in the system but a set of informal to semi-formal arrangements that work reasonably well. The financial and information flows are mostly controlled by the ginners. They provide the money that put the system in motion every year and they connect the supply and demand sources.

18. The traditional non-interference policy of the

118

government was modified in early 1981, when it started to dictate the rules of the foreign exchange rate. We do not analyze the reasons for that policy change but we do examine its visible consequences for the cotton subsector. Input/output prices have become severely distorted and against cotton production. An important but unknown percentage of the exports bypass official channels to get higher effective foreign exchange rates in the "parallel market". Both, the distorted input/output prices and the risk associated with illegal exports add considerable costs to the system that are probably passed on to the farmer.

19. The dependency of the sector on international trade and of the country on cotton are important and interrelated issues. Cotton depends on international demand and prices. And demand from our traditional markets is declining globally. Real prices of cotton are projected to decline in the future following their secular declining trend and; international prices of primary commodities like cotton exhibit a lot of instability. Additionally, the trend is now toward less consumption in developed countries; more consumption and processing in developing countries and; a flow of raw cotton from producers of developed countries to manufacturers in developing countries. Paraguay is out of line with these global trends. Exports of raw cotton represent 46 percent of the foreign exchange of the country. The value-added and employment benefits of processing are largely lost for the country.

20. An analysis of supply response indicated that

producers are responsive to changes in the real prices of cotton. A regression analysis for the series 1968-1985 indicated a short-run price elasticity of supply of 0.92 and a long-run elasticity of supply of 2.3.

The analysis also confirmed the structural problems that the cotton economy is experiencing in recent years due to the shortage of labor at harvest time. Other reasons that might be contributing to the low elasticity of supply are the tendency of the small farmers towards specialization on cotton production and the lack of public lands on which to expand cotton production. For the series 1977-1985, a short-run elasticity of only 0.36 and a long-run elasticity of 0.53 were obtained. That compares with the 1970-1985 elasticity values expressed above and with short and long run elasticity values of 1.21 and 2.22 respectively for the years 1968-1976.

21. Cotton production, being produced in a basically free economy, has been shown to possess a comparative advantage in the country. Only a small part of the real costs of production require foreign inputs (insecticides).

22. The government is lagging behind the development of the subsector. Main limitations are in the areas of control and regulation of competition; credit; extension and; the collection and diffusion of information. Recent foreign exchange rate developments are deficiently managed.

23. It is safe to say that the tremendous growth of the subsector in the last fifteen years in terms of production

and exports has had an equity dimension also, since it came from within the small farmer agriculture. The expansion in production had a dynamic multiplier effect in the rest of the economy; contributed to relocate the population across the Eastern Region in a more balanced way and; it did not come at the price of reducing per capita production of food.

24. The main strength of the system is that it works and is consistently producing more and exporting more with a minimum of government intervention and public budget support. However, many of the costs of this evolution are not very clear yet (farmers' income and capital formation; depletion of natural resources; etc.) and as such the performance of the cotton production-distribution system can not be fully assessed.

25. The important policy issue is what lies ahead in the near and in the long term future. Structural constraints; disincentives for production in the form of distorted input/output prices; declining international prices; diminishing consumption in our traditional markets; the inherent instability of international trade; the depletion of natural resources and; the technical inefficiency in the distribution system are all factors that should be closely monitored and evaluated in the future.

26. It is very important also to recognize our "areas of ignorance". This was precisely one of the specific objectives of this study. A lot of information is missing in the system. Research approaches tend to be fragmented, piecemeal, noncumulative and relatively unimportant as an

121

input for decision making. Decision makers tend to lack the flexibility to react promptly to changing economic conditions. And the performance of the system is seen as the end result of the interaction and iterations between the database of the country; its model base (the analytical techniques available) and the decision makers. They all should reinforce each other and the limitations in one of these areas will surely have an impact on the others.

The areas in which information is missing are: a) prices at different stages of the channel; b) a series on transport costs; c) ginneries: their costs of operation; fixed and variable costs; break-even points; economics of size, location and, transportation and; slack capacity ; d) extent of product spoilage throughout the system; e) income and capitalization of small farmers; f) Household/farm interaction, consumption decisions and goals of small farmers; g) number of participants at different stages and the flow of products and inputs by channels; h) exporters: who they are, the way they operate and, the sources of their capital; i) costs, profits and margins of the assemblers and; j) real impact of the government decisions upon the performance of the cotton production-distribution system.

Recommendations For Future Research

Possible areas for future research with significant pay-offs for the cotton production-distribution system and for the country are:

1) Cotton lint processing: determining its technical and economic feasibility in the country.

2) Logistical systems: designing and implementing more cost effective systems of physical distribution of inputs and outputs.

3) International trade: finding sales opportunities for cotton products in non-traditional markets.

4) Information systems: developing procedures to collect and process relevant data and to disseminate useful economic information.

5) Research methodologies: developing cost-effective methodologies that produce cumulative results, are inputs for decision making and provide a system-wide understanding of economic phenomena, e.g. informal simulation models.

6) Equity considerations: designing arrangements that can give small farmers more access to economic opportunities. Examples: collective bargaining; more effective control and regulation of competition and; diffusion of market information.

7) Government institutions: analyzing their contribution to sector and national development goals. Issues related with cost-effectiveness; accountability of performance and;

comparative analysis.

8) Farming systems: analyzing income, capital formation and, management of natural resources by small farmers in the context of farming systems.

9) Risks and returns to participants in the channel: getting information on costs, margins and, profits of producers, assemblers, ginners and, exporters.

10) Coordination and control in the channel: identifying pricing methods, coordination mechanisms and direction of the flow of information and control.

11) Ginneries' economics: finding optimum size, location and transportation patterns.

12) Rationale for government interventions in the system: Identifying necessary functions that the public sector can perform more efficiently than the private sector, from a societal point of view.

13) Cotton by-products: determining participants, product flows, processing costs and prices of cotton oil and pellets.

14) Differences in technologies of production among cotton producers: identifying the reasons behind the differences in technology (and economic results) among farmers and finding the means to transfer technology from the most efficient farms to the others.

APPENDIX

APPENDIX I

TABLE I.1   Paraguayan Cotton:
             Farmgate Raw Cotton Prices, F.O.B. and
             C.I.F. Cotton Lint Prices and Foreign
             Exchange Rate For Cotton Lint Exports
             (In Real Terms)

==

Years	Farmgate Price (G/kg)	F.O.B. Price ($/ton)	C.I.F. Price ($/ton)	Exchange Rate (1$=G)
1970	46	1236	2348	126
1971	55	945	2676	126
1972	62	1500	2760	126
1973	58	1656	4473	126
1974	76	2001	2452	126
1975	53	1504	2854	126
1976	83	2012	3419	126
1977	80	2375	2488	126
1978	67	1878	2629	126
1979	60	1573	2306	126
1980	59	1403	2056	126
1981	47	1251	1426	126
1982	39	901	1388	145
1983	63	779	1398	169
1984	74	883	918	235
1985	55	429	634	320

==

Source: Elaborated by the author based on: Paraguayan
         Central Bank, National Accounts. Report No. 21,
         Asuncion, 1985.

SELECTED REFERENCES

SELECTED REFERENCES

Abbott, John. "Agricultural Marketing Mechanisms and Institutions: Their Performance and Limitations". AGREP Division Working Paper No. 94, The World Bank, March, 1985.

Austin, James E. Agroindustrial Project Analysis. The Johns Hopkins University Press, 1981.

Breimyer, Harold F. Economics of the Product Markets of Agriculture. Iowa State University Press, 1976.

Bressler, Raymond G., and King, Richard A. Markets, Prices, and Interregional Trade. John Wiley & Sons, Inc., 1970.

Collins, N. R., and Holton, R. H. "Programming Changes in Marketing in Planned Economic Development". In Agriculture and Economic Development. Edited by C. Eicher and L. W. Witt. McGraw-Hill, 1964.

Dent, John Barry et. al. Systems Simulation in Agriculture. Applied Science Publishers Ltd., 1979.

Dornbusch, Rudiger, and Fischer, Stanley. Macroeconomics. Third Edition. McGraw-Hill, 1984.

FAO. The State of Food and Agriculture 1984. Rome, 1985.

Farris, Paul L. Future Frontiers in Agricultural Marketing Research. Iowa State University Press, 1983.

French, Ben C. "The Subsector as a Conceptual Framework for Guiding and Conducting Research". American Journal of Agricultural Economics, Vol. 56, No. 5, 1974.

Gujarati, Damodar. Basic Econometrics. McGraw-Hill, 1978.

Harrison, Kelly et. al. Improving Food Marketing Systems in Developing Countries: Experiences from Latin America. Research Report No. 6, Michigan State University, Latin American Studies Center, 1974.

Hayami, Rujiro, and Ruttan, Vernon W. Agricultural Development: An International Perspective. The Johns Hopkins University Press, 1985.

Johnson, Glenn L., and Zerby, Lewis K. What Economists Do
        About Values. East Lansing, Michigan State
        University, Center for Rural Manpower and Public
        Affairs, 1973.

Johnson, S. R., and Rausser, Gordon C. "Systems Analysis and
        Simulation: A Survey of Applications in Agricultural
        and Resource Economics". In A Survey of Agricultural
        Economics Literature. Vol. 2. Edited By George G.
        Judge, Richard H. Day, S. R. Johnson, Gordon C.
        Rausser, and Lee R. Martin. University of Minnesota
        Press, 1978.

Little, I. M. D., and Mirrlees, J. A. Project Appraisal For
        Developing Countries. Basic Books, New York, 1974.

Marion, Bruce W. The Organization and Performance of the
        U.S. Food System. NC-117 Project. Lexington Books,
        1986.

Ministerio de Agricultura y Ganaderia. Paraguay: Estudio del
        Sector Agropecuario. Asuncion, Gabinete Tecnico,
        1984.

Pindyck, Robert S., and Rubinfeld, Daniel L. Econometric
        Models and Economic Forecasts. Second Edition.
        McGraw-Hill, 1981.

Riley, Harold, and Staatz, John. "Food System Organization
        Problems in Developing Countries". Seminar Report
        for the Agricultural Development Council. East
        Lansing, Michigan State University, 1981.

Riley, Harold M., and Weber, Michael T. "Marketing in
        Developing Countries". In Future Frontiers in
        Agricultural Marketing Research. Edited by Paul L.
        Farris. Iowa State University Press, 1983.

Rossmiller, George E. Agricultural Sector Planning: A
        General System Simulation Approach. East Lansing,
        Michigan State University, Department of
        Agricultural Economics, Agricultural Sector Analysis
        and Simulation Projects, 1978.

Scherer, F. M. Industrial Market Structure and Economic
        Performance. Second Edition. Houghton Mifflin
        Company, 1980.

Schmid, A. Allan. Political Economy of Public Investment.
        Course Materials in Public Program Analysis at
        Michigan State University, March, 1985.

Schmid, A. Allan, and Shaffer, James D. "Marketing in Social Perspective". In <u>Agricultural Market Analysis</u>. Edited by Vernon Sorenson. Michigan State University, Bureau of Business Research, 1964.

Schultz, Theodore W. <u>Distortions of Agricultural Incentives</u>. Indiana University Press, 1978.

Shaffer, James D. "On The Concept of Subsector Studies". 1968. (Mimeographed).

_____. "Food System Organization and Performance: Toward a Conceptual Framework". <u>American Journal of Agricultural Economics</u>, May, 1980.

_____. et. al. "Influencing the Design of Marketing Systems to Promote Development in Third World Countries". Paper presented at the International Workshop on Agricultural Markets in the Semi-Arid Tropics, Hyderabad, India, October, 1983.

Timmer, Peter C. "Private Decisions and Public Policy: The Price Dilemma in Developing Countries' Food Systems". MSU International Development Paper No. 7. East Lansing, Michigan State University, Department of Agricultural Economics, 1986.

Timmer, Peter C., Falcon, Walter P., and Pearson, Scott R. <u>Food Policy Analysis</u>. The Johns Hopkins University Press, 1983.

Tomek, William G., and Robinson, Kenneth L. <u>Agricultural Product Prices</u>. Second Edition. Cornell University Press, 1981.

United Nations Conference on Trade and Development (UNCTAD). <u>Fibres & Textiles: Dimensions of Corporate Marketing Structure</u>. Geneva, UNCTAD Secretariat, 1981.

Williamson, Oliver. <u>Markets and Hierarchies: Analysis and Antitrust Implications</u>. The Free Press (A Division of Macmillan Publishing Co.), 1975.

World Bank. <u>The Outlook for Primmary Commodities, 1984-1995</u>. World Bank Staff Commodity Working Paper No. 11, Washington, D.C., December, 1984.